

THE
SUBSTANTIAL
PHILOSOPHY

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THE
SUBSTANTIAL PHILOSOPHY.

EIGHT HUNDRED ANSWERS TO AS MANY QUESTIONS
CONCERNING THE MOST SCIENTIFIC
REVOLUTION OF THE
AGE.

BY

J. I. SWANDER, A. M., D. D.



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TO
A. WILFORD HALL, PH. D., LL. D.,
MY ESTEEMED FRIEND,
TRIED AND TRUE,
THROUGH WHOSE
VERY VALUABLE WRITINGS
I HAVE BEEN LED
INTO
GREATER SCIENTIFIC LIGHT,
THIS VOLUME
IS
AFFECTIONATELY DEDICATED
BY
THE AUTHOR.

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PREFACE.

It has been my pleasure to examine this work on the Substantial Philosophy, by the Rev. Dr. Swander, and it affords me much pleasure in recommending the same to all who are interested in true science. The book makes no pretensions to be scientific or even to present the scientific department of the Substantial Philosophy in any other than a popular light.

The object has been to simplify all that which would be intricate, if expressed in scientific language, so that the average reader will be able to grasp the truths of this Coming Philosophy. I, therefore, cordially recommend the careful reading of this work as the forerunner of many additional works which are sure to come in the future. Respectfully,

HENRY A. MOTT, PH. D., LL. D., F. C. S., ETC.

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INTRODUCTORY.

IN offering this book to the public, the author neither admits a "felt want" on his own part nor claims it on behalf of others. Man's deepest wants are sometimes unmet. His greatest exigency is the need of ability to feel and acknowledge his neediness. The only apology that accompanies this volume is a statement of the circumstances under which it was called into existence. The book appears in answer to many expressed wishes for something of the kind. These expressions were mostly from men who had been reading the "Problem of Human Life," and the other voluminous writings of Dr. Hall, and whose minds had consequently undergone a radical change concerning the questions of which those writings treat. Some of these wishes were expressed to the author, but the most of them were sent directly to headquarters until the founder of Substantialism expressed his desire that something like a formulated reproduction of his philosophy might be undertaken, and if possible completed in time to receive his approval and benediction before he should be called to smite the

waters of Jordan, and take his long anticipated journey to the substantial glory of the skies.

Listening to these expressed wishes, and heeding the earnest requests which frequently accompanied them, we took our pen in hand and applied ourself to the accomplishment of the undertaking with whatever fitness a kind Providence had given us for the work, and now, having completed the volume, with its defects, and also, as we trust, with some merit and many provocations to a more thorough investigation of the subject discussed, we bow before the footlights of our intelligent audience, and assure the studious and patient reader that if he will take the "little book" and "eat it up," even though it should "make his belly bitter," it will be "as sweet as honey to the mouth" for all such as have a relish for the mellific nectar of truth.

It is not the primary object of this book to teach in detail the many positive truths of science and religion which enter into a complete academic course of study or college curriculum, but to suggest some general outlines thereof, as well as some new departures therefrom, and to assist the honest student in "learning to unlearn" whatever he may have learned amiss. That the highway of the scientific architect is strewn with the rubbish of worthless theories, is an assumption whose justification may be looked for in the following pages. In presenting these pages to the public the author disclaims any sympathy with that pessimistic school of philosophers known as the screech-owls of humanity. And yet he is just as unwilling to be classed with those credulous optimists who not only see that everything in nature is ordered for

the best, but who also seem to act upon the supposition that the most popular interpretation of nature's forces and phenomena is for that reason the most reliable.

It is also due to all parties interested that we announce candidly and publicly that this work lays no claim to originality on the part of the author. With the exception of the last four chapters, for which he is willing to be held individually responsible, this volume is an attempted formulation of some of the fundamental truths of the Substantial Philosophy, founded by Dr. A. Wilford Hall, and set forth in his "Problem of Human Life," which made its first appearance before a startled public in 1878, and since that date more fully explained and advocated by himself, and to some extent by his coadjutors, in the *Microcosm*, until very recently, when the challenge which the discussion of the questions involved was tossed into the *Scientific Arena*, the leading monthly journal of this country devoted to a bold investigation of current philosophical teachings and its bearing upon the religious thought of the age.

Whatever, therefore, this volume contains of original freshness in scientific investigation and discovery, and whatever is startling in its stalwart character and claims of revolutionary truth, are credited to others, but especially to that earnest investigator, logical reasoner, indefatigable worker, Christian scientist, and scientific revolutionist—Dr. A. Wilford Hall—at whose apostolic feet we are proud to place this little book, as the most appropriate expression of our esteem for one whom we have never seen, as well as our best token of gratitude to him for the great benefits which we are constantly deriving

from his rich discoveries of laws and facts in nature, never previously even dreamed of by those whose greatest fidelity to truth consisted mainly in feeling the popular scientific pulse, and in following the beaten paths of ancient and modern scholasticism. And while we thus make our obeisance to our venerable and beloved teacher, we are fully convinced, through what we know by correspondence and otherwise of the warm pulsations of his Christian heart, that he will readily join us in our further pilgrimage to the foot of the throne of that great "Teacher sent from God," to acknowledge Him as the personal embodiment of all truth, as well as the fountain of all redeeming life and love.

Candor compels us to admit also that this book has not been written with any hope of benefiting those who thirst and search for the volumes of popular pulpiness and gush so eagerly devoured by the indolent hordes of sickly sentimentalists in literature. The name of this class of readers is legion. They peruse pages with a pernicious habit of thoughtlessness; and their morbid stupidity is more alarming than wonderful. It indicates an effeminate tendency of the age when the popular mind, so inflated with the sweetened wind of fallacy and fiction, has no longer any considerable relish and admiration for those facts and beauties in science which can be ascertained and seen only through the process of laborious mental effort. It is because the general mind has been educated to take an easy surface view and make a superficial search for the cause of things, that stupendous errors have come to prevail in science. When truth is hard to find, error is a convenient substitute. Thus eminence

is made easy, and some men become pre-eminent fools. In science, as in religion, those tenets which offer an easy and superficial explanation should be looked upon with suspicion. The shallows murmur with plausible jargon while the silent deeps are filled with stores of knowledge for those who take to their intellectual diving-bells and leap after the hidden wealth which is never found floating upon the surface. To all such this book comes greeting in the name of revolutionary truth. Its mission is to renew the game of battle and continue the issue made by Dr. Hall when the "Problem of Human Life" was thrown into the arena of the greatest scientific combat the world has ever witnessed.

In order to enable the reader to locate any point upon which he may be in darkness or in doubt, or upon which he may wish to seek for further light from the founder of this philosophy, the catechetical form has been adopted. The question frequently contains the answer in the form of an interrogative proposition. The truth also frequently cross-questions itself in open court, and aims to answer all anticipated objections to the soundness of its premises and the logic of its arguments. Should any Substantialist differ from the author at any point as to his apprehension of Dr. Hall's teachings, it is hoped that the criticisms will be of such a character, and made in such a spirit, as to bring forth ultimately a volume whose shoe's latchet this first attempt at formulating the doctrines of the Substantial Philosophy may not be worthy to unloose. Furthermore, if it should appear that in some minor or mooted points in the general system we differ from the founder of the philosophy, it

must be kept distinctly in mind that Dr. Hall never expected to become the custodian of any man's conscience.

In the following chapters there is one fundamental question at issue. In the study of the work this question should be permitted to stand out in bold relief, and kept constantly and clearly in view, that the merits of the discussion may be seen in the light of relevant testimony and judged in the love of a righteous verdict.

Too many cob-houses in science are built upon the sand of a false assumption. What is that false assumption? That all substances are material—that nothing in Nature has an entitative existence except that which is measurable by the senses, or provable by mechanical or chemical tests. Against the advocates of such a doctrine we unite with Dr. Hall and others in joining an uncompromising issue. The man who denies the existence of such incorporeal substance in Nature, and the individual who, in religion, will believe only that which he can comprehend, are half-brothers in the broad family of infidelity. In order to state this cardinal question more clearly,* we prefer to paraphrase the language of one before whose superior ability we do ourself the honor to bow. Is there “an objective, real and spiritual world, or sphere of being from which the phenomenal world has its source, and by which it is constantly upheld”? Or, being translated into the vernacular of Substantialism, is there an order of invisible, inaudible, and intangible being coextensive with the material manifestations of God's great universe? To be or not to be, immaterially; that is the very material question now challenging the attention and

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respectful consideration of intellectual courage, candor, and common sense. If there is such a world of being in Nature, is it substantial without being material? Upon this recently alleged Gibraltar in philosophy the guns of opposition are being trained; and from this newly-announced position in science the affirmative artillery is hurling its missiles of merited destruction and death upon whatsoever worketh an abomination or maketh a lie by clinging to the superficial manifestation of things which are seen and temporal, and denying the existence of those things which are unseen and eternal. Upon this point hang all the law and the prophets of true philosophy, and upon this same point it is proposed to hang a few of the false prophets as a merciful warning for others to discontinue their adoration before the traditional gods of such materialistic idolatry.

Questions concerning the laws of gravity, magnetism, and sound, can never be satisfactorily settled until there is a more manly willingness and earnest effort to look beneath the material surface in search of certain invisible entities and elementary principles not generally acknowledged in the superficial and contradictory theories of the schools. Back of all theories and discussions relating to the qualities, properties, and phenomena of being, is the *question of being* in itself considered. Toward this fundamental question, the honest and diligent philosopher would do well to turn his most unbiased attention, if he would emancipate himself from the tyranny of traditional theories, and triumph gloriously where basic truth unfolds her banner and gains the victory with stubborn and substantial facts.

The case calls for rational thought. Is it unreasonable to believe that there is an order of being beyond the comprehension of the human intellect? If so, the Christian religion is unreasonable in its claims, and untrue in its nature. The apprehensible is not always comprehensible. It is not unreasonable to assume the existence of immaterial and imperceivable entities not found in the category of material things, and whose actual being cannot be proven by any chemical or mechanical test. When an unanswerable array of observed facts demonstrates conclusively that certain acknowledged effects cannot possibly be produced by any cause, force, or energy inherent in the mere material world, and that such effects cannot be accounted for except upon the hypothesis or theory that there is an immaterial substance, it is unreasonable to deny the existence of such substance. Materialistic evolution, including the advocacy of the wave-theory of sound, makes this denial in the very face of such facts and effects. It is, therefore, unreasonable and untrue. If religion clearly sees and understands by the things that are made that there are invisible things of God from the creation of the world, true science is bound to look beneath and beyond the sphere of the visible in search of something that shall prove more satisfactory in solving the most difficult problems of the age, and lead to a rational rejection of those infidel theories so obstructive to the progress of both religion and science.

Besides the general tendency toward superficiality, not only among the masses, but also in educated circles of pretended thoughtfulness, there is another tendency equally alarming, viz: to divorce science from religion.

This sundering of the two, places both at a disadvantage in their common conflict with the combined forces of ignorance and infidelity. Confusion is taken for the rattle of God's artillery, and the din of home strife is foolishly supposed to be a war with the foreign enemy. The conflict is also largely a battle fought with imaginary spooks by moonlight. The issue is not clearly defined, and the line is not well drawn. Friends are, therefore, not always distinguished from foes. It will ever be thus until the engagement takes place under the central sun of the universe. The Christ of God is that central sun. He shines through "the volume of the book," the written word, and also through the volume of nature, the demonstrated word. He is the alpha and omega of both, as well as the entire fullness of their inner glory. Revelation and science are a complementary twofoldness of the same thing. Rightly understood, there is no contradiction. Contradiction is the result of arbitrary separation, and the effect of moonlight apprehension. Christ must be recognized as the Sun of the universe, and the key to the full and final solution of all its mysteries. In Nature, as well as in the Bible, "there standeth one among you whom ye know not." The cardinal mistake is made in taking the mere *archive* of Revelation for the revelation itself, and in a corresponding substitution of the outward material form of Nature for those inward immaterial force-elements which in their common ground of union constitute the veritable and abiding substance of a volume no less canonical than the received scriptures of God. Bibleolatry is one form of materialism in religion,

and materialism in science is a worshiping of the letter which killeth. The one searcheth the scriptural letter thinking that therein it hath eternal life, and the other looketh into the motions of the air for the fecundous womb of sound. Under this view, both religion and science have neither genesis nor exodus. Let there be light! Let all be seen in the effulgence of Him who lighteth every man that cometh into this grand world and glorious periphery of truth. Here science appears no less divine than Christianity—both are answerable to their common archetypal source. Thus apprehended, truth gives eternal freedom, and opens the pearly portals to imperishable glory.

Viewing the subject in the foregoing light, and believing that the highest mission of the Substantial Philosophy is to serve in the temple of religion, the author not only felt himself justified, but also imperatively called to apply its fundamental principle to Christianity. The result of his response to such a call is the last four chapters of this book, which may be regarded by some as going a long distance to find a market for his philosophic merchandise. While we concede to all the freedom to think upon that question as to them may seem most reasonable, we must claim for ourself the equal privilege to follow what appeared to us as the plain path of duty. We believe that the Substantial Philosophy *is* thus applicable to the Christian religion, that Christianity involves philosophy and that theology must become less dogmatic and more truly scientific before it can accomplish its full mission to man and through man in brightening the visions of earth's dark night, and in

sweetening the anticipations of heaven's eternal day. Schleiermacher was right in announcing that Christianity as to its essence is *life*, and Dr. Hall is equally correct in proclaiming all life to be substantial force. The religion which cometh down from God out of heaven does not hold its being in mere abstract truth, under the form of doctrinal tenets; neither does it move forward in the chariot of human logic, as though man's greatest want were the liberation of his intellect from the thrall-dom of error. Though intimately related, the Bible is not the same as Christianity. The Bible is an outward manifestation of an inward life—substantial mystery in sacred history—principle in precept—law in statutorial form—truth in effluence—the unimpeachable testimony which Christianity gives of its origin, purposes, operations, and conditions, as it moves on through the ages, bearing witness to the truth. The Bible can testify to the truth only as Christ, the absolute fountain of eternal verity, comes “in the volume of the book,” to animate its paragraphs and illuminate its pages. Truth, under this concrete view, is inseparable from life. Under any opposite view it is truth in mere abstraction. Truth in abstraction (in the biological domain of science) is practically the truth held in unrighteousness—a perversion—a *lie*—anti-Christ—a virtual denial of the Incarnation in its proper historical sense, and a cowardly surrender of the only key by which intelligent faith may hope to solve the world's most momentous problem, *the destiny of man*.

It has been intimated from certain uncertain sources that the vast array of adverse criticisms upon the new doctrine will place it under suspicion, and ultimately

wipe it from the face of the earth. We have good reasons for thinking differently. Learned criticism has always been adverse to the truth upon the first appearance of a new doctrine, whether in religion or science. We mention the faith of the Hebrews in Egypt, the Gospel of the Nazarine in Judea, Christianity in the old Roman Empire, and Evangelical Protestantism in Europe, as cardinal points in the religious compass. Similar observations may be made in the respective spheres of astronomy, medicine, philosophy, and every other department of science. And yet there is nothing in the above-mentioned examples construable into an indiscriminate approval of every ridiculous vagary that could possibly originate in the cranky caverns of a diseased brain.

“The wisdom of the world is foolishness with God”; and the world has repeatedly made a fool of itself by rejecting the truth for no other reason than that it was paradoxical, unpopular and destitute of “respectability.” We concede that there is such a thing as a probable preponderance of popular opinion favoring those conclusions which have been reached through the intellectual wealth and wisdom of the ages; but we are not unmindful of the fact that the accumulated testimony of those exceedingly wise ages has frequently done very little more than to make room for the verdict that “the wisdom of the world is foolishness with God.” This will continue to be the case until that which is perfect is come. As long as the highway of history is strewn with the fragments of shattered theories and exploded orthodoxies, even the crowning grace of Christian charity may be permitted to shrug her comely shoulders with consistent hesitancy before she

“believeth all things” and “rejoiceth in the truth.” We are aware that persons who come before the schools with new ideas, and with the courage to proclaim them to the world, take their own risks of being convicted as fools; but it does not, therefore, necessarily follow that the light should be put under a bushel because it is new, neither does it follow that an assumed pharisaic indefectibility on the part of the scholastic world is conclusive evidence that it is either in the possession of truth or in the practice of wisdom. A thorough examination and consideration of all new theories is a duty that the world owes itself, and a respect that should never be withheld from the majesty of the truth which has frequently been found enshrined in its most seemingly absurd propositions. Talk not of “respectable” institutions in favor of this theory or that! History is full of proof that in matters of truth and right God and a few others constitute a very clear and respectable majority over all the rest. The Reformers were branded with being a set of crazy fanatics; Paul was charged with being “the setter-forth of strange doctrines,” a “babbling,” and a “fool;” and Jesus Christ was condemned as an innovator; yet they were all in the line of duty, and consequently on the highway to that imperishable glory which has never yet been reached, except through the persecutions of the majority. The world is more indebted to its “fools” than to its custodians of wisdom for the progress already made in the right direction. What would be its condition to-day if all its paradoxes had been strangled in their birth by the midwives and high priests of “regular” and “respectable” authority in matters of religion and science, and

all its so-called innovators had been crucified? Nay, rather, what would be the condition of the world if some of them had *not* been condemned and crucified for bearing testimony to paradoxical truth? Christianity at its introduction was the most paradoxical movement that ever flew into the face of an accepted order of things, and it is still doing more toward revolutionizing the venerable fallacies and frauds of history than all other combined powers of our polluted planet.

But it is said that the voice of the people is the voice of God. Nonsense! God has not said so. The false proverb is the production of the people blowing their own undulatory horn. Majorities have nearly always been on the wrong side of the question. They are on the wrong side of all great questions to-day. Christianity is in the minority as ever against the religions of the world; Protestantism is in the minority as measured with the aggregate of the Catholic millions; and it is quite possible that true and vitalized protestants are in the minority as compared with the number of nominal protestants who hold to the form while they deny the real power of evangelical godliness.

This feature of the question, then, is nothing more than a renewal of the old interrogative propounded twenty-five centuries ago: "How shall Jacob arise, for he is small?" In the midst of man's impotency, God steps upon the stage and answers all such questions for all time to come, and for his everlasting glory: "Not by might, nor by power," but by the dynamic impulse of his own substantial self in history. Who can read history aright without seeing this truth verified in every chapter? In

no sense is Substantialism to be an exception to the general rule which has prevailed in all past ages, and which will ever prevail in the Church and in the world. As all heaven-born principles and systems of truth ever announced among men have gradually spread toward the sure and full inheritance of the earth, so shall it be with the system of philosophy which God delighteth to honor. It has already widened its bounds. The ratio of its increase appears as something more remarkable than even the array of opposition which has been blind enough to cross its brightening pathway to beneficent power. Substantialism has now been before the world for only a few short years, and yet it has more openly avowed followers than had either Christ or Mahommed after a public promulgation of their respective doctrines for a corresponding length of time.

The Substantial Philosophy did not originate in Dr. Hall's brain. Its principles and fundamental elements had being before they passed into the laboratory of his grand and grappling intellect, and constituted him the first philosopher of the world. Just as the Reformation produced the Reformers; just as the principles of popular freedom produced Washington and Jefferson as distinguished actors upon the stage of colonial history, so did the eternal principle of Substantialism lay hold of its most natural selection, and use him as an active medium through which to appear before the world and challenge the consideration of honest men. Fact is, the fullness of time was here, the new philosophy was ready to be born, and all the mercenary midwives of materialistic Egypt could not strangle it at its birth. And now, since it has

been born, although it may be kept cradled for awhile among the bulrushes of popular prejudice, it will gain strength as a proper child, and finally go forth to lead the world from the bondage of scholastic corruption into its own higher sphere of philosophic truth and consequent freedom in the promised land.

Having such a high origin, there is no room to doubt concerning the success of Substantialism and the radical revolution it is destined to accomplish in science. It is an element in history and belongs to the objective constitution of the world's historic onflow. History has a power not derived from the agents employed in its unfolding process, but from Him who is above history, and whose personal being has no history. For this reason the essential features of all great world-movements are fashioned, not only after an inner pattern, but also by an inner plastic power. God has so constituted the economy of the universe with its dynamic force and unerring laws as to secure the end from the beginning. According to this view, a failure of the divine purpose is placed under the category of impossibilities. Neither can there be an ultimate failure of any human purpose when such purpose moves upon a line parallel with that of the divine. Truth calls great minds to its advocacy, and through them it asserts its own mighty power. "Ye have not chosen me, but I have chosen you and ordained you," is the language of the personal and supreme Truth. Christ is the principle of all normal world-movements; other actors upon the stage of history, though not puppets of a mock drama, are, nevertheless, agents through whom the objective forces of creation's development as-

sert themselves, and yet in such a way as that each rational agent is allowed to exercise the freedom of his own will, and enabled to harvest the reward of his own merit. Assuming the correctness of the foregoing view, there can be no abortion in the sphere of true science or sound philosophy any more than there can be a failure in the primary purpose of Almighty God, or a general miscarriage in the grand design of Him who is the author and finisher of the Christian faith. Whatever has its incipient being in the fecundous womb of eternal truth will come, through safe and certain delivery, to a legitimate and timely birth. The Substantial Philosophy can view itself in no other light without stultification and suicide. It has proclaimed from the high tower of its strength that truth is a veritable essence, that substance is before matter, that the mind, instead of being the function of the brain, uses the brain as its organ. To surrender this position would be to throw our excellent philosophy to the dogs, and crown materialism as both consistent in its claims and triumphant in the controversy which is now shaking the very heavens of honest, earnest inquiry and thought.

A wrong impression prevails in certain uninformed quarters as to the extent of the discovery involved in the Substantial Philosophy. It is supposed by some to be nothing more than an adventurous assault upon the wave-theory of sound. How inadequate is such a narrow conception! As well attempt to confine Newton's great discovery of gravital law in its application to the motion of the moon. As shown in the body of this volume, Dr. Hall's recently discovered and announced Philosophy

of Substantialism is broader than the widest range that can possibly be taken in the discussion of the sound question. Substantialism maintains that the universe in its very constitution incorporates certain immaterial elements of force which are as real as the material objects in nature and no less possessed of actual being than the rocks of the earth or the stars of heaven. This new philosophy is called Substantialism in contradistinction from Materialism because it lays the primary emphasis upon the immaterial or force entities in God's great handiwork. This emphasis is thus placed because the immaterially substantial in the universe is held to be the motive power that drives the wheels of its material machinery. Hence the reversal of some moss-covered theories in science. Matter cannot produce motion, neither can molecular motion produce an entity of any kind. Light, heat or electricity may produce motion, but cannot be the product thereof. The brain is not the originator, but the organ of the mind. Sound is an immaterial substance, and, like every other force-element in nature, asserts itself according to its own law of manifestation. The invisible things of God are clearly seen in the things which do appear. Air-waves can produce sound no more than the lengthening of the shadow of the Washington Monument can cause the setting of the sun, and just as little as the crowing of the cock can produce the twilight of the morning.

The broadness of the principle announced and the demonstrations already given to the faculty of reason of its soundness, to say nothing of the destruction already wrought among the unscientific Philistines with the jaw-

bone of their own materialistic ass, entitles Substantialism to an honorable place in the family of the world's numerous systems of philosophy. And whether thus recognized or rejected the eternal truth will remain the same, and in its dynamic power will force such general recognition in the near future's unfolding years. Strong in the revolutionary work already accomplished, it will not condescend to "bow the suppliant knee that thrift may follow fawning;" but, standing erect in the majesty of its intrinsic worth, the vigor of its symmetrical constitution, and the beauty of its admirable proportions, it will thunder with authority at the feeble gates of stubborn scholasticism, until the learned world will be glad to own and honor and utilize the only system of philosophy that can strike the fetters of fallacy from its limbs and bring it to the light and liberty of a more enduring substance.

Let all lovers of truth who are willing to follow its leadings through evil as well as good report not do themselves the great wrong to conclude that Substantialism is not worthy of their entire confidence, because, forsooth, it doth not yet fully appear what it shall be when that which is perfect is come. Neither should the increasing number of believers in the Substantial Philosophy be any less enthusiastic in its advocacy because it has not yet been fully formulated. The time is fast coming when its high rank in the family of philosophies will be generally acknowledged, and when, as the center of the world's admiration, the royal child shall receive the insignia of its intrinsic worth. Even in the bulrushes of the Nile Moses was a "proper child," and therefore the coming man and

lawgiver for a nation from whom, according to the flesh, Christ came. And Christ himself, instead of springing, like a full-fledged mythical Minerva from the head of Jupiter, into his highest attainable perfection, "increased in wisdom, stature and favor with God and man." So, too, with Christianity, as the substantial presence of the glorified Christ in the world. He is a very poor reader of church history, and a very shallow student of its philosophy who sees Christianity's highest attainable perfection either in primitive religion, the Church of Rome, or modern Protestantism. While nothing can transcend the limits of its own type and pattern, it is everywhere God's law that the old and more defective develops the want and prepares the way for the new and more perfect.

This general truth is equally applicable to our excellent philosophy. Its embryonic principle was always present in the essential constitution of being, and came to its birth in the fullness of time. It is a proper and promising child; and although it is not yet as old as was the child Jesus when he was taken up into the doomed temple to be questioned by the learned representatives of another dispensation which was fast passing away, it has increased in stature and in favor with God and unprejudiced man. This progress it has made in the face of an opposition, and under the reign of persecution and suffering not worthy to be compared with the glory that shall be revealed in the symmetrical strength of its coming manhood and the triumphal march of its victorious future.

The future of the Substantial Philosophy is neither a

matter of prophesy nor conjecture. It is something to be confidently anticipated according to the dynamic life-force of history. When once acquainted with the root we need no gift of prophecy to predict both the coming and the quality of the fruit. The form and the flavor of the fruit are predetermined by the norm of the root. All are already previously nominated in the bond. Only to a limited extent are such qualities and properties subject to modification by environments. Life needs no outward mold in which to cast its statuary or shape its bust—it will permit no such foreign interference without a protest. All life constantly struggles toward the realization of its own ideal. Such ideal is not a mere subjective concept in mental fancy, but a veritable objective and substantial pattern of the thing to come in an externalized form. That which is to be has been, and now is in type. Conformity to type is a fundamental law in the world's proper evolution. This law is as supreme in Nature as it is in the absolute religion. The Church of the Middle Ages made many centuries of ridiculous ecclesiasticism by its foolish and fruitless attempts to legislate law into life and life into law. Much of our statutory Protestantism and galvanic churchism is doing no better. Let modern theologians and materialistic mound-builders in philosophy read history aright and profit by its examples. Let them catch a glimpse of the power of the world to come—already come—and with uncovered heads do proper homage to the invisible, yet substantial forces, which, like Moses of old, build their tabernacles after the patterns brought down from the Mount of God. When the recognition

and acknowledgment of such invisible forces shall become as general as demanded by the claims of truth, Substantialism will receive an ovation worthy of the principle it involves and commensurate with the blessing it is able to impart to the family of man.

What a broad field is opening for the display of its power and the distribution of its benefits to all the lovers of truth! Passing through the wilderness of scholastic chemistry, it will complete its thorough examination of the present theory of force and energy, as already indicated and partially accomplished in this book. In this line of inquiry it will look a little more carefully into the chemical laws of affinity, cohesion, and repulsion, and show that some things hitherto treated as the properties of matter are really the proprietors thereof. Continuing its well-begun work in the domain of physics, it will perfect the new theory or sound and formulate its truths for the general instruction of the laity in the rudiments of scientific righteousness. Entering into the domain of optics, it will pour new rays upon the subject of light, recall Huygens and Newton to the witness stand, and submit a few questions by way of cross-examination concerning corpuscular emissions of luminous matter, ethereal jelly, and the undulatory theory in general. It will also examine further into the presumptuous assumptions that gravity, magnetism, electricity and heat are not substantial entities and forces of nature. Encouraged with its grand achievements in the lower departments of being, it will direct its efforts toward heaven, and with a hush of reverence, standing the scientific gates ajar, it will enable man to look into the laboratory of Almighty God,

where the handiwork of the visible creation is made of things that do not appear. It will continue to march its invincible forces into the realm of mind, lay peccable siege to the capital of intellectual empire, climb up into the highest dome of finite thought, examine more thoroughly the substantial structure of the human soul and demonstrate its constitutional power to survive the dissolution of its material environments. Neither shall the pent-up Utica of sublunary things contract its powers. Persevering in its searches to find out all that science can know of God, it will conduct its disciples up into the observatory of the skies, and direct their most devout efforts to ascertain the place of the more immediate presence of Him who evolves the stars like sparks from his own substantial being, and sends them as scintillations of his personal glory around the central throne of his boundless empire.

Not for one moment can the name "philosophy" in its broadest significance be consistently withheld from the harmonious collection of facts, phenomena and logical deductions which was obliged to annihilate some universally accepted theories of science in order to lay its foundation stone on solid rock. Ordinarily such a collection of facts, phenomena and deductions, depending entirely upon their harmonious consistency for acceptance, might, in best, be held as only a tentative theory or tolerated hypothesis; but when such systematized collection or arrangement is found not only entirely congruous in accounting for all the phenomena involved, but which comes before the public with the scalps of old theories strung upon the girdle of its strength, nothing but edu-

cated ignorance and unpardonable bigotry will refuse its admission into the family of philosophies.

Such recognition is sure to come. Our philosophy has force enough in its vigorous constitution to advance itself into favorable acknowledgement. Having cleared and secured its own right-of-way through the black forests of unscientific fallacies, and having engineered the building of its own iron road, it now claims to be *the trunk line of philosophic truth*. Why not? Its claims are no more courageous than consistent. Its testimonials are found in the work already accomplished. Not only has the road been built and ballasted, but is already being used in shipping rich cargoes of newly discovered commodities to all the established stations along its beneficent route. Gentlemen, don't you hear the mighty thunderings of the invisible engine and the musical rumblings of the wheels of Substantial Commerce? If not, the fault is your own. The really deaf are only they that will not hear. Do you say that the claims of the new philosophy are contrary to the senses? Then show your consistency by professing your infidelity in matters of religion. No man can be a consistent Christian and deny the veritable existence of present invisible entities in the veritable and substantial Kingdom of God which proclaims itself as really at hand. Neither can any man be a philosopher or scientist worthy of a place in the bright afternoon of the nineteenth century and yet deny the existence of corresponding, invisible entities in the Kingdom of Nature. Moreover, the objective reality of religion does not depend upon the testimony of the senses for its authentication to man's inward power of apprehension and ap-

proval. The same is true of the inward and real constitution of Nature. In science as in Christianity, we must endure as seeing the invisible: otherwise our theories and our hopes will fail to survive the test that shall try every man's work of what sort it is. Testimony allowable and valuable in the lower is not always admissible in the higher courts by the wise rules and rulings of the Superior bench. Therefore, if in the absence of tactile touch, or chemical test, or mechanical demonstration in proof of its genuineness, the gospel of our philosophy should remain hid, it is hid to them that are lost in the meshes of materialism; in whom the god of mere matter hath blinded the minds of them which believe not in the invisible, and yet most fairly and fully authenticated entities of the universe.

We repeat, therefore, that Substantialism can be confined within the compass of an hypothesis no more than it can be measured by the definition of a mere science. *It is a philosophy*—THE philosophy of the world and for the world. Its primary mission is to deal with the question of being, as that which underlies all science, and enters into all philosophy. That which Aristotle dreamed of as the “first philosophy,” is, in these last days, to be studied and known and applied as the philosophy of the absolute, so far as human reason may have the power to comprehend the absolute in its deep impulses and in the ever-expanding circles of its unlimited domain. This bold claim must not be confounded with the respective claims of other theories whose fragments strew the highway of all past philosophic research and inquiry. Descartes, in his

theory of substance, thought that he had gotten down to the bed-rock of truth; yet, with all the vigor of an intellect that placed him in advance of his age, he barely penetrated the cuticle of the question which he attempted to solve. Besides, the fragmentary truths which he did announce were comparatively of no lasting benefit to applied and practical science. His lightning was only seen in its flashes above the clouds. It was so vividly brilliant that it could not exist in closer contact with the practical affairs of the earth. Leibnitz dreamed of pre-existent force, thought of eternal harmony in the universe, projected his doctrine of substance, and formulated his theory of the monads. Others have advanced different theories, ranging all the way from the most ethereal idealism to the outward material crust of creation, and yet there is nothing upon record worthy to be compared with the harmonious collection of facts, phenomena, and logical deductions now known by its founder and intelligent friends, and soon to be known and read of all unprejudiced scholarly men as *The Substantial Philosophy*.

Why should the heathen rage, and the people imagine a vain thing, because God in his providence has "taken the wise in their own craftiness" by placing a king upon the holy hill of science? Is it not time for the star to appear above the birthplace of something better than anything now offered in the *Talmudic* traditions of scholastic materialism? The hitherto dissatisfied yearnings and searchings of earnest intellects demand something better. The glory of the truth calls for something more true in many of the prevailing theories of men. In fact the di-

versified fields of science require nothing short of a holy catholic philosophy, just as really as the diversified families of the earth and the divergent races of men need a holy catholic religion to bring them convergingly back to their original moorings, and conduct them thence to the port of their proper destiny. Substantialism is catholic in its constitution. Its catholicity consists in its universal adaptability to every proper department of human knowledge, and every legitimate inquiry of the human mind after the nature of things, from the point where they originate in the Personal Author of their being on to the ultimate goal of their wisely and beneficently ordained destiny. Sustaining this relation to the absolute, the general, and the ultimate, no narrow latitude can contract its powers. It is for science and for religion; for reason and for faith; for time and for eternity; for the solution of the problem of human life, here and hereafter. In reverential imitation of the Incarnate Truth, its mission is to bless all the nations of the earth.

Substantialism is not merely among, but above other systems of philosophy. As such, its mission is to correct the faults and supply the wants of others. They are in need of it. Its immaterial corpuscular emissions will unstop the ears of the deaf, and the scintillations of its substantial light will fall as healing rays upon the eyeballs of the blind. Like Joseph, after being persecuted, stripped, sold, banished, imprisoned, tempted and slandered by all the amorous hags in Potiphar's house, it will still retain its virtue, rise by its own invisible force of character into the highest place of earthly power, bind the princes of scholasticism at pleasure, teach its senators

wisdom, and furnish the corn of truth for its envious, famishing and beggarly brothers.

Moreover, Substantialism has a higher mission than merely to bring other theories and systems out of the materialistic wilderness in which for more than forty years they have murmured and meandered in their fruitless attempts to reach the scientific land of promise. Its face is turned toward "the Jerusalem which is above." Among all the vestal virgins that wait upon the Creator in the grand temple of creation, it stands nearest to the most sacred fires that burn upon the holy altar of the Christian religion. Its last scope and purpose, as well as its greatest glory, is to serve in the "more perfect tabernacle not made with hands." Ministering thus in the sanctuary of our holy religion, it will demonstrate in every prayer and sermon that the command of God for man to believe in the invisible entities and verifies of the Gospel is no exception to his general mandate continually uttered and echoed in every province of nature, and throughout every realm of his expansive universe. Serving thus at the altar of the Christian's God, the Substantial Philosophy sustains a more immediate and intimate relation to the "world without end," and ministers more directly and beneficially to the deepest wants and yearnings of the human spirit, than anything yet offered either in the current teachings of science or the prevailing subjective theories of undulatory religion. It is able to show by "many infallible proofs," cited from every province of creation, that while religion is above rationalism its claims are no less rational than divine. No wonder, therefore, that Substantialism approaches man with no ordinary power,

and addresses him at the central point of his being where the vital and connecting link of his personality holds him in peculiar and blessed relation to the God of heaven and the imperishable bliss of an endless hereafter. This is the reason why thousands are either standing upon the tip-toe of anxiety, or marshaling into line at the first tap-pings of the Substantial drum. This, too, is the reason why the new philosophy is gathering strength and marching forward with a sweep of power that no prejudice can resist. Let the good work go forward with the impetus of its own constitutional impulse, accelerated by the momentum of its own progress, stimulated by the beneficence of its own achievements, until empty idealism, on the one hand, and bold materialism, upon the other, shall burn the gods of their ridiculous idolatry, and hasten to worship with admiration and respect before the superlative truth of *The Substantial Philosophy*.

The Substantial Philosophy.

CHAPTER I.

THE SOURCE OF BEING.

QUESTION 1. What is the chief end of the universe?

ANSWER. The glory of God in the revelation of his character to the rational intelligences thereof.

Q. 2. Who made all things?

A. The Infinite, Personal God, of whom all things testify.

Q. 3. Did God make all things out of nothing?

A. Science teaches that out of nothing, nothing comes. *Ex nihilo nihil fit.*

Q. 4. Out of what did God make or create all things?

A. He evolved, or created all things from Himself.*

* It is certain that no substance in the universe can be annihilated, or cease to exist, however often it may change its form, and it is equally a settled and indisputable principle of science, that no substance, corporeal or incorporeal, can come into existence or be created out of nothing, even by the aid of infinite power. I am aware that this trenches upon one of the prominent articles of the Westminster Confession of Faith, held almost sacredly by large bodies of Christian believers in this country and Europe. But there are certain axiomatic truths so self-evidently settled even in the very roots of science, that to controvert them by any article of religious belief is to fly into the face of all science, and unnecessarily provoke disparagement of religion itself, in the minds of cultivated scientific investigators. Fortunately for religion, however, this article of

Q. 5. Does not such teaching confront the human mind with an insuperable difficulty?

A. This doctrine does not create the difficulty, but recognizes its existence, and treats it in a manner most in harmony with both reason and revelation.

Q. 6. How can the conclusion that God created all things from himself be logically reached?

faith, which so positively teaches that God created all things out of nothing, is not even claimed by its framers to be expressly taught in the sacred Scriptures, and, I may add my own opinion, not even by any fair or necessary inference. In opposing the false views of scientists, and their perversions of Nature's laws, nothing is more detrimental to success than incorporating into such opposing arguments, religious hypotheses utterly untenable and false in the very nature of things. Let us admit all that is rationally and necessarily true in science, and it gives us an infinitely firmer foothold to overthrow the temple of the Philistines, without killing ourselves in the operation, as did poor Sampson.

I am glad to agree here with the views of that radical and critical thinker—the Rev. Joseph Cook—as I do upon almost all questions;—though I have been forced to differ from him in a few instances which have been frankly pointed out, and which I trust will not offend that great scholar and Christian scientist. Upon the creation of the universe he distinctly takes issue with the Westminster Confession. I quote a single sentence:

“*It is not my belief that everything was created from nothing, nor do the authors of ‘The Unseen Universe,’ perhaps the most suggestive book lately published on these intricate themes, affirm that.*”—*Lectures on Heredity*, p. 121.

Then, if something cannot be created out of nothing, whence came this material universe? Is matter eternal? If so, there is something in the universe coexistent with, and consequently equal, in this respect to, God himself. This would seem to be inadmissible by all sincere theists, and hence *matter*, in the grosser form of substance, as contradistinguished from the incorporeal substances before named, from which probably it was derived, need not to have been eternal. But wherein, asks the reader, would lie the difference, and how would it alter the case

A. There is no logical way of reaching any other conclusion.

Q. 7. How do you reason in the matter?

A. Creation is finite. All existent, finite things had a beginning. That which had a beginning must have

as to the substantial eternity of matter, if the incorporeal substance, from which matter in its grosser form has come, existed from eternity? It would not, I confess, relieve the hypothesis of its inconsistency in the slightest degree, except to resolve all matter, for example, first into Prof. Crooke's fourth state, or Dr. Lockyer's single elementary substance, then into the grosser incorporeal elements of nature, in their various forms, such as electricity, gravitation, magnetism and other forces; then into the higher plane of incorporeal substance such as constitutes the vital and mental powers of the organic world; finally into the substantial elements of God's own eternal being, so to speak, out of which, by His infinite power and wisdom He might have condensed the various grades of substance down to the material world itself. This would constitute God himself the source from whence has been derived universal Nature, and answer both the scientist and the Westminster Confession. I fancy, however, the reader is shocked at this idea, and exclaims: *Pantheism!* But I believe a cool and careful consideration of the whole question will not only relieve this supposition of its apparently shocking character of pantheism, but will show it to be the only possible or consistent method of harmonizing the settled and axiomatic truths of science with the fundamental truth of religion—the existence of a personal God independent of, and superior to Nature, while also maintaining His immanence in Nature. The truth is, religious philosophers who have undertaken of late to break down the materialistic theories of advanced scientists, have been too much hampered by creed, or else too fearful of trenching upon some popular religious notions to grapple with these doctrines effectively, or without converting their own weapons into boomerangs. The hampered manner in which some recent attacks have been made upon evolution, for example, by our leading clergymen, is suggestive of the failure of the general who decided rather to lose the battle than to deviate from the tactics taught him in the military academy.—“Problem of Human Life,” p. 32.

started from that which *was* in the beginning. Therefore the whole creation must have had its sole origin in that which is not finite, in the Infinite—it derived its being from the Infinite One who had *no* beginning.

Q. 8. Does not such reasoning imply and require of the human mind the full solution of a great mystery?

A. It implies, and reason requires, the acceptance of the mystery.

Q. 9. Would it not be better to acknowledge the creation of all things out of nothing, and thus eliminate the element of mystery from the problem under consideration?

A. The mystery involved cannot be solved or disposed of by any such treatment of the case.

Q. 10. Why not?

A. Because it is less rational to suppose and more difficult to conceive that all things were evolved out of “nothing,” created out of “nothing,” as a manufacturing material, than to hold and teach in harmony with science and the Bible that God made all things of something, and that something from Himself.

Q. 11. But is not such teaching pantheistic?

A. It is not. Pantheism* so blends and confounds

* No true philosopher can object to the doctrine of universal substance until the substance of the Creator is proclaimed to be identical with the substance of the creature, thus making God and the universe substantially one. This latter, as we apprehend it, is pantheism, and the very marrow in the Spinozaen bone of contention. And yet Spinoza was nearer the truth than some modern philosophers who are continually putting asunder what God has joined together. It is quite probable that Spinoza sought to correct that old heresy of dualism which had been hatched from the false conception of two primordial principles—mind and matter—in eternal conflict. Intent upon such reconciliation, and unmindful of danger in the opposite direction, he fell into the vortex of pantheism. This is just what Wilford Hall cannot do without violating all the laws of

the Creator with creation as to ignore the proper distinction between the two. Besides, even such monstrous pantheism would seem less ridiculous to a truly rational and religious mind than the nonsensical theory which represents God as taking a piece of "nothing" into his infinite laboratory and there proceeding to place the aforesaid material upon the anvil of this Omnipotence, and hammer all the starry worlds therefrom, like sparks into material being.

Q. 12. But would it not be better to leave science to solve its own problems, and follow revelation exclusively in a matter of this kind?

A. If science cannot assist us in attaining to a more correct interpretation of the Bible, it has no proper mission among men, and is falsely so called.

Q. 13. But did not God reveal the truth in the Bible so far as it is proper and possible for man to know anything concerning the genesis of being?

A. God indeed made known his ways unto Moses, but the great scribe and lawgiver nowhere represents Him as having created the world out of nothing.

Q. 14. Is not such teaching found in some of the confessions and catechisms of Christendom?

consistency and rules of logic. If there is any danger it is in the direction of dualism, and its imminence is not yet very apparent. While he recognizes the dual structure of man as the microcosm of Nature, and distinguishes between the corporeal and incorporeal entities of the universe, he is both conscientious and consistent in proclaiming the *one* personal God as the fountain of all, over all, in all, and yet distinct from all. If this is pantheism, we propose to "run into" it as far as our holiest ambition will permit us to go; and still we expect to keep close company with the most biblical Christians of all ages. But it is not pantheism, and those who are trying to kindle their censorial fires to burn *such* heretics had better save their fuel and make a little effort to thaw the alarming fridity out of their own theological dormitories.

A. It is so taught, but the Church has not yet been freed from all error and led into all truth.

Q. 15. When will the Church attain to such infallibility in the interpretation of the Bible?

A. Not until she has a more reasonable recognition of the Fountain, forces and facts of the universe.

Q. 16. Is such a desirable state to be attained without the aid of the Holy Spirit, spoken of and promised in the Bible?

A. Not at all. Yet the Holy Ghost is "the Spirit of truth," and teaches more valuable lessons in true science than in false theology.

Q. 17. What system of philosophy now holds and teaches this true and tenable view of the origin of all things?

A. Substantialism.

Q. 18. Does Substantialism undertake to prove the existence of an Infinite God?

A. True science, like the Bible, assumes the existence of the personal Infinite, and then, like the Scriptures, proceeds to denounce and demonstrate as a "fool" (Psalm xiv. 1) the man who calls the existence of such a being into question.

Q. 19. Why is such a man a fool?

A. Because he is destitute of that without which man is not man.

Q. 20. What is that which is so essential to the constitution of true humanity?

A. The Divine image, and the consequent God-consciousness.

Q. 21. What do you mean by the God-consciousness in man?

A. The innate idea, or proclamation of the human soul that there is a God.

Q. 22. Is this feeling universal?

A. It is general. Creation has its moral as well as its physical monstrosities.

Q. 23. What is a monstrosity?

A. An unusual production; that which is monstrously out of the common order of things.

Q. 24. What is the cause of monstrosities in the human race?

A. Moral monstrosities are the extreme results of moral separation from God. See chapter on Death.

Q. 25. Is the innate God-consciousness full and satisfactory evidence to rational beings that there is a God?

A. The inward is complemented and corroborated by the outward.

Q. 26. Does true science tend to show this?

A. Science has no higher mission than to hold forth the great truth that "the invisible things from the creation of the world are clearly seen through the things that are made—even his eternal power and Godhead."

Q. 27. Does Substantialism, then, teach that God is the only and infinite source of all things, and that he is manifested in all things?

A. It not only holds and teaches this truth, but also sets it forth and demonstrates it in a manner and by arguments entirely different from anything hitherto known to science. It is now possible to see as never before in philosophy, that "by Him are all things," and "that which may be known of God is manifest in them."

Q. 28. What has been wrong with the most influential philosophy of the world that it could not occupy the vantage-ground recently taken and now held by Substantialism?

A. It started in a materialistic conception of being, and moved in a materialistic trend of reasoning, until the learned world has been led either to believe an unscien-

tific lie, or stultify itself by denying the conclusions of its own logic.

Q. 29. What is now the trilemma confronting the modern materialistic philosopher and all scientists who accept not the truth and obey not the gospel of Substantialism?

A. They are compelled to yield an unwilling assent to the substantial existence of God as the only source of all things; acknowledge that all things were created out of nothing, manipulated by a being who has no substantial existence, or admit the eternity of matter.

Q. 30. Thus confronted, how do they exercise the power of choice?

A. Some, with mincing daintiness, take hold of the first horn, and then try to deny that God has a substantial being in any real substantial sense. They argue that because God is a spirit his essence cannot partake of the nature of substance. It is impossible to follow these ethereal philosophers, as they immediately soar away through their own spiritual skies to find refuge behind the plea of "mystery" and false reverence for their unsubstantial God.

Q. 31. What does the second class of anti-substantialists do when caught in the meshes of this trilemma?

A. They choose the creation-out-of-nothing theory, creep into the second horn, and come out at the little end, advocating as their authority the confessions of the Church, while they lay great stress upon the omnipotence of their unsubstantial God, and of his alleged consequent ability to do the most unnecessary and ridiculous thing that false philosophy could conceive of.

Q. 32. How about the third class?

A. They are atheists, either from the start or from the force of their own reasoning in the premises. They are frequently men of great intellects, and honest enough

to follow their own logic to its ultimate conclusions. They start with the eternity of matter, and deny that there is anything more than matter and its supposed phenomena in the universe.

Q. 33. What conclusion is reached through the inductions of the philosophy of this third class?

A. The evolution theory.

Q. 34. What does the evolution theory involve?

A. That matter, starting in the *moneron* or in a less organic state, finally reaches its highest possible form of organic being in man, and that mind is nothing more than phenomena or molecular motion.

Q. 35. Does Substantialism claim that mind is substance?

A. That is just what Substantialism teaches concerning mind and all other forces in nature.

Q. 36. What is meant by the forces of nature?

A. Those invisible entities which, under God, uphold and move the universe toward its final goal.

Q. 37. Name some of these forces.

A. Cohesion, magnetism, electricity, gravity, heat, light, sound, life, mind, spirit. They will each receive attention at the proper time in detail.

Q. 38. But is not matter also a force?

A. Matter has no force whatever. It may even be questioned whether matter could have an existence in the withdrawal and absence of all the physical forces by which it is now constantly permeated, reconstructed and made to occupy its place and serve its purpose in the scale of being.

Q. 39. Does not matter possess the possibility of self-action?*

* This materialistic theory that molecules and their inherent motion constitute all there is in a living body, is one of the most mischievous, as well as one of the weakest, doctrines ever taught

A. It possesses no such possibility whatever. It cannot act upon itself, neither can it act upon or produce that which is not itself.

Q. 40. Is there nothing in the favorable attitude or combination of the different molecules in a lump of matter that can generate molecular motion?

A. Substantialism denies the miserable assumption.

Q. 41. But may not a mechanical power be brought to bear upon matter so as to jostle its molecules into action and thus produce an immaterial force *per se*?

for science. The very notion that the ultimate material molecules of a body are normally separated hundreds of times their diameters apart, and that they are inherently in ceaseless motion, flying hither and thither, without some real and substantial force filling the spaces between them, as the medium of motion or the *cause* of such movements, is so puerile and irrational a supposition that it is simply inconceivable how physicists of sufficient intellectual capacity to conduct a scientific experiment could have fallen into it, much less have been satisfied with it after it had been adopted. Let us illustrate:

Had the inventor of the molecular theory chanced to see a simple enlargement of his idea exhibited by some ingenious mechanic, in the shape of a thousand cannon balls flying with an enormous velocity hither and thither, criss-cross, and every way throughout a ten-acre field, at the same time constantly clashing with each other and glancing off in new directions, but with no let-up to their pell-mell bombardment, is it supposable for one moment that, as an intelligent investigator, he would not have suspected that such movements in inert material masses must of necessity be produced by some substantial energy-producing cause, such as that of compressed air, steam, gunpowder, tensioned springs, or other source of adequate mechanical power? Would he, with less logical intuition and acumen than the most untutored savage, look on at such a marvelous exhibition of mechanical energy and skill, and without even a grunt of reflective inquiry, not suspect that an invisible but substantial cause, as real as the cannon balls themselves, was doing all this work of hurling them with such force

A. None but the unscientific heathen have believed and taught such nonsense!

Q. 42. What will become of them?

A. Since Substantialism has made its appearance, giving them a "second probation," they must now repent of their false theories or find themselves scientifically damned.

and velocity, and without which it would have been impossible for them to move at all?

It seems to us that a child old enough to walk would suspect, on seeing an exhibition of this kind, that some power would be necessary, even if invisible, to produce such wonderful physical results, and at the same time that such *motions*, in the nature of things, cannot be the *power* or *energy* which produces them! Yet the originator of the molecular theory simply pushed this very exhibition of cannon balls so far back into the invisible as to satisfy his intellect that the reduced missiles, which he now terms *molecules* and *atoms* (just as inert and incapable of moving themselves or of being moved without adequate force as would be cannon balls or even mountains), actually propel themselves without any substantial cause, or else that they generate, by their *motion*, the very force by which the *motion* is produced!—Dr. Hall, in *Mic.* Vol. V., p. 199.

CHAPTER II.

MATERIAL SUBSTANCE.

QUESTION 1. What general term does true science use in denominating the entities of creation?

ANSWER. *Substance.*

Q. 2. How are substances in general classified?

A. Into *corporeal* and *incorporeal* substances.

Q. 3. What are corporeal substances called?

A. Matter.

Q. 4. Whence is matter derived?

A. It was produced from the one primordial substance which pervades all space.

Q. 5. Who produced it?

A. The Infinite, Personal God—the fountain and source of all normal things, tangible or intangible.

Q. 6. What is usually meant by the tangibility of matter?

A. Its ability to be seen, felt or otherwise touched through one or more of the lower organs of sense.

Q. 7. What is the normal or natural state of matter?

A. The solid.*

* According to the Substantial Philosophy matter is considered to be perfectly homogeneous. A mass of matter may have porosity, but the matter itself is homogeneous.

When a mass of matter is expanded by the application of heat, every particle (so to speak) expands—a grain or the million millionth part or any further millionth part of a grain of

Q. 8. It is generally held and extensively admitted that the earth was formerly in a fluid state. Revelation also teaches that the earth was founded upon the seas and established upon the floods. How then can it be scientifically and consistently held that the solid is the normal condition of matter?

A. If matter was originally in the fluid state, it was then only in the process toward its present solid and normal condition: just as normal manhood is attained through the processive age of childhood.

matter expands just as we see one pound or one ton expand. The expansion is not due to the separation of the particles farther apart, but to the expansion of every particle as the mass is seen to expand. A gas is simply a highly attenuated condition of any particular form of matter, and depends for its existence on the temperature of the medium in which it is found. The normal condition of all the elements and their compounds is the solid, and this view was first pointed out by Dr. A. Wilford Hall. It is on account of the presence of the substantial heat-force, in different degrees, which determines whether an element or its compounds can exist as a liquid or a gas. Deprive a liquid or gas of its heat and the result is a solid. Experiment has shown that if any of the gaseous elements, which exist as such at the average temperature, be subjected to pressure and deprived of some of their heat, they will condense to a liquid, which can be poured from one vessel to another. The gaseous and liquid states of matter are forced conditions, and depend for their existence on the temperature of the medium in which they exist.

As the word "particle" will be used frequently during the course of this article, it is best to understand what is meant by it when used in connection with the Substantial Philosophy.

A particle of matter is a small mass of matter which is capable of being divided into smaller particles, these into still smaller particles, and so on *ad infinitum*. In other words, according to the Substantial Philosophy, matter is subject to infinite divisibility.

With these brief remarks let us proceed to consider such arguments as have been advanced to show that matter is heterogeneous and not homogeneous.—H. A. Mott, LL. D., *Microcosm*, Vol. V., p. 103.

Q. 9. But is not childhood a normal condition of humanity?

A. It is only the normal process by which the perfect stature of manhood is reached. Second childhood, or the state of decrepitude, is abnormal.

Q. 10. May normal matter undergo a change as to its state and form?

A. It is susceptible of change into many forms.

Q. 11. Can matter change itself?

A. No more than the Ethiopian can change his skin or the leopard his spots. It is *passive* in all its transitions and transformations.

Q. 12. How then is the change produced?

A. By some other substance which is not material.

Q. 13. What is the general term applied to all such immaterial substances?

A. True science calls them the force elements of nature, and they will be more fully explained in the next chapter.

Q. 14. What is the force element under which matter is known to undergo its greatest changes from the normal or solid state?

A. *Heat*.

Q. 15. What is heat?

A. The answer to this question will be more fully given hereafter.

Q. 16. Is matter composed of parts?

A. A lump of matter is composed of parts, and yet each part is subject to infinite divisibility.

Q. 17. What is one of these parts called?

A. When fractionally reduced to minute dimensions it is called a *particle*.

Q. 18. What holds these particles together in the solid or normal condition of matter?

A. They are held together by the substantial force of *cohesion* which will be more fully explained at the proper time in one of the chapters of this book.

Q. 19. Can a particle of matter, or any portion thereof, become anything else than matter?

A. It cannot—not even by a process of division extending unto infinity.

Q. 20. May it not by chemical process become something different from matter?

A. Neither the ancient science of alchemy nor modern chemistry have achieved any such results.

Q. 21. Does not materialism teach that matter can develop itself into mind?

A. It so teaches; but such materialism is an unscientific fraud, and teaches an untenable theory of falsehood.

Q. 22. May not a drop of water be divided into parts, and any one of its parts or particles be separated into hydrogen and oxygen?

A. The process of such division or chemical analysis does not convert water into hydrogen and oxygen: they already existed, and in their chemical union constituted water. Water is a *compound* material substance, and by certain known process may be analyzed or decomposed into its constituents.

Q. 23. May not one of the constituents of a compound substance be changed into something else?

A. If such a constituent be itself a compound, it may be analyzed, or undergo further decomposition.

Q. 24. The end of such process being reached, what have we?

A. We have a *simple* material substance, or matter purely homogeneous.

Q. 25. What is meant by the homogeneity of matter?

A. That matter, properly considered, is a simple ma-

terial substance which cannot be decomposed or analyzed by any power or process known to chemistry.

Q. 26. What is this simple, material, homogeneous substance called when considered in its relation to other simple substances as they all enter into the constitution of a compound?

A. It is called an *element*.

Q. 27. How many distinct elements are now known to chemistry?

A. About sixty-eight—about the number of books constituting the complete volume of God's Revelation to man.

Q. 28. Has a simple or homogeneous particle of matter any different elements in its being?

A. It has not. If it had, it would be heterogeneous.

Q. 29. To whom is science now indebted for demonstrating that matter is homogeneous and not heterogeneous?

A. To Dr. Mott, in various articles in the *Microcosm*.

Q. 30. Is the smallest possible particle of matter porous?

A. Porosity ends where indivisibility begins.

Q. 31. Where is that?

A. Just one point on the other side of infinity.

Q. 32. But is not a particle divisible into molecules or atoms?

A. A particle is still divisible into smaller particles, and there can be no serious objection to calling a small particle a molecule, but it is still nothing less than a particle of the same size and nothing more than matter.

Q. 33. Why then are these small particles called molecules?

A. To use them as pepper for the eyes of unsuspect-

ing dupes and gullions—to get them out of the chemical domain into the realm of legerdemain.

Q. 34. Is there really such a thing as legerdemain in science?

A. Yes, in *false* science.

Q. 35. Why do learned men resort to such things?

A. To cover up and hide the defects and deformities of false theories.

Q. 36. What is this whole system of false theories in chemistry and physics called?

A. It is known by the general and appropriate term *materialism*.

Q. 37. But is it not just as proper to use the term materialism as it is to speak of Substantialism?

A. We do not object to the use of the term, although its apostles tacitly ignore that more important side of God's creation which is not material, but we protest against its positive falsification of the facts of nature, and the unwarrantable conclusions to which its false reasoning leads.

Q. 38. In what does materialism falsify the facts of nature?

A. It attributes to matter forces which are independent thereof, and superior thereto.

Q. 39. What are these forces?

A. They will receive general attention in the next chapter, and be treated more specifically in the following chapters of this book.

Q. 40. Is there then nothing but transformality, divisibility and porosity predicable of matter?

A. Matter has other *properties*.

Q. 41. Will you name a few of the properties of matter?

A. Inertia, impenetrability, transparency, and elasticity.

Q. 42. What is the inertia of matter?

A. Its inability to move itself, and to cease moving when in motion.

Q. 43. What is meant by the impenetrability of matter?

A. That peculiar property thereof by which it excludes other matter from the same space it occupies.

Q. 44. Is matter absolutely impenetrable?

A. It does not exclude all substances from the place it occupies, as will be shown hereafter.

Q. 45. What is meant by the transparency of matter?

A. Its penetrability so far as it is able to receive light.

Q. 46. Are all material bodies penetrable by light?

A. No; only such as have the ability to receive it.

Q. 47. Does light give matter its transparency?

A. No. Some bodies of matter have transparency in their constitutional structure, and the entrance of light gives them penetrability before the power of vision.

Q. 48. Is elasticity a property of matter?

A. It is a peculiar property *in* matter.

Q. 49. Of what is elasticity a property?

A. It is the *effect* of cohesion or constructive force operative in some kinds of matter.

Q. 50. Is this cohesion and constructive force found in all bodies of matter?

A. No; only in such as have the potential ability to receive it.

Q. 51. In the process of change from one state to another, say from the solid to the fluid, or the gaseous form, is it possible for matter to suffer diminution or loss of any of its particles?

A. We have no authority in either Revelation or science for believing or teaching that God will permit

the annihilation of anything which He has made, and which belongs properly to His creation. Out of nothing nothing comes, and unto nothing nothing goes.

Q. 52. Is the material part of the universe therefore everlasting?

A. Not in its present form.

Q. 53. Will the material heavens and earth undergo a radical change?

A. They shall perish, and wax old as doth a garment, and they shall be changed.

Q. 54. Will there then be no more heavens and no more earth?

A. There shall be new heavens and a new earth.

Q. 55. Will they be any less real or substantial than the present heavens and earth, in whose constitution the material elements now serve their purpose?

A. They will be more so indeed. The immaterial is more real and more truly substantial than the corporeal.

Q. 56. Will the new heavens continue forever?

A. They who seek a more enduring substance shall find a house not made with hands eternal in the heavens. That which is eternal in the heavens is most probably in the eternal heavens.

Q. 57. Will there, then, be nothing material about the new heavens and their contents?

A. Whatever of material substance enters into the constitution of the future heavens, with the inhabitants thereof and their environments, will be more highly attenuated and refined than matter in its present state.

Q. 58. Through what agencies will this great change be wrought?

A. Science teaches that heat is the great chemical dissolvent, and Revelation proclaims that the day cometh that shall burn as an oven, that the elements of matter shall melt with fervent heat.

Q. 59. Will matter then continue to exist in the melted or fluid form as a vast and universal sea of molten material?

A. Reason teaches that God would not permit matter to have a perpetual existence in any one of its abnormal states, and Revelation teaches that there shall be no more sea, except the sea of glass before his throne.

Q 60. What is primarily signified by the celestial sea of glass?

A. It signifies that God's whole creation, which now groaneth and travaileth in pain for deliverance from its present comparative opacity, shall be so renovated as to its morals, so refined and attenuated as to its material, and so rendered transparent as to the full and ultimate scope of its meaning, as to admit the effulgent light of the great white throne, and mirror back the image of the "King in his beauty."

CHAPTER III.

IMMATERIAL FORCES.

QUESTION 1. Since matter is inert, and consequently incapable of moving itself, and since it is equally incapable of generating a motor-power of its own, whence is it that the material substance of creation is made to serve the progressive purpose of God in the vast machinery or organism of the universe?

ANSWER. By *Force*.

Q. 2. What is force?

A. It is the energy which God imparted to creation in the constitution of the universe, and which he still continues to communicate thereto in his providential maintenance, movements, and government thereof.

Q. 3. Does he impart or communicate this energy from himself?

A. He does. There is no other primary source of energy or force.

Q. 4. Is the force element thus present in creation a constitutional and essential part thereof?

A. So science teaches us to believe, and honesty compels us to affirm.

Q. 5. Is not this force element in creation just what the "Heidelberg Confession" teaches in question twenty-seven to be "the almighty and everywhere-present power of God," and is not this "power" merely an abstract attribute of the Deity without entity or substance?

A. There is no conflict between the above-named

question of the old Reformation catechism and Substantialism, unless the former be so interpreted as to teach that the real and entitative universe can be maintained, propelled, and governed by the nonentity of an abstraction.

Q. 6. But is not this the old heresy of emanationism revived?

A. It is no more heretical to admit that energy proceeds from the Creator to creation than for infallible inspiration to teach that virtue went forth from the Son of God to heal the sick.

Q. 7. But does not such reasoning lead logically to the conclusion that the flowing forth of energy from the fountain diminishes the amount of energy therein?

A. That which is infinite cannot be diminished. At least the Christian scientist will not admit that Christ was any less virtuous after the efflux of healing force from his person.

Q. 8. Does Substantialism, then, teach that some things have a real entitative existence without being composed of matter?

A. It so teaches with all the assurance that ascertained facts justify, and with all the emphasis that obvious truth inspires.

Q. 9. Does it teach that these immaterial entities are either infinite or spiritual?

A. According to Substantialism they are not necessarily the one or the other.

Q. 10. How are the finite forces of creation classified?

A. They may be classified as *vital* and *nonvital* forces.

Q. 11. What are the nonvital forces called?

A. They may be denominated as the *chemical* or *physical* forces of nature.

Q. 12. How many physical forces are there in nature?

A. Their number is not known any more than the

number of distinct elements in the domain of material substances.

Q. 13. Will you name a few of the *known* forces of nature?

A. Leaving odor as yet somewhat questionable in its real constitution and nature, the Substantial Philosophy is at present pushing *seven* different immaterial substances into the scientific arena of the world, emphasizing them as among the fundamental forces of nature, with a general challenge to the scientific world to dispute the claim that it respectfully and yet defiantly makes in their behalf.

Q. 14. What are these seven forces?

A. They are *cohesion, gravity, magnetism, electricity, light, heat and sound.**

Q. 15. Are not these seven forces but one force with different offices and operations in the extensive and manifold realm of the physical department of finite being?

A. They are one in their primordial source and es-

* To teach, as do the received theories of science and philosophy, that the physical forces of Nature, such as light, heat, sound, magnetism, gravity, electricity, etc., are but *modes of motion* among material particles, and not themselves substantial entities, is as irrational and unsatisfactory to the mind of an intelligent Substantialist as to teach that the invisible spring in the clock-case is only a mode of motion of the clock-wheels which it drives. Substantialism therefore repudiates this notion that any force of Nature is but a mode of motion: and hence it claims as among its fundamental principles and original discoveries that *sound*, as well as light and heat, instead of being a mode of motion, is a *real immaterial* but *substantial emanation* from the sources whence it radiates: and that but for trying to make light and heat *material* emanations, as did Newton and others in his day, instead of making them what they really are—*immaterial entities*—the true Substantial Philosophy might have been inaugurated a hundred years ago.—Dr. Hall in the *Microcosm*, vol. iv., p. 22.

sence, and yet, like the seven spirits of God spoken of in Revelation, proceeding from the same Spirit-fountain of all, they are as distinct from each other as they are inseparable from their common origin. Like the seven colors in the rainbow, all of which proceed from the same common source of light and yet form distinct arches in Heaven's beautiful token of the Covenant with man, these seven forces of nature, when seen in the light of true science, constitute another arch of hope and promise that creation shall not be forever deluged with the destructive flood of materialistic philosophy, whose murky waters are even now beginning to abate from the face of the earth.

Q. 16. Does Substantialism, then, teach that these distinct forms of force, and the several simple elemental substances denominated matter, have all been evolved from and produced by the same Infinite source of all being?

A. It so teaches unequivocally.

Q. 17. Are the adherents of the Substantial Philosophy, then, to understand that force is a mere highly attenuated form of matter?

A. While force and matter have a common source of existence, they differ qualitatively as to their respective essences, as well as in the positions and purposes assigned them in the dual constitution and progressive economy of the universe.

Q. 18. Who first advanced and advocated these essential and revolutionary tenets of philosophy?

A. Dr. A. Wilford Hall, of 23 Park Row, New York.

Q. 19. In what college or university was he schooled in the principles and laws of physical science?

A. Instead of slavishly following the beaten path of old and current theories, he placed and pressed his ear upon the warm bosom of Nature, and felt the instinctive throbbings of her sympathetic heart.

Q. 20. Was not this presumption on the part of the founder of Substantialism?

A. Yes, it was just such presumption as that which gave Socrates honor above Sophists, Harvey an enviable distinction in medical history, and Gallilea an immortality of glory that fadeth not away.

Q. 21. Did not Dr. Hall take a paradoxical position and pursue an unpopular course in crossing the paths of current and accepted theories in science as taught in all the old institutions of learning throughout the world?

A. His position was at first very unpopular. It is not so unpopular to-day.

Q. 22. But is not the voice of the people the voice of God?

A. Nonsense! In heaven the saying is true; on earth it is generally false.

Q. 23. Was his course warranted by anything found in Revelation?

A. Yes, the Bible teaches that the wisdom of the world is foolishness with God.

Q. 24. Why is it foolishness with God?

A. Because it is false, and its teachings not on a line parallel with the facts as God has ordained them, and as he would have them known in the study of his Word and works.

Q. 25. Did the founder of Substantialism ignore everything that science had already achieved in its efforts to interpret Nature's entities and laws?

A. He did not. He rather made himself familiar with the teachings of the past in order not only to know the fundamental errors of many of its teachings, but also to enrich himself with the wheat of truth which he found in a great amount of theoretical chaff.

Q. 26. Does Substantialism consist merely of the

truth as found only in the old theories after winnowing the chaff of error therefrom?

A. While the Substantial Philosophy accepts and teaches some truths previously taught, it is radically different, as to its essential and distinguishing principles, from anything hitherto taught as science.

Q. 27. What is the fundamental principle of the Substantial Philosophy which distinguishes it from, and makes it superior in truth and excellence to the current teachings of the schools?

A. The Substantial Philosophy teaches that everything in the universe, visible or invisible, tangible or intangible, corporeal or incorporeal, of which the mind can form a positive concept, is a real *substance* or objective *entity*.*

Q. 28. In what publication did this new philosophy first appear and challenge investigation by the learned and thinking world?

A. In the "Problem of Human Life."

Q. 29. When did Dr. Hall give this revolutionary book to the public?

A. In 1877.

Q. 30. Does the birth of Substantialism bear the same date as its formal announcement to the world?

A. It dates a number of years prior to the first appearance of the "Problem."

Q. 31. But was not this same doctrine advanced and advocated by other philosophers previous to the inauguration of Substantialism?

A. If so, no record thereof is found upon the pages of history.

Q. 32. Is it not an accepted and announced tenet of the Christian religion that God is a substance?

*See *The Substantialist's Creed, Scientific Arena*, vol. I. p. 6.

A. The *Nicene Creed*, one of the Catholic or Ecumenical confessions of Patristic Christianity, taught that Christ was "of one substance with the Father," but the subsequent trend of theological science has been so much in the direction of a spiritualistic interpretation of everything concerning the infinite God that any proper idea of substance, as once held by the Church Fathers, has been measurably spirited away or ignored by the world's most popular and influential theologians.

Q. 33. But is not God a spirit?

A. God is indeed a spirit, and just as really a substance.

Q. 34. But the materialistic philosophy, at whose doors Substantialism continually lays the charge of heresy, is certainly far enough removed from the spiritualistic conception and construction of being. What, then, is the matter with materialism?

A. Materialism lies upon one side of the truth, while spiritualisticism in religion, and idealism in philosophy, are found in the opposite extreme. Between these two extremes the pendulum of restless inquiry after the truth has been swinging through all the centuries from Platonism to Agnosticism, and it were strange, indeed, if, in its constant oscillations, it did not pass near the truth, even though it had no power until recently to tarry in the vicinity thereof.

Q. 35. But did not Descartes and Leibnitz advance the doctrine of substance several centuries ago?

A. It is true that these two great philosophers spoke of substance, monads, and pre-existent things, yet they were so high upon their transcendental stilts of theoretical speculation that the world has finally abandoned any further attempt to arrive at anything like a clear and satisfactory solution of their ethereal subtleties.

Q. 36. Is not Substantialism also charged with being equally incomprehensible?

A. Its adherents have found no such fault. On the contrary, they agree that it is more rational and lucid than any other equally profound and extensive system of thought that ever challenged the candid consideration of thoughtful, intelligent, and unprejudiced minds.

Q. 37. What good reason can be assigned for the fact that the Substantial Philosophy is being received with such unprecedented enthusiasm and delight by those who are willing to examine its claims upon their impartial consideration?

A. The answer is simple. Man was made for the truth, and it is only when the truth remains undiscovered, or when discovered by the leaders it is for sinister purposes withheld from the masses, or when the masses have become perverse and obstinate under a long reign of error that they choose to believe a lie in preference to the truth.

Q. 38. But may it not in truth be said that the current materialistic theories of philosophy have met with a general reception for many years and throughout the scholastic world?

A. These theories have been received and taught for want of something better, just as a majority of the human family are now worshipping idols for want of a knowledge of the true God. There is, however, not that enthusiasm in false philosophy that there is in false religion.

Q. 39. Why are men less enthusiastic in false philosophy than they are in false religion?

A. Because in philosophy truth is the only thing sought after, while in religion there are other elements besides truth entering into the constitution of that which its votaries regard as the *summum bonum*, or chief good.

Q. 40. Is it not true that hitherto many have given a reluctant assent to some of the current theories of

science, for the sole reason that there was nothing better to take their places in the curriculum of the schools?

A. Thousands of men converted by and to the truth of the Substantial Philosophy are ready to so testify as soon as their unconverted neighbors are willing to call them to the witness-stand.

Q. 41. Will God hold men responsible for clinging to error where the truth has not been revealed?

A. Possibly not. But the truth has been revealed from the very throne of Nature, and therefore the times of such unscientific ignorance will be no longer winked at by Him who is anxious and has made it possible for all men to come to a scientific knowledge of the truth.

Q. 42. What then is the only remaining condemnation?

A. That new substantial scientific light has come into the world, and some men choose darkness rather than light because popular error is regarded as more respectable than unpopular truth.

Q. 43. Does Substantialism teach the correlation of forces?

A. It does.

Q. 44. What is meant by such correlation?

A. That the several physical forces sustain mutual or correlative relations with each other.

Q. 45. Are these forces convertible one into another?

A. Under favorable conditions, and within certain limitations, they are.

Q. 46. Is force therefore destructible?

A. Science teaches the conservation of energy. Force, like matter, cannot be annihilated.

Q. 47. What then is meant by the convertibility of force?

A. It means its transformability, or its ability to exist under another form of force or energy. Thus elec-

tricity, by virtue of their common correlative relation to each other, may be converted or transformed into heat, light, magnetism or sound, or all of them.

Q. 48. Are the doctrines advanced in this chapter controverted by any authorities upon the subject.

A. The teachings of Substantialism are radically at variance with accepted authorities on the most essential points involved in the general science of physics.

Q. 49. What are accepted authorities?

A. Text-books in common use and the acknowledged educators throughout the learned world.

Q. 50. Who are those representative men or personal standards of authority upon the facts and laws of physical science?

A. Prof. P. G. Tait, of the University of Edinburgh, is quite generally regarded as most ably and fairly representing the most advanced scientific thought, so far as there can be any such thing as really scientific thought in harmony with the current and accepted theories in physics.

Q. 51. Then Substantialism is not engaged in the sham-battle of fighting a man of straw?

A. No, indeed. There is no straw in the powers against which Substantialism wrestles, except that which is found in the bundle of dry theories, and which will give them combustibility in the near future, when every man's work is to be tested of what sort it is.

Q. 52. What is Prof. Tait's position, and what does he teach concerning force as he sounds and resounds the key-note of the old campaign in physical science?

A. In a lecture recently delivered before a learned audience,* he asserts that "there is probably no such

* In Edinburgh. See the destructive review of the lecture by Dr. Hall and Dr. Mott in *Microcosm*, Vol. V., p. 1.

thing as force at all." "That it is, in fact, merely a convenient expression for a certain rate"—"the rate or change of momentum." The fact is, that in the near future those who are now denying the existence of the most essential elements and entities in God's creation will learn, to their confusion and chagrin, that force is not a mere "convenient expression," but a very *inconvenient* fact and substance throughout the veritable universe of God, and an entity that can never be satisfactorily explained from the false standpoint still occupied by the advocates of current theories in physical science.

CHAPTER IV.

COHESION.

QUESTION 1. What is cohesion?

ANSWER. It is that form of force in Nature which unites like particles of matter together in a homogeneous mass.

Q. 2. Is cohesion a substance?

A. It is an immaterial substance, just as real as the material particles of matter under its control.

Q. 3. Whence is cohesion derived?

A. Like all forms of force in the universe it is evolved or created from the Personal Infinite and Absolute Fountain of all normal energy.

Q. 4. Has cohesion an existence outside of matter?

A. Cohesion, like the other forces, was prior to matter, is superior to matter, and, therefore, independent of matter. Matter, however, affords cohesion an opportunity to manifest itself in the phenomena of nature.

Q. 5. Does Substantialism then teach that cohesion is not a property of matter?

A. This, indeed, is one of the essential tenets and teachings of the Substantial Philosophy. Instead of existing as a mere property of matter, cohesion is rather one of the proprietors thereof.

Q. 6. In what sense is cohesion proprietary in matter?

A. In a limited degree it possesses and governs matter by holding its particles in normal relation with each other.

Q. 7. Is cohesion recognizable through the evidences of our senses?

A. It is not, except as to its effects. As a substantial but immaterial entity it addresses itself to our higher faculty of reason. In the proper exercise of this rational and supersensuous faculty its true nature may be profitably studied until it shall be perfectly known by its demonstrable effects upon matter.

Q. 8. Does cohesion hold the particles of matter into absolutely close contact with each other?

A. As close as that property of matter known as porosity will admit.

Q. 9. But can the inferior properties of mere matter interfere with or limit the action of the superior substantial force elements of nature?

A. The forces of nature never act upon matter or in matter in such way as to do violence to matter, or to any of its properties or laws. The higher kingdom may suffer violence, but it never does violence to the kingdom or order of being next beneath it, and to which, according to the general providence of the "King invisible," it condescends as a benefactor.

Q. 10. Is all matter porous?

A. Gold is as really porous as sponge. Under sufficient pressure, water may be forced through a body or plate of gold.

Q. 11. Does Substantialism then teach that the substantial force elements of nature penetrate matter by virtue of its porosity?

A. This is just what Substantialism does *not* teach. With all the emphasis that truth justifies, it teaches the opposite doctrine. Some of the forces of nature pass through platinum and glass more freely than they would through a sponge or sieve, and yet platinum and glass are considered impervious to and impenetrable by matter.

Q. 12. Then cohesion does not reside in normal matter by virtue of its pores or interstices?

A. Not at all. As stated in a former chapter, material substances are not absolutely impenetrable, as taught in the current theories of Natural Philosophy. Immaterial substances and substances material may dwell together in the same place, even when such place is reduced in dimensions to the smallest possible measure of finite extension.

Q. 13. Are the several force elements of Nature capable of being penetrated by each other? Is impenetrability a property of immaterial substance?

A. It can be shown beyond dispute, that two or more of the forces may dwell together in the same place—that they neither exclude each other from the same identical locality, encroach upon each other's right-of-way, as they severally move forward upon their respective missions, nor stumble over each other until they tumble into confusion like many of the untruthful theories of modern materialistic philosophy.

Q. 14. But do not the several normal force elements sometimes destructively antagonize each other by their respective operations in and through nature?

A. Only in appearance is such antagonism destructive. They are as really co-operative in their services as they are correlative in the one grand purpose of God, and the one great solution of Nature's complex and comprehensive problem.

Q. 15. Which one of the force elements of Nature seems to be destructively antagonistic to cohesion?

A. As stated elsewhere, *heat*, among the forces is the great dissolvent, and therefore may be regarded as the most direct counteractant of cohesion.

Q. 16. What degree of heat is required to overcome cohesion in metal?

A. Different degrees are required in different metals.

Q. 17. Why is less heat required in one metal than in another?*

A. Because in some metals the particles of matter are so arranged that heat and cohesion operate more correlatively than in others.

Q. 18. How many degrees of heat, respectively, are required to overcome cohesion in *lead*, *tin*, and *bismuth*?

A. Lead requires 619 deg. F., tin 442 deg. F., and bismuth 510 deg. F.

Q. 19. What then should be the *mean* melting point when in a certain proportion alloyed?

*Take another illustration, which a beginner in physical science will comprehend, but which no physicist has ever attempted to explain, simply because it is inexplicable according to any present scientific theory. We refer to the well-known fact that a certain proportionate alloy of *lead*, *tin* and *bismuth* will fuse at 201 deg. F., while *lead's* fusing point is 619 deg., *tin's* fusing point is 442 deg., and that of *bismuth* is 510. deg. Why is it that these metals when mixed will melt at less than half the heat required by the lowest, and less than one third the heat required by the highest of the three metals constituting the alloy? Surely here is a problem worth attacking by science. But difficult as it seems, all mystery disappears when we give proper consideration to the nature and correlation of the forces as substantial entities.

The melting of any substance by heat consists simply in the yielding of the cohesive force which holds the body in a solid condition, sufficiently to liquify it. The intensity of heat required to melt any given body, and thus overcome its cohesion as a solid, depends entirely upon the correlation existing between these two substantial forces, as regards the cohesive arrangement of the particles of the particular substance to be fused. Plainly the same metallic substances must exist in the alloy which existed in the three separate metals before mixing, the only difference, so far as the action of heat-force is concerned, being a new and different cohesive arrangement of the

A. The mean melting point should be 523 deg. F.

Q. 20. Does Wood's alloy require a temperature of 523 deg. to melt it?

A. It does not. It will melt at 201 deg. F.

Q. 21. How can this remarkable phenomenon be accounted for?

A. It cannot be satisfactorily explained by any principle hitherto known to chemical or physical science; neither can the problem be solved by any rule of simple or compound proportion hitherto found in the mathematics of materialism.

Q. 22. How then may it be accounted for?

A. By a candid recognition and rational use of the

particles in the alloy, by which heat can the more easily master and thus neutralize cohesion. If there is nothing in these forces by which substantial co-operation or conflict can occur, then the melting point of the alloy should be the *mean* of the three separately; that is to say, about 523 deg. F., just as the *weight* of the alloy would be the mean aggregate of the three weights before melting. This is as it should be, and according to observation, for the reason that no change takes place in cohesive force in its relation to gravity in this act of forming an alloy, while there does a change take place in cohesion in its susceptibility to be overpowered by heat; for, instead of the fusing point in the alloy occurring at the average mean temperature of 523 deg., it is actually reduced to 201 deg.

The truth is, this mingling of the three separate arrangements by cohesive force, in the three separate metals when alloyed, simply weakens its hold on their combined particles, and, on account of the peculiar contest it experiences with heat in the alloying process, now makes it an easier prey to its chief enemy in nature—heat. If these forces were not as really substantial as the metals upon whose particles they act, we see no possible ground for an intelligible solution of the mystery they present. As real substantial friends or enemies in the economy of nature, these forces may oppose or assist each other, as circumstances require, and thus exhibit all the wonderful phenomena observed, but not otherwise.—Dr. Hall, in *Scientific Arena*, Vol. I., p. 43.

facts and laws recently presented in the Substantial Philosophy.

Q. 23. What facts and laws are these?

A. That cohesion and heat are substantial forces; that they are not only correlative in Nature, but also, and as a consequence of their correlation, they have relative strength, and that their respective degrees of strength differ in different simple or compound metals, enabling them to cling with a greater or less degree of tenacity according to the arrangement or rearrangement of particles.

Q. 24. What, then, is it that conditions the degree of power which force may have over matter?

A. It is conditioned by the ability of matter to receive force, and by the extent to which two or more forces are able to correlate each other in any given body of matter.

Q. 25. But why may not question twenty-one be satisfactorily answered from the old materialistic standpoint in philosophy?

A. Because materialism denies the existence in matter of any force which is not inherent therein, essential thereto, or a property thereof.

Q. 26. How is the impotency of the current theories of philosophy logically deducible from such a general denial of the proper force elements of Nature?

A. It is logically deducible from what will generally be admitted as fundamentally true in the following formula: *That which is a mere property of a thing, or an innate quality thereof, has no power to amend the law of the being upon which it depends for its own existence, and just as little power to change the conditions of its convertibility from one state or form to another.*

Q. 27. But is not cohesion a mere quality in matter, or a property thereof and dependent thereupon?

A. No more than the soul is a mere property of the

body, or dependent upon the body for existence, as shown elsewhere in this book.

Q. 28. Is cohesion dissolvable, by heat?

A. Cohesion is an entity, and therefore incapable of destructible dissolution.

Q. 29. Is immaterial substance divisible.

A. In the physical domain immaterial substance is an *element* and therefore is divisible into particles, even as it is transformable; in the biological domain of being, as will be hereinafter shown, immaterial substance is grounded in *life*, and therefore involves the possibility of manifestation in numerous individuals.

Q. 30. What then does heat, as a dissolvent, separate?

A. Heat swells the mass and every portion and particle of the mass but does not separate them.

Q. 31. As heat in the swelling of material bodies and particles does not destroy cohesion, what is its peculiar effect upon cohesive force in matter?

A. Heat overpowers cohesion sufficiently to expand the body only, however, to extent of heat applied.

Q. 32. What then becomes of that particular portion of cohesive force thus superseded and suspended by the superior force of heat?

A. As to its positive workings as an agent for the God of Nature, it temporarily retires from that portion of the field, and falls back to report for duty at the fountain-head of all authority and power.

Q. 33. Will cohesion ever return again to the field from which it had been driven to bring the decomposed body of matter back to its former and normal condition?

A. As soon as heat has completed its mission in any lump of matter, and consequently relinquishes its sway, cohesion again appears upon the hotly contested field, takes the cooling particles of the former body of matter

into its embrace, gives them a pressing reception, and holds them in their normal relation to each other.

Q. 34. Does cohesion ever fail to reappear under the aforementioned conditions.

A. Never. Like all the other forces of nature, it is always at its post wherever the law of nature's economy, or the solution of nature's problem require its services, and whenever such services are possible.

Q. 35. But may not cohesion be antagonized by some extrinsic force mechanically applied?

A. It may be, and frequently is so antagonized, as, for instance, by the projection of a lump of matter against a pane of glass, or when a boy blows his breath into a soap-bubble.

Q. 36. What is the effect of such collision between bodies, or such conflict of forces?

A. The effect varies according to the properties of the matter composing the bodies, and the relative strength of the forces thus antagonizing each other.

Q. 37. What is the effect in a case of collision between fragile bodies?

A. The usual effect is that one or both colliding bodies are broken into fragments.

Q. 38. What may prevent the instantaneous fragmentation of one or the other, or both of the colliding bodies?

A. Elasticity.

Q. 39. Is not elasticity therefore another term for cohesion?

A. Cohesion, in the common acceptation of the term, is not broad enough to include in its mission of constructing bodies, the arranging of their particles, the re-arranging of them into more contracted or expanded forms, etc.

Q. 40. What then would be a more adequate term

for cohesion in its broader meaning and in the broader domain of its mission as a force-element in Nature?

A. *Constructive force.*

Q. 41. What does such constructive force include?

A. It includes cohesion, in the narrow sense of the term, adhesion, the power of readjustment and chemism.*

Q. 42. Is this constructive force equally operative in all elements and in all the combinations of elements in bodies of matter?

A. No. As already seen, only according to the elasticity thereof, and its consequent ability to receive the aid of such constructive force.

* Having thus defined force, energy, inertia, and momentum, we have now to ask what is meant by the "property" of any given body, and how does it originate? And here we approach one of the most profound and difficult fields of research and investigation in the entire domain of physical science. To this field, and the mighty problems it opens up, we propose now to give our serious attention; and we ask the reader to accompany us with all the powers of discrimination he can summon, as the task even of grasping the problems involved, after they are met and explained, is an immense one.

We say, first, that, while a property of a body is not a force or any form of energy in the true sense of these terms, yet its existence as a condition, quality, or characteristic of a body is always an *effect* of one or many forms of substantial force. Thus *elasticity*, for example, is the name of a certain property of bodies, as the result chiefly of the form of force commonly known as *cohesive attraction*, and by which the particles or smallest conceivable portions of a body are not only held together when united, but by which also they were originally placed together under certain laws and arrangements at present unknown to man.

Indeed, we are not at all satisfied with the term *cohesive force*, as applied to the various natural operations not readily attributable to some other recognized form of force. The term is not broad enough to include the original construction of bodies, the arranging of their particles, the rearranging of them into a more contracted or expanded form, etc., etc. *Constructive*

Q. 43. Is elasticity primarily a property of matter, or an immaterial force-element of Nature?

A. As already stated, it is a peculiar property *in* matter, or a fruit of cohesion asserting its conditional power over matter. Without the constructive energy of cohesive force in arranging the particles of an elastic body, and the continued static persistence of its energy in maintaining them in such relation to each other, no such property could exist in matter.

Q. 44. To what extent, if any, may the force-element of cohesion be concentrated at a given point, and thus augment its power to withstand extrinsic or counter-force?

force would be a more generally appropriate term, making it to include cohesion, adhesion, rearrangement of bodies, chemism, etc. Then when destruction or disintegration of a body takes place by any form of force, the *cohesive* form of this *constructive* force would be destroyed, or, what is better, converted into heat or some other form of force, as when a piece of metal is pulverized into impalpable dust. The bulk of cohesion in such a case disappears, to be regenerated from the force-element of nature by the action of heat, as when this dust is melted into a liquid, and then cooled into a solid mass. When a chemical compound is produced, this general *constructive* force acts as chemism, and when the chemical union is destroyed by heat or electricity, such constructive force is relegated to the force-element, to be regenerated as chemism when the separated substances are again united, either with each other or with some other substance in practical chemical proportions. But we use *cohesive* force at present, as we have done in the past, with many grains of mental reservation, entering this mild protest as a part of the record of Substantialism.

Returning, then, to the cause of the elastic property of bodies, we say that without the original constructive energy of this force of cohesion in arranging the particles of the elastic body, and the continued static persistence of its energy in maintaining them, no such property as that of elasticity could exist in matter, nor could the opposite property of *inelasticity* exist either.—Dr. Hall, in *Scientific Arena*, Vol. I., p. 29.

A. Cohesive force cannot permeate matter to a degree of strength or energy beyond a certain limit.

Q. 45. What is the point or law of its limitation?

A. The limit of the ability of matter to receive it.

Q. 46. Does a body of matter in which there is the property of elasticity receive more cohesive force than an inelastic body of matter?

A. Like a well-arranged fort for the defense of a city elastic bodies have not only the ability to receive, but also the peculiar power to *retain* and *utilize* the force-element of cohesion under the sudden shock or constant pressure of the extrinsic or opposing force.

Q. 47. Is the retentive ability of elastic bodies limited?

A. It is limited, and may be overpowered by superior extrinsic force mechanically or chemically applied.

Q. 48. When an elastic cord is stretched beyond the point limiting the cohesive force which it contains, what is the result?

A. If the cord at every point or place be equally constituted in uniform size, the same elements of matter with the particles thereof similarly related in each and every section of the line, the same temperature prevailing in every part of the cord, and around it from end to end, and the extrinsic stretching force be applied without violent suddenness, so as to distribute such force equally along all sections of the line, and the extrinsic force, thus applied, augmented gently and gradually until it overcomes the cohesive force within, the result will be a breaking of the cord at the same instant at every lineal point, and the fragments of disintegration will be exactly equal to the number of material particles lineally contiguous from end to end in the center of the line.

Q. 49. What would be the result in the absence of one or more of the above-named conditions?

A. If either the power of endurance or the force applied be unequal at every point, the cord would break either at the weakest place or place under the greatest degree of applied force.

Q. 50. What would become of the force retained in the fragments or pieces of the cord?

A. Its first duty would be to care for the wounded. This would be done by restoring each piece to its former condition.

Q. 51. What, then, would become of the force overpowered at the snapping point?

A. A small portion at that point would be liberated, or excused from immediate duty, and fall back to headquarters. Just as the spirit of man, when the silver cord is loosed by the shock or constant strain of mortality, returns to the Fountain of its being—"the God who gave it"—to await further orders, so will any force, or any portion of a force, when liberated by temporary defeat in the elemental warfare of Nature, fall back to the primordial fountain or reservoir of all force-elements, to await further orders from the God of nature, who is at the same time the commander-in-chief in the general campaign of forces and counter-forces throughout the universe in the gradual solution of the grand central problem thereof.

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CHAPTER V.

MAGNETISM.

QUESTION 1. What is magnetism?

ANSWER. It is one of the force-elements of Nature.

Q. 2. In what does it differ from cohesion?

A. Cohesive force joins contiguous particles of homogeneous matter concretely together, and holds them in the latter relation until it is neutralized by some superior force, as seen in Chapter IV. Magnetism draws separate bodies of matter together, and holds them in contiguity until the expiration of its term of service at any particular point in the wise and systematic economy of Nature.

Q. 3. In what other respect do cohesion and magnetism differ?

A. In their modes of laying hold of matter.

Q. 4. What are their different modes respectively of seizing and clinging to material substance?

A. Cohesion seizes matter directly; magnetism lays hold of matter through the medium of its own reciprocal.

Q. 5. Is it true that a magnet attracts a piece of iron?

A. It is not strictly true in science.

Q. 6. How, then, does it pull the iron toward its embracing arms?

A. As in a case of pure and genuine courtship, intervening distance is diminished by *sympathy*.

Q. 7. Is there really such a thing as sympathy existing in some of the force-elements of Nature?

A. Indeed there is, and also, of necessity, the possibility of repulsion.*

Q. 8. Is this sympathy directly between the magnet and the pieces of iron?

A. It is not. It is rather in and between magnetic force or forces potentially or actually resident in both the magnet and the distant piece of iron.

Q. 9. How, then, are the two distinct and separate bodies of matter brought together?

A. When these sympathetic and reciprocal forces approach each other with a tendency toward elemental union, they *carry with them* the bodies of material in which they respectively reside and over which they have a limited control.†

* While every entity in the physical domain of being is a substance, it is also, relatively, a shadow of better things to come, according to the law of continuity in the one organic universe of God. There is an order of sympathy which serves the purpose of sex in plants. The lower animals woo their mates in their unconscious obedience to the behests of brutish sympathy. In human kind a higher magnetic force, or

“love will find its way

Through paths where wolves would fear to prey.”

The highest imagery of Revelation represents a second process of sympathetic attraction between the Redeemer and his spouse—the Church, which will be consummated finally when they meet in the Millennial air; why, then, after witnessing the demonstrations which magnetism affords, should we for one moment deny the existence of a low and prophetic order of sympathy in the inorganic or physical sphere of existence, even though its manifestations and purposes are less apparent than in the biological domain of being?

† We say in common parlance that a magnet attracts a piece of iron, and that the earth attracts a stone. Neither is strictly and scientifically true. As just hinted, it is the active *force* of the substantial magnetism radiating from the magnetic poles which seizes by sympathy the latent magnetic *force* residing in metal of a similar quality with the magnet (it does not affect the

Q. 10. Can the truth of the above assertion be conclusively proven?

A. It is above the need of any testimony admissible merely through the organs of sense to the perceptive powers of the mind.

Q. 11. How then can the alleged fact be known?

A. It is demonstrable to and clearly cognizable through the higher faculty of reason.

material metal itself), thus drawing the two bodies together by cords of sympathetic force. The earth, in like manner, only draws a stone downward by the substantial cords of gravital force from the earth interlocking sympathetically with the same substantial force centering in small quantity also in the pebble. If by any means this almost infinitesimal quantity of gravital force in any body of the metal could be neutralized or destroyed, the earth's gravity would not act upon such metal in the slightest degree to cause it to fall, any more than magnetic force can attract copper or other metal which contains no latent magnetism for it to take hold of. Hence this is exactly the reason why the piece of copper or silver falls slowly through a dense atmosphere of magnetic force. Such force tends to neutralize the small quantity of gravital force *as it resides in copper and silver only, owing to some unknown quality of those two metals, thus partially breaking the sympathetic hold of the earth's gravity.* It is not the obstruction caused by the dense collection of magnetism which impedes the fall of the piece of copper *on the principle of a body's settling through "mud,"* as Sir William Thomson supposed, but its neutralizing effect upon the gravity within the copper, thus rendering it unfit, so to speak, for the gravity of the earth to take hold of. In evidence of the simple correctness of this position, that gravity is partially neutralized in a piece of copper while within a dense magnetic atmosphere, weigh it in that position, and it will be found to weigh almost nothing. A child might thus lift a ton of copper with one finger by simply bringing the two poles of a magnet, powerful enough, on the two opposite sides of the mass of copper, thus neutralizing its inherent gravity, and thereby destroying the hold of the earth's gravity upon it.—Dr. Hall, in the *Microcosm*, Vol. IV., p. 28.

Q. 12. Can it be illustrated?

A. It can. For example: A gentleman and a lady may attract each other in the sphere of pure and unadulterated love, but it would be neither true in science nor honorable in contemplated matrimony for either of them to think or speak of attracting each other's iron or gold. When they legitimately attract each other, or the image which each one begets in the other, or, to speak more scientifically, when the mutual and reciprocal life-force, resident complementally in them both, attracts or pulls them together in virtue of the distinction of sex, the effect of such sympathetic attraction is not only a union of hearts and hands, but also, as a consequence, a domestic community of any material property or goods possessed respectively by the parties before the interesting pulling process began.

Q. 13. What is the more scientific term for this mysterious sympathy in the domain of chemistry and physics?

A. Affinity.

Q. 14. Does this affinity, or complementary property of interlockular force exist in all the force-elements of Nature?

A. Its presence is more marked and manifest in magnetism than in some of the other force-elements of which we have a partial knowledge.

Q. 15. Why is it not as obviously present, and its manifestations equally apparent in all the forces?

A. Because the God and source of all power and energy has different missions for his different elemental servants in the wise and prudent economy of Nature.

Q. 16. Are all bodies of matter equally subject to magnetic force?

A. They are not. Matter is governed by magnetism only to the extent that it is able to receive it.

Q. 17. But is there not static magnetism in all bodies of matter?

A. Static force pervades all space, even that space which is occupied by matter.

Q. 18. Is force then generated or developed?

A. Under favorable conditions it is liberated, generated or developed.

Q. 19. From what is it developed?

A. Any distinct form of force is developed from the general reservoir of all force-elements in Nature.

Q. 20. Does Substantialism, then, teach that there is static force in everything and everywhere?

A. It so teaches.

Q. 21. Is not force therefore omnipresent in the sense that that incommunicable attribute is predicable of Deity?

A. Finite or created force is under the general category of the finite, conditioned and limited order of being, even though the finite mind of man is bewildered in its fruitless attempts to fix the bounds thereof.

Q. 22. Is magnetic force a substance?

A. It is just as really a substance as the matter which it permeates and controls.

Q. 23. How may the substantiality of magnetic force be made to appear as a scientific fact beyond the attempt of a rational contradiction?

A. It has already been demonstrated to the faculty of reason in the unprejudiced mind by the universally admitted fact that magnetism can lift a body of matter at a distance from the magnet.

Q. 24. But is not the weight thus lifted, raised up by the unsubstantial rays of magnetic *influence*?

A. It is impossible to conceive of such an achievement, except where the mind is controlled by the "influence" of unscientific hocus-pocus.*

Q. 25. May not the pulling be accomplished by molecular vibration, without any substantial means of contact or connection between the magnet and the distant piece of iron?

A. The whole miserable theory of molecular vibration, as generally employed in current teachings of physics, is as untenable as it is ridiculous.†

* If magnetism were not a real *substance*, it could not lift a piece of metal bodily at a distance from the magnet, any more than our hand could lift a weight from the floor without some substantial connection between the two. It is a self-evident truism as an axiom in mechanics, that no body can move or displace another body at a distance without a real, substantial medium connecting the two through which the result is accomplished, otherwise it would be a mechanical effect without a cause—a self-evident absurdity in philosophy. Hence, the force of magnetism is a real, substantial entity.—Dr. Hali, in the *Arena*, Vol. I., p. 18.

† And that *real thing* which causes the motion of a body forward, as in the case of an armature, cannot be the *vibration* of the molecules of the medium which fills the space between the two bodies thus separated. Mere *vibration* of a medium cannot pull or push a body at all. At most such vibration could only cause the body to *tremble*. As well talk of pulling a balloon to the earth by causing an atmospheric tremor, or of pulling a boat to the shore by causing a tremor among the molecules of the water! Indeed, modern science, with its prodigious disclosures, actually proposes to pull the boat through the water alone by the molecular tremor of the *shore*, and that, too, without any force to make the shore vibrate. A magnet, Sir William Thomson tells us, will pull a bar of iron from a distance through a perfect vacuum (or without any intervening medium) alone by the molecular tremor of the magnet and without any force to

Q. 26. Is magnetic force an *immaterial* substance?

A. It is just as immaterial as it is real, and just as real as matter itself.

Q. 27. What proof can be given that magnetism is not matter?

A. The best and most incontrovertible evidence of its immateriality is in the fact that it passes unimpeded through the most impenetrable and impervious bodies of matter.*

Q. 28. What kinds of material bodies are, by common consent, classed among the most impervious?

* If magnetism were not an *immaterial* substance, then any practically imporous body intervening between the magnet and the attracted object would, to some extent at least, impede the passage of the magnetic current, which it does not do. If magnetism were a very refined or attenuated form of matter, and if it thus depended for its passage through other material bodies upon their imperceptible pores, then, manifestly, some difference in the freedom of its passage, and in the consequent attractive force of the distant magnet should result by great difference in the porosity of the different bodies tested, as would be the case, for example, in forcing wind through wire netting having larger or smaller interstices, and consequently offering greater or less resistance. Whereas, in the case of this magnetic substance, no difference whatever results in the energy of its mechanical pull on a distant piece of iron, however many or few of the practically imporous sheets of glass, rubber, or whatever other material body be made to intervene, or if no substance whatever but the air is interposed, or if the test be made in a perfect vacuum. The pull is always with precisely the same force, and will move the suspended piece of iron at the same distance away from it in each and every case, however refined and delicate may be the instruments by which the tests are measured.—Dr. Hall, in *Arena*, Vol. I., p. 18.

make the magnet tremble. Why not, then, pull a steamship to its mooring without a rope, by simply making the wharf tremble, or by letting it tremble without any cause? Nonsense!—Rev. F. Hamlin, D. D., *Microcosm*, Vol. V., p. 98.

A. Glass is among the most impervious.

Q. 29. Will magnetism pass through a solid plate of glass?

A. Glass is no impediment or obstruction in the way of magnetic force.

Q. 30. But may not the magnetic force pass around the edges of the plate of glass in such a cunning, crafty way as to deceive the most skillful experimenter, and thus attract its object on a curved line, or on a line with angles more or less acute?

A. Magnetic force is neither materialistic in its philosophy nor unscrupulous in its methods. It therefore never skulks from the direct line to the point at issue, neither does it fail to grapple fairly with its object at the end of the line.

Q. 31. Will magnetic force lay hold of distant particles or pieces of iron when both the magnet and the iron are shut up in different, distant bottles closed with tightly fitting stoppers, sealed and immersed in water?

A. Just as directly and effectually as though no material substance surrounded either one or intervened between the two.

Q. 32. But does not magnetism pass as a material substance through the glass by virtue of the porosity of the latter?

A. Glass is more imporous than gold, and more impervious to material substances than any known body of matter.

Q. 33. But is it absolutely impervious?

A. It is so much so that any substance which penetrates, permeates, and passes through it cannot be composed of material particles.

Q. 34. What is the result when the test is made in a vacuum?

A. The result is the same. Neither empty space nor mountains of matter can interfere with the free workings of any one of the substantial and immaterial force-elements which the Personal, Infinite Fountain of all force has wisely and with beneficent design ordained and delegated to manipulate and manage the material elements of this vast universe until the ultimate meaning thereof shall fully appear to its rational intelligences when the tremendous tidal-waves of its declarative glory are finally rolled back to the throne of His majestic presence.

CHAPTER VI.

GRAVITY.

QUESTION 1. What does Substantialism teach as to the nature of gravity?

ANSWER. The Substantial Philosophy holds and teaches that gravity, like cohesion and magnetism, is a force-element in Nature.

Q. 2. In what does it differ from cohesion?

A. Cohesion unites particles of matter in concrete mass; gravity draws material particles, or aggregations of massed particles into approximate nearness with each other.

Q. 3. Does gravital force assist cohesion in the performance of its work?

A. Where gravity ends its peculiar mission cohesion may begin its work upon the same material; *e. g.*, gravity pulls the melted mineral into the mold, and cohesion concretes it into a hard body or mass.

Q. 4. But do not the several particles in such a hard body still continue to attract each other gravitally?

A. There is gravital force between material particles wherever located and however distant from or near to each other; but gravital force is comparatively inactive in the proper sphere of cohesion.

Q. 5. In what particular does gravity differ from magnetism?

A. As seen in Chap. V., magnetism involves affinity: affinity implies sympathy, even as sympathy involves the

possibility of repulsion. On the other hand, gravity never acts as a repellent.

Q. 6. But does not gravity, like magnetism, involve elemental sympathy?

A. The respective gravital forces of particles in different bodies interlock sympathetically—it however involves no possibility of repulsion as in the spheres of magnetism and in some of the higher spheres of biological being.

Q. 7. Why does not gravital sympathy also involve the possibility of repulsion?

A. Because gravity, as a force-element, is not so high as some other immaterial entities in the graduated scale of being.

Q. 8. Does not gravity neutralize other forces?*

A. Under certain conditions gravity neutralizes magnetic force, *e. g.*, when the piece of iron or copper contains preponderant gravital force, the force of the magnet fails to lift it up.

Q. 9. May not gravital force be neutralized by other forces?

A. Superior magnetic force, or force in a greater degree of density may counteract and overcome gravital force and lift bodies of matter from the earth.†

Q. 10. Does gravital force act where there is no matter?

A. Where there is no matter there is no opportunity for its action.

Q. 11. But does not gravity therefore depend upon opportunity for its existence?

* See Dr. Hall's review of Sir Wm. Thomson.—*Microcosm*, Vol. IV., p. 26.

† His inability to seize and comprehend this truth left Sir Wm. Thomson unscientifically swamped in his "thin mud" difficulty.—See the *Scientific American* of May 17th, 1884.

A. It only depends upon opportunity for an opportunity *to act*.

Q. 12. What is the state or condition of gravity when inactive?

A. Gravity, like all other forces when not active, is *latent* or *static*.

Q. 13. Is there gravity in heaven, and among the angels of God?

A. It is probable that nearer the Fountain the purer the stream.

Q. 14. Is gravity active in heaven?

A. Yes, if there is material there to act upon.

Q. 15. Who discovered gravity?

A. Dr. A. Wilford Hall discovered its real character as an entitative force-element.

Q. 16. Did not Newton first make the great discovery?

A. Starting with some of the secrets which Kepler had extorted from the bosom of Nature, Sir Isaac Newton discovered *Gravitation*.

Q. 17. What is gravitation?

A. It is the law of gravity's action.*

Q. 18. What is law?

A. It is the will of God "on earth as it is in heaven," or Heaven's mode of operating through its own ordained forces.

Q. 19. Does *Law*, then, differ from *Force*?

* "The natural laws originate nothing, sustain nothing; they are merely responsible for uniformity in sustaining what has been originated and what is being sustained. They are modes of operation, therefore, not operators; processes, not powers. . . . Newton did not discover gravity—that is not yet discovered. [The Caledonian philosopher had not "yet" read the "Problem of Human Life."] He discovered its law, which is gravitation, but that tells us nothing of its origin, of its nature, or of its cause."—Drummond's "Natural Law," p. 5.

A. True science makes a distinction between the two.

Q. 20. What is that distinction?

A. Force, under God, is the *motor power* of the universe; law is the *mode* according to which the motor power moves the vast machinery. Force operates; law is the eternally and internally ordained rule of its operation.

Q. 21. Did Newton formulate to perfection all the truths involved in gravitation?

A. He did not. It is as impossible for science as it is for religion to have an infallible human pope.*

* Neither was Newton infallible. As a member of the fallen family of man, he shared the infirmities of the race. Pope's couplet:

"Nature and Nature's laws lay hid in night;
God said 'Let Newton be,' and all was light,"

contains more English pride than poetry, and, still, more poetry than truth. Though born on Christmas Day, he was not *the* light of the world. Although the "Principia" is a masterpiece of mathematical skill, it is not the production of unerring wisdom. It contains light enough to make darkness distinctly visible. The above expression should be considered as a flattering compliment to the noblest work of any living man. Newton's great mind was not capable of supposing that the "Principia" was perfect, and that it would need no revision in the progress of the ages. A consciousness of its defects was probably one element in that reluctance which inclined him to desire a suppression of its further publication. Neither is there any evidence that Halley, in assuming the financial responsibility of bringing the astounding work before the public, looked upon its author as the *avatar* of astronomical science. Such superstition enters a more modern temple: such idolaters pour out the oblations of their sycophancy in a more modern worship. They fill the front pews of the scholastic Church; and their hands go up with holy horror at the mere mention of "Newton's oversights." They consider it no sacrilege to revise the authorized version of the Holy Scriptures, and correct the "oversights" of King James' translators. They also seem to think it eminently proper to change the English text of God's

Q. 22. Why did he fail to carry his *principle* to greater perfection?

A. Partially because he had failed to discover the true character of gravity.

Q. 23. But did not Newton in his letter to Bentley deny that gravity was something "innate, inherent and essential to matter"??*

* Because that mysterious something called gravitation, which pulls a weight toward the earth, can neither be seen, heard, felt, tasted, nor smelt, it is no proof that gravity is not a substance as really and truly as is water, iron, or even platinum, the heaviest of all known substances, only the substantial corpuscles or attenuated threads of gravity are of such a nature that we cannot recognize them except through our higher faculties of reason, by what they accomplish. The German laborer who placed his bucket beneath a dripping rock to catch water, was astonished when he undertook to carry it home. He could neither lift it nor stir it, with all the strength of his arm. Yet he saw nothing to cause such a result except the water the bucket contained. It could not have frozen to the ground for it was a hot summer's day. Yet something held it down with immovable but invisible power. The secret was soon revealed. The bucket was nearly full of quicksilver which had dripped

Word in order to make it read more in harmony with those most ancient extant manuscripts recently discovered by the same spirit of search and research which has since blessed the human family with the "Problem of Human Life." Some of them are possibly ready to march with Robertson Smith in his crusade of criticism upon the very subject-matter in the oracles of the Most High; or, perchance, swell the ranks of Beecheronian vandalism with a determination to either dry the fountain or dam the stream of God's Revelation to man; but a critical examination of Newton's astronomical calculations is too sacrilegious for their pious toleration. While they cannonade the Pentateuch, they canonize the "Principia," and swear, with an idolatrous veneration for the bones of a fallible man, that Wilford Hall shall not stand in the assembly of the righteous, because, forsooth, he has dared to question the immaculate conception of Newton's "yard-stick."

A. He did; yet to tell what a thing is *not* is something different from discovering and defining its positive character.

Q. 24. What was Newton's most fundamental and fatal oversight concerning the nature of gravity?

from the rock with the water. Had this quicksilver still remained invisible, after the covering of water had been removed, and had it been even unobservable by any other of the senses, or could the hand have been passed through it without feeling it in the slightest degree, it would still have been none the less a real substance so long as its effects were the same in holding the bucket to the earth. We must therefore judge of the substantial or entitative nature of anything of which the mind can form a concept, not by its recognizable or unrecognizable qualities through the direct evidence of our senses, but by its demonstrable effects upon other and known substances under the exercise of our rational faculties in judging, analyzing, comparing, etc. Thus gravity is a substance as really and truly as was the invisible mercury in the bucket, but its nature is such that it is hidden from all our senses. Our hands can pass through it without feeling it. It permeates and passes through all substances that may intervene between the earth and a suspended weight, and when the cord that supports the weight is severed, the invisible and intangible threads of this all-pervading substance seize each molecule of the weight and pull it to the earth.

Those who are thus forced to admit the substantial nature of magnetic rays, have stepped into a new world, filled with new entities and verities. They are mentally and logically compelled at once to look upon gravity in the same light. Sir Isaac Newton caught a glimpse of this new world of incorporeal entities as he contemplated the law of gravitation. In a letter to Bentley he says:

“That gravity should be innate, inherent, and essential to matter, so that *one body may act on another at a distance through a vacuum*, without the mediation of anything else by and through which their action and force may be conveyed from one to the other, is to me so great an absurdity that I believe no man who has in philosophical matters a competent faculty of thinking, can ever fall into it.”

The greatest of philosophical reasoners, though inspired with

A. He failed to discover and recognize it as a substance. He denied the substantiality of everything beyond the range and testimony of the senses.

Q. 25. How else than by the bodily senses can force be discovered?

A. Just as Newton discovered gravitation or law—by rightly exercising the royal faculty of reason.

Q. 26. But did he not hold that light was a real substance?

A. This question is answered in Chap. IX.

Q. 27. Was Newton's oversight as to the nature of gravity followed by oversights in his great work of formulating the laws of gravitation? If so, what were they?

A. The above questions cannot be satisfactorily answered until gravity, as now viewed in the better light of the Substantial Philosophy, is permitted to assist in the interpretation of the law of gravitation.

Q. 28. Does Substantialism differ from Newton as to the law of squared distance inverse?

A. The principal disagreement is as to the proper place of beginning the calculation, or in the adoption of the proper unit of measure.

Q. 29. Have mathematicians outside of the Substantial School disagreed among themselves as to what Newton meant to teach concerning the proper unit of measure?

this brilliant dash of intellect, did not, however, take advantage of such a sparkling revelation, and, by dint of logic, carry it out to magnetism, electricity, life, mind, spirit—even up to the substantial throne of the Deity Himself. He entered the portals of the new dominion of philosophical thought, but unfortunately stopped there, and spent his life in contemplating and elucidating the substantial wonders and all-pervading effects of that mighty entitative force which his own genius had formulated, if it had not discovered.—“*Problem of Human Life*,” p. 29.

A. A recent discussion upon the subject has made such disagreement most manifest.*

Q. 30. Is gravity a substance?

A. It is just as really a substance as the bodies of matter which it draws together.

Q. 31. Could it not pull bodies together without being a substance?

A. Substance cannot be seized by anything which is not substantial, or, if it could be so seized, the unsubstantial nonentity of which the mind can form no rational concept would have no power to draw different bodies of material together.

Q. 32. But it is claimed that the human mind can form no rational concept of the Infinite, and that Revelation teaches the existence of an all-powerful God who upholds all things in their proper relation to each other.

* We have noticed: (a.) The several vindicators of Newton have disagreed among themselves as to just what the great astronomer meant to teach in his gravitation law of squared-distance-inverse, as applied to the question of the moon's divergence from a given tangent, and the double displacement of both earth and moon by virtue of reciprocal attraction. (b.) They have not agreed as to the best line of defense against the assaults of the *Microcosm*. General symptoms of *lunacy* are the only common badges of their mathematical brotherhood. (c.) They have contradicted themselves, and changed both their terms and tactics when met by truth and valor, and pressed to close engagement. (d.) They have conceded several points which they had warmly disputed in the beginning of the discussion. (e.) They have blown the breath of suspicion upon the dogma of Newtonian infallibility by charging the great astronomer with using a "rough measurement" in the service of "pure mathematics." (f.) They have thus, consequently, played the pitiable poltroon when it was found necessary to forsake their master in order, if possible, to save themselves from inevitable defeat in the last ditch of desperation.—The author, in *Microcosm*, Vol. II., p. 239.

How can this objection be answered without an abandonment of the fundamental teachings of Substantialism?

A. The objection is met, *First*: God, is himself substantial in the essence of His being. *Second*: Because God is a substantial being the human mind *can* form a concept, or rather is intuitively possessed of an innate idea of Deity, or God consciousness, as already shown in Chapter I.

Q. 33. Can a man then comprehend God?

A. He cannot. Neither can he comprehend gravity.

Q. 34. Is gravity a material substance?

A. It is not. If it were such, it would have the property of inertia like all matter, and consequently could not move itself, much less that which is not itself.

Q. 35. Is it then an *immaterial* substance?

A. It is.

Q. 36. What is the best evidence of its immateriality?

A. The fact that it passes unimpeded through all material substances, no matter what may be their properties, such as impenetrability, impositivity and imperviousness.

Q. 37. Does gravity exist in all kinds of matter?

A. It does.

Q. 38. Is it resident in equal quantities in all bodies of matter of equal size and solidity?

A. It is not. Glass is more solid, because less porous than gold, and yet gold contains more gravital force than glass.

Q. 39. Why is this the case?

A. For the same reason that one star differeth from another star in glory. The peculiar constitution of the material substance known as gold is such that it is able to receive and retain more gravital force than glass, even as iron is so constituted that it contains more magnetic force than gold.

Q. 40. Does not the heaviest matter contain the most gravity?

A. Yes, just as the hottest metal contains the most heat, and just as the figure 9 contains more quantity than the figure 2.

Q. 41. But are figures mere expressions of numbers and indications of quantity?

A. They are, indeed, and so is weight the mere index of the measure of gravital force resident in any given lump of matter.

Q. 42. Has gravity a mechanical force?

A. Gravital force may be harnessed to machinery.

Q. 43. When so attached, is it really the *motor power* which, under God, causes the rotatory and other movable parts of the machinery to move?

A. The affirmative answer to this question is one of the cardinal teachings of the Substantial Philosophy.

Q. 44. Do not other and current theories of Natural Philosophy teach the same thing?

A. If so, our reading has been too limited to make the discovery.

Q. 45. But is it not the water that turns the wheel, that moves the machinery, that connects with the burrs, that grinds the corn and bolts the meal in the mill that Jack built?

A. Such is not the case in the mills of God and true science.

Q. 46. What is the motor power in such mills?

A. It is gravital force which overcomes the inertia of matter and pulls it down upon the water-wheel, causing every part of the more complicated machinery to move in obedience to this impelling energy of Nature.

Q. 47. But does not gravity use water to make the master-wheel go round?

A. Yes; and so does man use gravity to accomplish

the same end, and yet no one who is not blind to the facts of nature, the principles of science and the rules of logic, will, for that reason, identify man with gravity, or gravity with water.

Q. 48. How is gravity correlated to cohesion?

A. Gravity may begin its work at a point where cohesion relinquishes its hold upon any given portion of matter.

Q. 49. Can the foregoing truth be illustrated?

A. It can. For example: Through heat or some other force of nature, cohesion may be overpowered where a rocky cliff projects above the water. As cohesion relinquishes its hold, a piece of rock passes immediately under the predominating force of gravity; gravital force thus pulls the boulder down into the lake beneath the granite cliff that overhangs its border.

Q. 50. What then may be predicated of gravity as to the effect produced upon the lake beneath?

A. Under God, gravity is the efficient cause of all the changes made upon the watery surface, or in the water under the surface.

Q. 51. But has not the elasticity or compressibility of the water something to do in causing the change or changes in the lake?

A. Compressibility is not a force in Nature, but primarily a property in matter, by which matter is able to receive a sudden application of extrinsic force in such a way as to be recovered from the immediate effects of the shock.

Q. 52. What is meant by the immediate effects of the shock?

A. A temporary displacement of particles around, a removal of the water immediately beneath the falling stone and a very brief vacancy above it.

Q. 53. By what force then is the displacement of particles adjusted, and the vacancy filled?

A. Cohesion avails itself of the opportunity afforded in the slight compressibility of water, and *operates as a constructive* force, while gravity seizes the advantage at hand in the liquidity of such matter to restore the former evenness and tranquillity of the lake's surface.

Q. 54. But is not the water deeper than it was before the fall of the rock?

A. It is.

Q. 55. Does this small increase of depth extend over the entire surface of the lake?

A. True science so teaches.

Q. 56. In effecting this change of depth, is every drop of water in the lake more or less affected?

A. Not necessarily. The mobility and slight compressibility of the water in the vicinity of the rock, and along the line of its descent from the surface to the bottom of the lake, shields the more distant portions of the water from the effects of the shock.

Q. 57. From what portions of the lake is the water taken which is distributed over the entire surface thereof?

A. It comes exclusively from no particular locality or place of definable limits, but from the entire portion in which the disturbance and displacement occurred, from the final resting place of the fallen rock, upward along the line of its descent, and out over the entire portion of the lake immediately beneath its new or raised surface.

Q. 58. And gravity does the work?

A. The falling rock performed an instrumental or mechanical part, but the efficient work was done by gravity, as ordained by the wisdom and operated under the power of Him who calmed the storm on Galilee, and tranquillized the troubled elements of wind and water from the aerial heights above to the aqueous depths beneath.

CHAPTER VII.

ELECTRICITY.

QUESTION 1. What is the current theory of science with reference to the nature and laws of electricity?

ANSWER. There is great divergency, disagreement and confusion concerning this branch of physics, running from Thales to Tait, and ranging from matter to motion.*

Q. 2. How can such confusion in our progressive age be satisfactorily accounted for?

A. Only upon the supposition that the schools and text-books are radically wrong in their basic theories of electricity.

Q. 3. But do not the pretended leaders claim to be agnostic in this branch of physical science.

* Edison, the greatest practical electrician now living, declares: "They (the text-books) are most misleading. I get mad with myself when I think how I have believed what was so learnedly set out in them. *There are more frauds in science than anywhere else.* Take a whole pile of them that I can name and you will find uncertainty if not *imposition* in half of what they state as scientific truth. . . . Professor this or that will controvert you out of the books, and prove out of the books that it can't be so, though you have it right in the hollow of your hand all the time and could break his spectacles with it.—Edison in *New York Herald* of Dec. 31, 1879, and quoted by Dr. Hall in the "Problem of Human Life," p. 8.

A. Some of them in this particular are beautifully consistent.*

Q. 4. Do they all make such concessions and confessions?

A. They do not. Some of them define electricity as *imponderable matter*.†

Q. 5. Do the most of modern electricians agree to the foregoing definition?

A. There is no general agreement. Gordon, in his "Phys. Treat. on Elect. and Mag.," says: "We must not, however, commit ourselves to the idea that electricity is a [material] substance. We do not know whether it is or not. There are many other instances of quantities which are not substances."‡

Q. 6. What does he mean by "unsubstantial quantities"?

A. His meaning is obvious from his illustrations; *e. g.*, he speaks of *pressure* as a quantity without substance, and represents the pressure as produced by the pulling of a horse, unmindful that the pressure of which he speaks is mechanical force, produced by or converted from the life-force of the animal, which force is a quantitative substance.

Q. 7. What is the latest theory, and the one most

* Prof. John Trowbridge, in *Pop. Sci. Monthly*, says: "We shall never know what electricity is." Prof. Nichols, of Boston, says: "Electricity in itself considered, and much of its attendant phenomena, belong to the realm of the unknown. . . . Considered as a thing, we know as much of spirit as we do of electricity.—Dr. H. A. Mott, LL.D., in *Microcosm*, Vol. V. p. 145.

† This is called Lymmen's theory, and of which Ganot says: "It is quite hypothetical, but its general adoption is justifiable by the *convenient explanation* it gives of electrical phenomena."—See Dr. Mott, *ibid.*, p. 147.

‡ *Ibid.*, p. 146.

alarmingly epidemic in the densely populated metropolis of false science?

A. That electricity is a *condition* of an all-pervading material called ether, and that electric attraction and repulsion are only a palpitation of ether's great heart.

Q. 8. But is electricity really knowable?

A. If it is something entirely beyond the power of human investigation and comprehension, it has no mission in a world whose entities and activities all culminate in the superior endowments of the human mind. God speaks to man in every entity, by every force and through every law of Nature, and it would be exceedingly disrespectful to the God of nature to even intimate that he has spoken in an absolutely unknown and unknowable tongue.

Q. 9. Why then this babel of confusion?

A. The light of Nature, like that of Revelation, may shine in darkness and the darkness comprehend it not. Confusion in science is sometimes the result of educated ignorance and formulated falsehoods. Concerning electricity there has been great ignorance as to its real nature.

Q. 10. Have there been any recent discoveries throwing new light upon the subject?

A. The recent discoveries of certain laws and facts in Nature are conservatively revolutionary in their bearing upon the general field of science, and as a result electricity will be studied from the new standpoint of inquiry into its real character.

Q. 11. Why was not the discovery made sooner?

A. For two sufficient reasons: 1. The learned world persisted in shutting out the new light by interposing the opacity of its own scholastic prejudice. 2. God has his set time to favor Science as well as to favor Zion.

Q. 12. What then is electricity as to its real nature?

A. It is a real, substantial force element and a veritable entity of being, independent of all matter, and absolutely dependent only upon the Infinite Source of its finite being.

Q. 13. In what does electricity surpass and differ from some other force-elements in Nature?*

A. It surpasses some of them in its performance of the most marvelous functions in the complicated system of the physical realm, and by certain phenomena indicating that it is possibly a connecting link which unites the physical with the biological realm about it.

Q. 14. How is electricity produced?

A. It is developed or excited into a more active state of being.

Q. 15. From what is it developed?

A. From *static* electricity, or electric force in a state of rest.

Q. 16. Is static electricity really or only *apparently* at rest?

A. It is only apparently at rest. Indeed, it may be questioned whether any force is ever really at rest.

Q. 17. Does not such a statement seem unwarrantable and unscientific?

A. It ought not to seem unreasonable to the materialists who have the venturesome arrogance to affirm, and who are bound by all the cords of their own stubborn sophistry to teach, that inert matter is always moving upon the rickety vehicle of molecular motion.

Q. 18. In what does static electricity reside?

A. In all forms and kinds of matter. In some there is more than in others.

*

* "Had we eyes or a sense which could unfold the part which electricity plays in the economy of Nature, our knowledge would be greatly increased, and scenes as varied as a gorgeous sunset would be disclosed to us."—Dr. H. A. Mott.

Q. 19. How is static electricity developed so as to give manifestation of itself by its phenomena and power over matter?

A. It may be developed by friction or contact of different bodies.

Q. 20. May this be done independent of all conditions?

A. God has ordained that in the tranquil workings of his perpetual Providence, as well as in the possible catastrophes in Nature, nothing is done without the presence of required conditions.

Q. 21. Can electricity be developed from the other force-elements of Nature?

A. Under the required conditions other force-elements, such as adhesion, chemism, cohesion, heat and light are converted or transformed into electricity.

Q. 22. In order to change one or more forces into electricity does it require a *friction of forces*?

A. It does not. The possibility of such transformation is based upon the constitutional correlation and consequent convertibility of forces.

Q. 23. Is work or life-force convertible into electricity?

A. Yes; *e. g.*, when a piece of glass is rubbed with a piece of silk the life-force thus expended is converted through the mediate forces of adhesion and heat into electricity.

Q. 24. What is *life-force*?

A. This question is answered in chapter XI., which treats of *Life*.

Q. 25. Are there two electricities, or only one?

A. Electricity, like humanity, is *one* in the essential unity of its substance and constitution. Humanity involves a twofoldness of sex as essential to the essence of its being, as well as to the law of its development; so

does electricity involve a certain twofoldness of attraction and repulsion, by which it continues to complement itself in its development and in the performance of its important functions in nature.

Q. 26. But are there not opposite, or *positive* and *negative* poles in electricity?

A. There are different electrical states or potentials, but the opposition is only apparent.* The distinction between attraction and repulsion is involved in the constitution and laws of *one* positive force-element in nature—*electricity*.

Q. 27. What is the meaning of “potential,” as employed above?

A. In an electrical sense, the word is used to express the degree in which a body is charged with electrical force.

Q. 28. Then the terms *positive* and *negative* express quantity rather than quality?

A. They express quantity in a relative sense. The electrified body is said to be *positively* or *negatively* charged, according as it has + or —, greater or less electricity than surrounding bodies.†

* There is no opposition necessarily involved in the distinction of sex as long as these complementary parts of humanity are kept in their normal and legitimate relation to each other. When it is abnormally otherwise, look out for thunder and lightning extraordinary.

† It must be borne in mind that substantial electrical force, like substantial heat and the substantial force of gravitation, is a simple form or manifestation of the force-element of Nature. A metal rod, heated at one point, has its heat potential at that point raised, and there is an immediate flow of heat to the colder part, or part of lower potential, which continues till the equilibrium is restored, by raising the lower potential and lowering the higher. (See the *Electrician*--article by Atkinson, Vol. II., p. 270.)

Fill with water two vertical pipes, connected below, and it

Q. 29. Can electricity travel?

A. It has demonstrated its ability to move at a very rapid rate of speed.

Q. 30. What substances conduct it?

stands at the same level in each. Press it down with a piston two feet below the level in one, and it rises two feet above the level in the other; and the force of the piston is the exact measure of this difference of potential. Decrease this force, and the tendency to equilibrium at once becomes manifest; remove it, and the equilibrium is restored.

So with the substantial electrical force. + and — electrical force are simply difference of potential. In a large conductor like the earth, the potential over any limited area, as stated, is equal or at zero; hence the potential of the earth is taken as the standard.

If two insulated conductors are oppositely charged (*i. e.*, at different potential), and either of them placed in electric connection with the earth, its equilibrium is restored: in the +, by a flow of electricity *to* the earth, and in the — by a flow of electricity *from* the earth. If both, while insulated, are placed in connection with each other, equilibrium takes place between them by a flow from + to —; and their potential will then be above or below that of the earth, that is, at + or — potential, according as the original potential of either was the greater. If the — potential of one was exactly equal to the + potential of the other, the resulting potential would be zero, like the earth. Charged bodies at the same potential naturally repel, and at different potential attract each other, the flow of electricity being from + to —; a charged body, then, is one whose equilibrium is disturbed by a change of potential above or below the potential of the earth, and therefore shows a tendency to equilibrium.

These two kinds of potential have for another reason been called + and —, because when added together (as in algebra) they combine, and the substantial electrical force disappears, under some conditions, to reappear as substantial sound, substantial heat, substantial light, etc., which in turn disappear, to reappear in some other form, or go back to be conserved in the force-element of nature.—Dr. Henry A. Mott, in *Microcosm*, Vol. V., pp. 149, 150.

A. Under proper conditions all finite substances are conductors of this wonderful force.*

Q. 31. Then there can be no such thing as a perfect insulator?

A. No more than there can be a perfect vacuum. Nature, not having been made out of nothing, despises a vacuum, and, to be consistent, must despise the theory that there is an effectual blockade in the royal right-of-way of her forces.

Q. 32. But are not some substances better conductors of electricity than others?

A. They are; and the same is true of heat and all the other force-elements in nature.

Q. 33. What is one of the best known conductors of electricity?

A. Silver.

Q. 34. Why is it one of the best, or why has it the most conducting ability?

A. Because in silver the substantial force of cohesion is so permitted to exercise itself in holding the particles of that metal in concrete mass as to assist the passage of electrical force with greater ease and facility than is possible in many other kinds of matter.

Q. 35. Does matter really conduct electricity?

A. It does not. Matter is always passive. It allows that entity to pass, and the extent of the permission is in exact proportion to the degree of ability that matter possesses to justify the charter for the transit.

Q. 36. If matter then is merely passive in permitting the passage of traveling electricity, what is really the conductor thereof?

* Dr. Hogeboom thinks that perfectly dry ashes is one of very few exceptions.—See his article on Electricity in "Appleton's Cyclopedia."

A. Force is the active agency in the conduction of force.

Q. 37. Is electricity then its own conductor?

A. Electric force travels with ease according as the cohesive and heat force in any kind of matter gives it facility for speed. Thus silver admits of a better rate of travel than charcoal because of the more favorable arrangement of its particles by the substantial force of cohesion.

Q. 38. Is electricity convertible or transformable into other forces? *

A. It may be transformed into heat, light, and sound. †

Q. 39. Is electricity a material or an immaterial substance?

A. True science teaches that it is an immaterial substance.

Q. 40. Why is it unscientific to teach that electricity is matter, even in its highly attenuated and alleged ethereal form?

A. For two general reasons: 1. It is destitute of properties which belong to all matter. 2. It possesses dynamic powers which are not predicable of matter.

* The Substantial Philosophy has not yet undertaken the tempting task of investigating and explaining the relation which *may* exist between electric force and that obviously *instinctive* force by which the young pigeon returns directly to its distant home, and to that *spirit* force by which the child of heaven seeks with constant yearnings his home beyond the clouds.

† It must be clearly understood that, according to the theory of Substantialism, the all-pervading force-element of Nature is capable of manifesting itself in various forms, according as it is acted upon, and that each of the forms of manifestation of this reservoir of force is capable of being converted into any one of the forms which can be produced from the original condition of the force-element.—Dr. Mott, in *Mic.*, Vol. V., p. 151.

Q. 41. But is not electricity matter in *motion*, or a peculiar *condition* of ethereal matter?

A. Nonsense in motion! Electricity moves matter. That which moves matter can be called matter in neither truth nor science; and that which changes the condition of matter cannot be predicated as a mere condition thereof.

Q. 42. At what velocity does lightning or electricity travel?

A. It has been estimated at 300,000 miles per second by the copper wire route.

Q. 43. And are there men upon the earth in this scientific age who teach that inert matter, or some "condition" of matter can travel at such an astounding rate of speed?

A. Yes, gentle reader, there are still some teachers who stuff their unsuspecting students with such superlative bosh.

Q. 44. Why do they teach it?

A. Because they have been so long chained to the fatal rock of false assumptions that the vultures of educated prejudice have eaten out their very vitals of proper independence as pretended searchers after the truth.

Q. 45. But is it not a mere *influence* going out from matter, or from an assumed condition of matter, as an immaterial nonentity producing certain results which the human mind is bound to relegate to the domain of mystery?

A. Mysterious things are not produced of nothing any more than the things which are more fully accounted for and comprehended. The works which electricity performs bear testimony to the unprejudiced reasoning faculties of man that it is a substantial force-element in the constitution of Nature.

Q. 46. What works does electricity, under God, perform?

A. It is just now a leading question in the minds of advanced thinkers* as to what works are *not* performed by electricity in the physical economy of Nature. It should for the present be satisfactory to all earnest inquirers after the truth that electricity must be a *substance*, a *force* and an active *entity* in Nature, or it could not accomplish what every schoolboy of ordinary intelligence knows to be above and beyond all rational controversy. Time itself would fail before its manifold functions in Nature could be told. It purifies the atmosphere and conserves the conditions of animal life. It is capable of moving the machinery of industrial civilization, and of illumining all the cities of the globe. It carries messages of human intelligence at lightning speed over the mountains and under the oceans of the world. Instead of dissipating, it conserves the energy and renews the vigor of its youth; and will so continue to conserve itself until its marvelous phenomena shall culminate in a grand display of its elemental glory, when the coming of the Son of Man, as lightning shining from the east, even unto the west, shall be heralded by a corresponding display of its correlative forces in the *heat* of burning worlds, the *light* of blazing planets, and the last long *sound* of Gabriel's mighty trumpet.

*Rev. B. T. Kavanagh, D. D., of Owingsville, Ky., a forcible and voluminous writer, has advanced the theory that the heavenly bodies are all moved by electrical or magnetic attraction. This bold theory, plausible in many of its features, has now been before the world for a number of years, and yet down to this present writing there has been no unusual wreck of matter or crash of worlds in any visible portion of the zodiac as a consequence of the change from gravital to electrical motive power.

CHAPTER VIII.

HEAT.

QUESTION 1. What may be properly considered under this general subject of heat?

ANSWER. Its *source, nature, action, and motor-power.*

Q. 2. Whence has heat its origin?

A. God is primordially the source of all substantial things. (See Chapter I.)

Q. 3. But is not the sun in some sense the source of heat?

A. Mediately heat comes from the sun as the great thermal store house or reservoir in our solar system. It also comes from its latent state in Nature when developed by mechanical or chemical action. So does it pass from any body of higher relative temperature.

Q. 4. Is heat made by mechanical or chemical action?

A. It is not. There is static or latent heat in all matter, and it may be produced by friction or favorable combination, just as sound is liberated and electricity developed by compliance with certain conditions ordained of God to such ends.

Q. 5. What is heat as to its *nature*?

A. It is that force in Nature which, by entering our tactile nerves, produces the sensation called warmth.

Q. 6. Has heat an objective existence independent of such sensation?

A. It has; just as light would still have an existence even though all sensuous beings were to become as blind

as materialistic philosophers, or as nearsighted as sensationists in science; just as the æsthetic world would have no less beauty though all angels and men were to lose their powers of admiration; just as flavor would still be found in the savory viands of the sumptuous feast though all the guests should be deprived of their gustatory nerves; and just as sound would still have its objective existence even though all men and birds and beasts were to become as deaf as adders are supposed to be.

Q. 7. Is heat a real substance?

A. It is just as really a substance as the water which it converts into vapor, the air which it rarifies, the clay which it hardens, the wood which it reduces to ashes, or the material elements of the building which it licks up with the cloven tongues of its conflagration.

Q. 8. But do not the text-books of the schools and the representative physicists of the world teach that heat is "only a mode of motion"?

A. They all so taught until recently, when the appearance of the glorious gospel of the Substantial Philosophy began to show the tremendous fallacy of such teaching; and even yet there are some who still cling to this mode of motion theory of heat.*

Q. 9. What do such authorities say in support of this theory?

A. They lay down false premises and start their sophistry from a false assumption; viz.: that *rest* is an abnormal state of matter, and that therefore "even the molecules of a solid are in constant vibration. This assumed voluntary activity of inert matter is supposed to produce heat. Thus the cart is placed before the horse,

* See "Appleton's Cyclopaedia." Vol. 8, p. 568, Steele's "Nat. Philosophy," p. 228, and "Heat as a Mode of Motion," by John Tyndall.

and as they with the driver go rolling and tumbling down the hill amidst the adulation of thoughtless fools, the regular symposium of the world's philosophers look exceedingly wise at what they call thermo-dynamics.

Q. 10. Then heat is something more than vibratory rotation of molecules in matter?

A. Indeed it is. True science rejects the whole miserable assumption and sophistry of molecular motion. Rest or quiescence is the normal state of matter. If gravity had been recognized as a force-element in the universe, the learned world would never have fallen into such a fundamental fallacy. Inertia is a property of matter in lump; why should it not be considered a property thereof in smaller quantity? If matter cannot move itself in mass, why should science conclude that it can do so in molecule? The sooner the world's bookful block-heads abandon the theory built upon such an assumption the better will it be for all parties except those who are building precarious reputations for wisdom out of the wood, hay and stubble of false science.

Q. 11. Is inertia a property of immaterial substances?

A. Not in the same sense that it belongs to matter. God has given to some immaterial substances power to move themselves. He has not endowed matter with such power. Heat being an immaterial force-substance, has derivative dynamic power in itself.

Q. 12. Why should heat have such power when it has been withheld from matter?

A. Because it was in accordance with the pleasure and wise purpose of God, the great source of all things material and immaterial, so to ordain it. He may have created the horse to pull the wagon because the wagon cannot move itself.

Q. 13. What is the first peculiar motion of heat as a force?

A. Diffusion.

Q. 14. What is diffusion?

A. That property or ability of heat by which it travels or disperses itself.

Q. 15. Is it not ascribing to heat an attribute of Deity to concede to it the power of self-motion?

A. It is not claimed by the Substantial Philosophy that heat either originates itself or endows itself with self-impelling energy, but that it came into existence from God's own substantial being, and brought with it the principle of its peculiar impulse as a force-element in Nature, as well as the law of its diffusive activity. The same is true of magnetism, electricity, sound, and also of all the life-forces, even up to the intellectuality and spirituality of the human person. See Chapter XI.

Q. 16. By what law or rule does heat travel?

A. While it has some things in common with all the forces of Nature, its law of travel has some peculiarities of its own.

Q. 17. Does it travel equally well through all kinds of matter?

A. It does not. Like sound and electricity, heat travels better and faster through some bodies than others.

Q. 18. Does heat require a material medium or conductor through which to travel?

A. It does not. Heat travels with greater freedom and speed when by strict radiation it darts away in every direction, and like gravity and light shoots its rays from world to world.

Q. 19. Do rays of heat elevate the temperature of the media through which they pass?

A. They do.

Q. 20. What is the teaching of the text-books upon this point?

A. The language of the text-book* before us is: "Rays of heat do not elevate the temperature of the media through which they pass." But let the professor lay his hand on a bar of iron with one end heated, and thrust it into a vessel of cold water, and he will soon feel the temperature of the medium rise high enough to burn his hand—possibly high enough to burn his book.

Q. 21. How does he attempt to prove his fallacy in science?

A. By the statement that "space is not warmed by the sunbeam."

Q. 22. Is not this latter statement correct?

A. It is correct, because space is nothing, and consequently there is nothing in its emptiness to warm. It is just as impossible to warm space as it is to warm motion or a triangle. It is, however, different when the medium of heat's travel is a material substance. Space being nothing, it is not media. It is *room* for something.

Q. 23. But is not all interstellar space filled with *ether*, and, if so, is not this ether necessary to the conduction of heat?

A. Yes. False science, in its ignorance of substantial immaterial forces, manufactured ether, and out of it constructed some hypotheses which it will be glad to get clear of as soon as the brightening, broadening splendor of revolutionary truth succeeds in driving such imaginary "jelly" from the skies.

Q. 24. Is there any difference between the *conduction* and *radiation* of heat?

A. The term *conduction* is most proper in speaking of the travel of heat through dense material, while radiation primarily signifies the dispersion of heat from the surface of a dense body containing more heat than the

* Steele's "Fourteen Weeks in Philosophy," p. 245.

surrounding atmosphere, space or *ether*, provided there be such a thing in existence.

Q. 25. What is the effect of heat upon matter?

A. Its direct tendency is to overcome cohesive attraction and expand the mass. In chemistry and in the sphere of life its effects are numerous, and often the very reverse of each other. It changes the form of matter differently, as in the thawing of ice, and in the hardening of an egg by boiling. It hardens clay while it melts iron.

Q. 26. Why does heat have such an opposite effect upon different kinds of matter?

A. Because in different kinds of matter the particles are differently arranged by the force of cohesion; and also because other forces operative in matter are differently correlated with heat and with each other. Forces act less freely when largely antagonized or neutralized by other forces.

Q. 27. What was the purpose of God in endowing heat with the power and facility of manipulating matter, and traveling through matter by way of conduction, and radiating from matter by way of general diffusion?

A. To enable it to accomplish its mission in the general economy of the universe.

Q. 28. What is its peculiar mission as a traveler?

A. Like electricity it serves to restore equilibrium between extreme conditions.

Q. 29. Between what two extremes does radiation seek to restore equilibrium?

A. Between intense heat and severe cold.

Q. 30. Why is such intermediate state or moderate temperature demanded in the economy of Nature?

A. In order to serve Nature's higher purpose—the preservation and propagation of animal life.

Q. 31. What degree of heat is most favorable to the accomplishment of such a purpose?

A. The required degree of heat or *warmth* differs according to circumstances, according to the specific nature of the animal or animated being, according to its environments, and the specific purpose each animal or living being is to serve in the general economy of Nature. Human life attains its fullest earthly development and finest earthly form in the Temperate Zone and a degree of warmth not far from the half-way point between sixty degs. below zero and boiling water point, 212 degs., above.

Q. 32. If then the proper equilibrium or temperature more favorable to the preservation and perpetuation of animal being is more or less adjacent to the middle point between a destructive degree of intense heat and the severity of extreme cold, and if heat, as Substantialism teaches, is a positive entity, does it not follow in reason that *cold* is also something substantial in its nature, since it *seems* to join with heat in producing certain results?

A. It does not so follow. Cold is a negative idea of which we can have but a negative concept. It is a non-entity. On this point the text-books are mainly right. And it would be strange indeed if it were otherwise. The current materialistic theories of physical science, while they deny the positively substantial character of all entitative force-elements in Nature, would be unpardonably inconsistent if they should hesitate or fail to call a genuine nothing by its right name.

Q. 33. Do the analogies of Nature tend to confirm the correctness of this view?

A. They do. Negative darkness is the absence of light. Silence is the absence of the substantial force-element called sound. Death or lifelessness is the negative of life—a nothing of which the human mind can form no positive concept. Absolute vacuity, if such a

thing were possible, would be the absence of everything—a realm of emptiness—space—nothing.

Q. 34. Is absolute cold the absence of *all* heat?

A. Theoretically, it is; practically, it is an impossibility. Nature despises a vacuum, and raises her protest against it in every part of her domain. If all other substances were to rebel and secede from the territory of her dominion, her partial desolation would still cry out through inter-stellar space: “Let there be gravity!” and “Let there be light!”

Q. 35. What do our experience and observation teach concerning the presence of some heat in all places and in all matter of which we have any knowledge?

A. They teach, in harmony with Revelation, that since God “set a tabernacle for the sun” “there is nothing hid from the heat thereof.” Two pieces of ice rubbed together will develop heat, proving that there is a limited quantity of heat even in the cold bosom of an iceberg.*

* And here let us say, in passing, that this natural law or tendency to diffusion, which causes heat to radiate from one body of greater heat into another possessing less heat, thus seeking to establish equilibrium, would seem necessarily to preclude the possibility of the absolute non-presence of heat, even in the coldest ice of the arctic regions. . . . Ice can be frozen solid at 30 deg. F. But it becomes colder and colder by thermometric test down to zero, then on down to 40 deg. below zero, when the mercury solidifies in the bulb of the Fahrenheit thermometer. Of course it could only become colder by the radiation of more and more heat, and therefore there must have been *some* heat there to get out. Then by another thermometer of greater range we still trace the further radiation of heat even from that arctic ice down to the equivalent of 60 deg. or 70 deg. F., and all the time it is solid ice, though all the time having some heat yet to part with, making the cold, as we call it, or *heat-absence*, more and more intense. Clearly, if there were not some heat left in ice at 60 deg. below zero, it is plain that a thermometer in contact with it could not continue to go down.—Dr. Hall, in *Microcosm*, Vol. III., p. 283.

Q. 36. Does cold join with heat to restore an equilibrium—does it draw heat?

A. No more than an empty stomach can draw a loaf of bread.*

Q. 37. If cold is not an entity and positive force, how can we account for the *apparent* fact that it solidifies water and other liquid forms of matter, converts mill-ponds into skating-rinks, bursts solid masses of metal by the freezing of a few drops of water, when confined within them, and turns melted mineral into pig-iron, cog-wheels, and cooking-stoves?

A. Scientifically speaking, cold does nothing of the kind. It is the radiation or departure of heat from liquid mineral that gives cohesion an opportunity to reassert its power in restoring mineral matter to its more normal state. The same is true in the freezing of water. Heat radiates from water as long as its temperature is above the mean temperature of all adjacent and surrounding substance. After the temperature of the water is thus reduced to freezing point, any further radiation restores water to its more normal condition—ice.† The

* If two water-tanks, one full and the other empty, were connected at the bottom by an open faucet, it is plain that the *emptiness* of the one tank (corresponding exactly to *thermal* or *magnetic cold*) does not force the water out of the other tank; but it merely permits the water to run out by a law of Nature in order to establish an aqueous equilibrium. How plainly this appeals to our common sense!—*Ibid.*

† Freezing into ice and expanding into greater bulk, are not, therefore, the action of *cold* at all, scientifically speaking, but are the effect of the natural radiation of heat from the liquid body which thereby allows it to return to its normal condition of solid ice. The bursting of a mass of iron by the expansion of a little confined water in the act of turning into ice is not, therefore, properly the work of cold in any positive sense, but is simply the work of heat in the act of withdrawing by radiation

normal condition of water requires for it more room than when cramped up in its abnormal state of lukewarmness; hence the bursting of the metal globe or vessel in which freezing water is confined.

Q. 38. Why does congealed water require more room than water in a moderate temperature and fluid state?

A. Because the particles when thus crystallized will not fit together with the same compactness as when in their fluid and abnormal condition.*

Q. 39. But will not heated water also burst the vessel in which an attempt is made to confine it; and if so does

* The reason why *ice* takes up more room in the act of forming than liquid, is this: the particles of water being round fall together with the greatest possible compactness and with the least possible interstitial spaces between them, thus taking up the least possible room. Now it is evident that all the particles of a given mass of water would not radiate their heat with the same facility, or at the same instant. Hence those particles first giving up their heat will form themselves into crystallized particles of irregular shapes, which of course will take up more room than the perfectly round particles. As there is no place for them they commence wedging themselves in between the fluid particles, forcing them apart, which being almost entirely incompressible (and acting also as frictionless wedges—see solution of hydrostatic pressure) must begin to exert a powerful strain upon the inclosing cylinder; till finally, as the crystallization continues, millions of these infinitesimal wedges have formed and come into play, thus bursting the cylinder asunder. It is simply split by the action of an infinite number of mechanical wedges. That's all. Now to say that cold bursts the cylinder, is the same as to say that *vacuum* crushes the thin glass receiver surrounding it; whereas it is only the pressing of the air which causes the collapse.—Dr. Hall in *Microcosm*, Vol. 3., p. 214.

from the inclosed water, thus allowing it to return to its normal condition or more enlarged form of ice, which necessarily bursts the cylinder containing it.—Dr. Hall, in the *Microcosm*, Vol. III., p. 314.

it not follow that steam like ice is also a normal condition of matter.

A. In either case it is heat which causes the bursting of the vessel. Cold has nothing to do with it in any positive way. As Dr. Hall has so forcibly illustrated with the thin glass receiver, the *vacuum* does not do the crushing; it is the work of the *air*, or more properly the work of *gravity* making use of the air at the rate of fifteen pounds to the square inch on the outside. Put one receiver into another and pump (radiate) out all the air not confined within the inclosed receiver, and the result will be the crushing *out* of the walls of the small receiver. Hence whether crushed *in* or *out* the work is performed by the same force.*

* Other difficulties have been suggested, such, for example, as the fact that a touch of the naked flesh to ice in the polar regions, at forty degrees below zero, will raise a blister the same as would the touch of hot iron, and will even cook meats the same as will boiling water. Is it possible, it is asked, for *heat* and *cold* both to produce the same results, and one of them be merely the absence of the other? We answer, as before, that cold does not do it, strictly speaking. Our key will unlock even this mystery. *Normally*, flesh could not exist at all. It is an abnormality, a creature of *heat* operating in a partial degree of intensity, say 86 deg. F. Increase this heat 126 deg., or to 212, and flesh is disintegrated or destroyed as living organic substance; reduce this same heat, which allowed flesh to organize, 126 deg., or to 40 below zero, thus exposing it to a condition in which normally it could not have come into existence at all, and its texture is equally destroyed as living flesh, or, in other words, it is *cooked*, and it will so appear when returned to that degree of heat which organized it. Hence, the canning of cooked meats is claimed to be done as effectually by the absence of heat as by its excess. Thus the *life-point* of heat for organizing flesh, 86 deg. F., seems to be exactly midway between the two extremes of heat or its absence where flesh will, after organization, become disintegrated; or, as we commonly designate it, *cooked*. Keep it at either extreme, and it will not putrify for

Q. 40. Is it true that heat can be generated by the contact of a moving body with another at rest or in motion?

A. It is not true, save so far as such stoppage of motion by contact produces friction in either body among its displaced particles. Mere contact of two bodies, where there is no distortion and resultant friction, would produce no appreciable heat, however large the colliding bodies might be, or however swift their motion when coming into contact, even should it be two worlds as large as our own. As motion, *per se*, is absolutely noth-

ages—one on account of the intensity and the other on account of the want of heat, but neither of them as the result of cold.

Take the experiment of testing the temperature of different substances in a room where they are equally exposed to the same degrees, and it is easily explained by this simple philosophical law. The iron, for example, is certainly colder under the same conditions of exposure than would be an equal mass of wool; not because cold is a substance, or because it can get into the iron with better facility than into the wool; but because substantial heat radiates or departs from iron with greater facility than from wool, and thus restores it quicker to its normal condition. Indeed, such is the affinity of heat for wool or fur that it will not entirely radiate for a long time, even in a region of the lowest temperature. Hence the heat of a man's body communicated to clothing of wool is retained in the woolen fiber, while a person clothed in the same weight of *linen* might freeze to death because of its greater facility to radiate or part with the heat of the person wearing it. In like manner iron, exposed to the sun's rays above a medium temperature, absorbs heat with the same facility with which it parts with it in excessive cold, or cold below a medium temperature; while with wool and many other substances it is *vice versa*. Hence, iron in a hot sun will blister the hand, while the heat of woolen cloth, similarly exposed, will scarcely be felt. How completely all this harmonizes with the views here set forth, that heat is the only real entity involved in the premises!—Dr. Hall's discussion with Dr. Roberts on "cold" as an "entity," in the *Microcosm*, Vol. III., p. 215.

ing, the mere stoppage of motion cannot produce heat only as the conflicting inertia of the two bodies causes displacement of their particles and resultant friction. A leaden bullet, when fired from a gun and stopped by contact with a steel target, will show sensible heat, because in flattening out its particles powerfully abrade each other; but fire a tempered steel bullet and stop it in the same way, and not even a small fraction of the heat observed in the lead will be noticed, because there can be but very little distortion of the metal, and therefore but very little friction among its particles, though its motion was just as suddenly stopped as in the case of the leaden bullet. Dr. Hall was the first scientist to oppose this popular view of the text-books, that the mere stoppage of motion will generate heat.

Q. 41. But since the sudden compression of air or other elastic gas is known to generate sensible heat, why should not mere contact of weighty bodies produce the same effect?

A. It is a serious mistake of physicists that the sudden *compression* of air under a piston generates any sensible heat, the only heat thus generated being the inappreciable modicum caused by the friction of the air-particles among themselves and against the sides of the containing vessel, an amount which is too trifling to be recorded by the most sensitive thermometer.

Q. 42. If this be true, how is it that a piece of punk placed in a tube will take fire by the sudden compression of the air upon it by means of a piston, as shown by Prof. Tyndall in his "Heat as a Mode of Motion," and his "Lectures on Sound"?

A. The substantial heat already in the air of the tube is condensed to a smaller compass, or brought within a smaller space, and to the same degree that the air itself is condensed or made more compact, thus intensifying the heat already there, and not in any sense increasing

the heat by compression. This new law in physical science, first discovered by Dr. Hall, if irrefutable, overturns the entire philosophy of heat as a mode of motion, since manifestly nothing can be condensed into a smaller compass, and be thereby intensified in the same ratio, unless it be a substantial entity, either material or immaterial. As well insist that air itself is a mode of motion, and not a substantial entity, since it shows precisely the same result of increased intensity or compactness by compression, as does the heat contained in it before the piston moves.*

* Having already shown, according to the current theory of acoustics, that the *locust*, which is able to fill four cubic miles of air with its *sound*, ought also to fill the same air with *heat*, whether its stridulating force sent out shall result in sound or not, we now come to another phase of the discussion, namely, the real effect of atmospheric condensations and rarefactions, as relates to the heat and cold observed in the same: and we have no hesitation in promising the critical reader in advance one of the most, if not the most, important scientific discussions in this connection which we have ever had the honor of producing in these pages.

At the very threshold of the argument, therefore, we venture to announce what we, as well as others, regard as a new and most revolutionary law in physical science, to wit: *that the heat observed, when a mass of air is suddenly condensed, is not "generated" at all by such act of condensation, as the present theory teaches, but that it was already in the air and to the same amount precisely before the condensing operation was commenced, its apparent "generation" being only the concentration of this substantial heat to a smaller space, thereby intensifying it in the same ratio as the air containing it was reduced in volume.*

If this law be true, it necessarily overturns the present theory of "heat as a mode of motion," and demonstrates heat to be a real substantial entity, or objective existence, as much so as is the air, only that *heat* is an *immaterial*, while *air* is a *material* substance. For surely if *heat* is capable of being condensed, and thereby concentrated to greater intensity, the same as is the

Q. 43. Is heat a *motor power* in the mechanical and commercial industries of the world?

A. It has been so utilized for more than eighty years, and will probably be so applied in the future until the inventive genius of man shall triumph in the discovery of some force more powerful or of some new application of force in a manner that will render it more powerful and economical in the performance of the same or similar service.

Q. 44. But is it not the elastic force of steam which

air containing it, it must in all reason be as really a substantial entity as is the air itself.

The present theory teaches that the heat observed, when confined air is compressed, is actually "*generated*," or comes into existence, by the conversion of the mechanical force which was expended in compressing the air: not one single physicist having conceived the idea, so far as the record shows, that by putting two volumes of air into the space of one we necessarily put the two volumes of substantial heat contained in the air into the space of one, thus doubling its intensity. This position, therefore, if true, is so revolutionary and startling, in the very face of the present theory of "heat as a mode of motion," that it cannot be too carefully analyzed and impressed upon the reader's mind.

We do not wish it to be inferred, from this assumed law, that we discard the fact of the conversion of mechanical force into heat, as well as into light, electricity, sound, magnetism, and even other forms of force. In the usual experiment of compressing air into a tube by means of a tightly-fitting piston, there is no doubt that a slight but inappreciable amount of heat is generated by the friction of the piston against the sides of the tube, and also by the friction of the air particles against each other in the act of being compressed, which trifling heat may be properly attributed to the conversion of mechanical force: but this is by no means the intense increase of heat observed in the compressed air, nor has it anything to do with the heat claimed to be "generated" in such experiments, as taught by the whole scientific world. This will be shown so clearly as to satisfy every attentive reader.—Dr. Hall in *Microcosm*, Vol. V, p. 160.

drives the engine and moves the cargoes of commerce to the marts of the world?

A. The text-books so teach:* but they are radically wrong. As shown in a former chapter of this book, elasticity, while it is a very peculiar property in matter by which cohesive attraction is enabled to become a constructive force in nature, it is not strictly a force element, but rather a property of matter.

Q. 45. Has heat, as a motor power, anything analogous among the other forces of nature?

A. It has. Gravity uses water to turn the water-wheel of the mill, as shown in Chapter VI., and heat uses steam to whirl the burs and press-rollers of the flouring-mill and to drive the multiplied and multiform machineries of the world's busy workshop.

Q. 46. What will be the final result of the rapid strides now being made by the inventive genius, utilitarian tact and grand achievements in the world's march of progress?

A. The effect upon science, which is now, as never before, learning to see God's invisible things in Nature, and to trace their origin back to the Divine hand and the Divine substance, will be to make it more devout, and, in its increased devotion to the truth, make religion more scientific. †

* See "Steele's Nat. Philosophy," p. 247.

† To illustrate: If the engine moves, we know it must be by the force of the steam behind the piston; but what moves the steam? It, too, must have a force behind it by which it acts, as steam is as much an inert entity as the water from which it has been expanded into vapor. That force which makes steam effective is *heat*. But heat, again, is an entity—a substantial, objective, finite, or limited thing—and as such can only *act*, and thereby move the water, changing it into vapor, thereby acting on the piston, thereby moving the engine, thereby propelling the

train, and, finally, transporting the passengers. What force is it that moves this substantial heat into effective action? * * * Does not wisdom, then, utter her voice and cry aloud even in the streets, assuring us that there must of necessity be an ultimate, intelligent, self-existent, and unoriginated fountain of force as the moving power of all the forces, and other entities in nature, and as the primordial First Cause of all the minor causes in this universe which come within the observation of sentient beings?—Dr. Hall, in *Scientific Arena*, Vol. I., p. 13.

CHAPTER IX.

THE NATURE OF LIGHT.

QUESTION 1. What is light?

ANSWER. Light is that form of physical force by which the sense of sight in men and animals is addressed and affected.

Q. 2. Is light anything different and distinct from the effects or sensations produced thereby?

A. There is as much difference and distinction between the two as there is between odor and the sensation of smelling, or any other force in Nature and its phenomenal effects. Light exists external to our senses. If it had no such external existence, it could not so act upon our organs of sight, or come into such contact with the retina as to bring distant objects within the compass of our observation and under the power of our recognition.

Q. 3. Is light, then, an objective entity without any dependent relation to that which it may produce in the way of subjective experience?

A. Its existence is as really objective as that of the sun; and Milton merely echoed back the revealed truth of God when his pen recorded the poetic sentiment:

“ Before the sun,
Before the heavens thou wert, and at the voice
Of God as with a mantle didst invest
The rising world of waters dark and deep.”

Q. 4. If light is an objective entity, may it not be a subject for scientific investigation, in search of what it is

per se, without primary reference to that branch of physical science called *optics*, as usually treated in the textbooks?

A. The effects and phenomena of an entity may assist us in our attempts to attain to a correct knowledge of the nature of such entity; yet the investigation of the subject in search after the real nature of the objective entity should be held as something entirely distinct from any consideration of or inquiry into its phenomena.

Q. 5. How may the positive investigation of an entity be gradually approached?

A. By considering it negatively, or as to what it is *not*. This implies also the clearing away of any false or defective theories which may have stood in the way of science, in its attempts to attain to a more perfect knowledge of the real nature of such entity.

Q. 6. What two theories of light have been assumed as correct and taught in connection with the science of optics during the last few hundred years?

A. The *Emission* theory and the *Undulatory* theory.

Q. 7. When and by whom was the emission theory originated?

A. It seems probable from the readings of history, that it began to take form under the powerful mind of Descartes, in the first part of the 17th century, and reached its highest form of defective perfection, as well as the earliest stage of its abandonment, under the mathematical genius of Newton in the beginning of the following century of the Christian era.

Q. 8. What was the emission theory.

A. That light consisted of material corpuscles or little luminous balls sent off from the luminous bodies, and by virtue of their supposed elasticity* bounded and re-

*The property of elasticity has been superficially mistaken by all writers on physical science, ancient and modern, for one of

bounded through space and all transparent media at the enormous velocity observed, entering our eyes, and thus causing the sensation of sight.

Q. 9. Was it really held and taught as science that these luminous balls were of material substance?

A. The popular scientists, then as now, had no proper conception of any other than material substance.

Q. 10. What is the undulatory theory?

A. Truth and justice require that it be defined by one of its ablest apostles and scholarly friends. Prof. J. Dor- man Steele, on page 189 of his "Fourteen Weeks in Philosophy," says: "*The Undulatory Theory of Light.*— There is supposed to be a fluid termed *ether*, constituting a kind of *universal atmosphere*, diffused throughout all space. It is so subtile that it fills the pores of all bodies, eludes all chemical tests, passes in through the glass receiver, and remains even in the vacuum of an air-pump. A luminous body sets in motion waves of ether, which pass off in every direction. These [waves] move at the rate of 183,000 miles per second, and breaking upon the eye, give to us the impression of sight. This ethereal

the forces of nature, instead of being, as it is, the *effect* of force merely. This error runs through every text-book we take up, and the most critical investigators, we are sorry to say, even after their attention has been called to it, still persist, on account of their prejudice or habits of thinking, in trying to make a plausible showing of argument in defense of this most unscientific blunder of their predecessors.

We are humbly proud of the honor, and we say it without boasting, of having been the first to announce the true explanation of elasticity as in no sense a force, but as a characteristic or property of a material body superinduced by the action and persistence of the force of cohesion in so arranging and sustaining the particles of the body in relation to each other as to permit the mechanical force, after distorting the body, to store itself up in it, and thus react, when outside resistance is removed, by which to restore the distorted body to its original form.—See *Microcosm*, Vol. IV., pp. 346, 347.

wave-motion is precisely like that of sound, except that the vibrations are *transverse* (crosswise) to the line of direction."

Q. 11. What is the fundamental difference between the two theories?

A. According to the *emission* theory, light is the transference of luminous matter; according to the *undulatory* theory, it is the vibration or motion of something "supposed" to be ether.

Q. 12. By what other name was the emission theory called?

A. It was known also as the *corpuscular* theory.

Q. 13. Were these corpuscles, of which light was supposed to consist, material or immaterial?

A. As already stated, in answer to Question 9, before the appearance of the "Problem of Human Life," the world had never conceived of anything like *immaterial* corpuscles.

Q. 14. Did Newton finally abandon his emission theory of light?

A. He does not seem to have continued holding it with clear conviction and entire satisfaction after the undulatory theory had been introduced.*

Q. 15. Was it supported by the testimony of observed facts?

* With a moment's reflection, the reason must be clear to every reader, why Sir Isaac Newton could not maintain his corpuscular or emission theory of light; for a more unreasonable or impossible hypothesis was never propounded. How he could, for a moment, have supposed that "*material particles*," however minute, could penetrate and pass through the hardest crystals—even diamonds—without meeting with resistance, to say nothing of pouring into the eye at such an enormous velocity without injury to that delicate organ, is one of those profound mysteries which great scientists are called upon to explain.—Dr. Hall, in *Microcosm*, Vol. II., p. 351.

A. Indeed it was not. On the contrary, its assumptions were proven false by the inexorable logic of mathematics as applied in calculating the astounding velocity of light.

Q. 16. What did such applied mathematics show?

A. That light had nearly a million times the velocity of sound through the atmosphere. This was considered too much speed for the travel of matter, even though the luminous balls of matter were supposed to be small enough to be called corpuscles.

Q. 17. What insuperable incongruity stood in the way of the emission theory?

A. It was out of harmony with the undulatory theory of sound, which then, as now, taught that sound consisted of atmospheric waves.

Q. 18. What was done to bring agreement and harmony among the several members in the family of physical sciences?

A. The theories of heat and light were both so reconstructed as to bring them into greater harmony with the science of acoustics.

Q. 19. Did the change of light and heat into modes of motion really harmonize physical science as taught at that time?

A. Not by any means. This change, so far from harmonizing science and reconciling its discrepancies, merely subverted two of the forces (light and heat) from an already false basis (material corpuscles) to another false basis (material wave-motion), by which to make them conform to another and underlying false basis (air-waves in sound), thereby trying to bring about the impossible harmonious congruity of error as the result. Yet when these three forces were thus temporarily reconciled, there stood directly in the face of this patched-up scientific truce, the overwhelming fact that odor was

known and admitted to be real substantial emanations by which the sense of smell is addressed by the actual contact of odorous particles with the nasal membrane, and that no mode-of-motion theory or wave-hypothesis could swerve this sensation-producing cause from its substantial anchorage as a scientific fact.

Q. 20. Did the scientists of that age, in their discussions of light and their final abandonment of the corpuscular theory, ever acknowledge the difficulty of *odor* standing in their way?

A. No; so far from acknowledging it, they apparently ignored it, as have done all other scientists since their day when discussing light, heat and sound as modes of motion. One of those early scientists gave it as the strongest possible analogical proof that light must be the wave-motion of some kind of substance, since it would be unreasonable to suppose that Nature would make such an abrupt leap from the sense of hearing, addressed by wave-motion, to that of sight addressed by the contact of substantial light-particles. Yet these great physicists overlooked the fact, that they had forced Nature to leap just as abruptly from the sense of smell, addressed by actual substance, to the sense of hearing influenced alone by wave-motion! The author of the "Problem of Human Life" was the first writer on record to introduce in these discussions the senses of touch, taste and smell, and the substantial agents which actuate those senses, as an overwhelming analogical proof that the other senses, as well as sensation-producing causes, must continue right along the line with the same substantial order of things, merely grading the refinement of the substantial contacts to suit the various senses, and thus to correspond with their delicate structure.

Q. 21. What other objection has since been raised to the emission theory of light?

A. It has been found by careful calculation to be

dangerous to the delicate little membrane known as the retina of the eye, as well as destructive of its own eyes when once exposed to the incandescent light of true science.

Q. 22. How can it be made to appear as something dangerous to the eyes?

A. The degree of perfection to which the science of optics has been carried, even though conducting its investigations upon a radical misapprehension as to the nature of light, accompanied by a careful examination of the eye, has shown, in a manner most alarmingly conclusive, that the organ of sight is such a delicate piece of anatomy that it can no longer endure to be shot at from some great celestial gun, charged with mysterious dynamics and multiplied bullets every time the eyelid is raised and the retina exposed to the enflaming fires of the emission battery.

Q. 23. Did the emission theory really involve such a dangerous doctrine?

A. It has been settled beyond dispute, by the assistance of the science of astronomy, as applied in observing the motions of Jupiter's moons when passing into the shadow of that planet, and by the conclusions reached from other confirmatory observations, that light moves with a velocity of not less than 180,000 miles per second. Now this was considered to be decidedly unsafe for anybody's eyes, especially for eyes affected and afflicted with unscientific myopy, and it was finally decided either to get out of the destructive range of the emission guns or to invent some other theory, more easily managed and less dangerous to the very valuable organ of human vision.

Q. 24. But were not these material particles or luminous bullets very small?

A. They were almost infinitesimally small, it is true, but the astounding velocity with which they flew would

still give them a very dangerous quantity of momentum, according to the truth of the generally admitted formula that "the momentum is always proportioned to the quantity of matter multiplied into the velocity." Just think of several thousand little bullets shot into one's eyes with several hundred times the velocity of a rifle-ball!

Q. 25. But were not these little luminosities imponderable—without any weight?

A. According to the theory of which they were a part, they were material. Being material, they must have had the properties of matter. Ponderability is one property of matter. As each material corpuscle, therefore, was a fraction of a pound, as to its quantity, its weight must have had the same fractional proportion.

Q. 26. So the emission theory had to pass away?

A. Like the wave-theory of sound at the present time, it began gradually to recede.

Q. 27. What should then have been introduced in its stead?

A. The theory of substantial *immaterial* substance.

Q. 28. Was it not then suggested?

A. It was not even dreamed of.

Q. 29. Why not?

A. God's set time to favor science in such form had not yet come. The Malakhoff of all the physical sciences was yet held by the old false theory of sound, and it was simply impossible to conceive, formulate, and hold a correct theory of light as long as the citadel of acoustical science was occupied in ignorance of the truth, even though its ramparts were strong in nothing but the accumulated moss of past centuries. If the true theory of sound, as advanced by Dr. Hall in his writings, and as formulated in Chapter X. of this book, had then been suggested, the intellectual and moral giants of the sev-

enteenth century, instead of barricading themselves behind their prejudices, would have repented in dust and ashes for the nonsense which they previously held concerning these forces of Nature. But *they* never saw the truth in the light of the glorious sunrise of Substantialism; and for that reason they shall be able to rise up in judgment and condemn much that is popularly unscientific in this generation.

Q. 30. What was substituted for the emission theory?

A. The undulatory theory of light.

Q. 31. In what did it differ from the former?

A. It rejected, or denied, the materiality of the rays or beams of light, and substituted *motion* for *matter*.

Q. 32. Motion of what?

A. Yes, there now, dear reader. That question is very hard to answer. It has been called motion of energy without any clear conception or definition as to what is meant by energy. The text-books are full of circular syllogisms. They talk about the properties and laws of light without any conception of entitative light upon the subject. To assume the existence of motion without something to move may do in the sphere of abstractions, but it will not do in a world of concrete realities. Such talk is just about as rational and satisfactory to scientific minds as it would be for a hungry man to attempt to take breakfast on motion, dinner on vibration and supper on obtuse angles and abstract zigzags.

Q. 33. Did not the theory meet with some opposition at its first introduction?

A. Indeed it did.

Q. 34. What was the ground of such opposition?

A. It was rationally claimed that there could be no vibration where there was nothing to vibrate—no reflection where there was not something to reflect. And as it was known that the atmosphere of our planet did not

extend more than two millionths of the distance to the sun, the difficulty was to get the rays of light down from the vicinity of that luminous orb in the shape of vibrations without something to vibrate.

Q. 35. What was done in the extreme exigency of the case?

A. Some of the great minds of that Newtonian age began to stir up the latent powers of their inventive genius. About that time a prolific Dutchman, who was already rising to eminence as a physicist, came over from Holland and suggested *ether* as the very thing that was required to keep the light turned on.

Q. 36. But was not ether an article of mythologic and scientific faith before the time of Huygens?

A. Yes, some of the poets had already sung its praises as something intimately related to their most excellent gods. Some had invoked their deities to teach them how to strike their lyres and send their loftiest strains abroad and up through ether's boundless temple. Some praised it as the "supposed" primordial principle of fire; others sought its acquaintance that they might do it homage as the worshipful source of all being. Descartes even intimated that it was the medium through which light came down from the skies; but it remained for Huygens to invent it in such fluid form and obliging subtileness as to meet the requirements of that peculiar scientific crisis.

Q. 37. Has the great invention of Huygens been properly valued by the scientific world?

A. His services have been fully appreciated, especially by the advocates of the undulatory theory of light.

Q. 38. Why do they have such high appreciation of his services in this particular department of physical science?

A. The reason is obvious. Something of the kind was

an absolute necessity. Without ether the undulatory theory could have had no existence. Ether was the anæsthetic administered to both mother and child upon the occasion of the uncomely baby's birth. The theory inhales ether as the breath of its precarious life, and upon ether it has subsisted for 200 years. In ether it lives and moves and has its being, and with ethereal luster shines.

Q. 39. What evidence is there that there is such an element in existence?

A. The only evidence of its existence is supposition. "There is *supposed* to be a fluid termed ether," says the text-book before us. The undulatory theory is built upon ether, ether rests upon supposition, and the supposition is based upon a radical misapprehension of Nature's forces. Such a theory is rather too ethereal for any earthly use. For our part, we would sooner have a few of Newton's material corpuscles shoot us in the eyes than to be made so unscientifically blind by the transverse vibrations of an ethereal supposition.

Q. 40. Have we no evidence of the existence of ether through the testimony of the senses?*

* Well, what was all this prodigious discovery of *ether* for; and what was it that led to this scientific leap from the frying-pan into the fire? Why, it all came from the apparent difficulty of *light-refraction* in water, and occurred solely because Newton and Huygens did not grasp at that time the true and beautiful doctrine of *Substantialism*. Had they realized that light was an *incorporeal substance* instead of matter, they would have had no more difficulty in explaining refraction by waves or pulses of substantial light itself, than by waves of substantial *ether* for the existence of which there has never been either use or evidence. And further, had they been fortunate enough at that time to have caught the broad idea of innumerable immaterial substances, it is plain to reason that not only light but sound itself would for a hundred years up to this date have been taught as substantial emissions in all the colleges of the world, instead of being held as the nonsensical wave-motions of

A. None whatever. Eye hath not seen it, ear hath not heard it, neither hath it offered testimony to the gustatory nerve. It has never been recognized through the olfactory organ of our sensuous being; neither has it evoked our recognition by any tactile touch.

Q. 41. But may not the same be said of the immaterial forces which underlie the whole system of the Substantial Philosophy?

A. No, indeed. The works which these forces manifestly perform bear testimony of their real entitative existence. The advocates of the undulatory doctrine of light admit their existence, and dispute their substantial character for no other obvious reason than that such admission would destroy the necessity for their ether, sap the foundation of their theory, and tumble the whole miserable mendicancy of its nonsense into merited ruin and rubbish. The substantial force-elements of Nature authenticate themselves through the right use of the faculty of reason, when exercised with rational scientific faith, while ether is absolutely unknown, except through the tactile touch of supposition.

Q. 42. May not the motions of the *ether*-waves, as supposed and taught in the undulatory theory of light, cause the sensation of seeing by the tremulous action of such refined form of matter against the optic nerve, similar to the action of sound-waves in air, and their tremulous effect upon the ear-drum?

A. No; for while such an assumption is forced and far-fetched, it has not one rational analogy in Nature to justify it, as will be more fully shown when we come to treat of the nature of sound. Motion of itself is nothing but the changing position of some substance in space,

the air; and the author of the "Problem" would have been spared the terrific battles with stubborn scientists he has been obliged to fight during the last two years.—Dr. Hall, in *Microcosm*, Vol. II., p. 351.

and if any substance changes position, however tenuous or refined such substance may be, it can only be in consequence of a substantial force acting upon it. Hence, if such a material substance as *ether* exists, it must change its position in order to move and thus act upon the optic nerve in the form of waves or undulations; and such action must be caused by the operation of some force. Why not then assume this force, which is thus required to put the material *ether* into motion, to be the *light* itself, acting directly upon the sense-nerve, and thus avoid a useless circumlocution? This would be the rational view to take, since the ether being an inert material substance, according to the undulatory theory, can no more move of itself, or without the application of an adequate force, than can a granite rock?

Q. 43. To what extent is this mythical element supposed to exist?

A. It fills all space, surrounds all worlds, and pours itself through the interstices of all matter. The founders and advocates of the undulatory theory of light were not parsimonious in making provisions for its maintenance in the future. They seemed to fear that in the march of revolutionary progress something more substantial might arise above the sombrous horizon of such superficial science. Seeing that the known universe was everywhere filled with light, and that all the lamps in heaven's illumined chamber were burning in constant brilliancy, the undulatory gods became generous in the exercise of their creative power, and sent large quantities of this supposed commodity into every longitude and latitude of interstellar space.

Q. 44. What are the alleged properties of this supposed ether?

A. Those who have a suppositional acquaintance speak of it as being, like their theory of light, exceedingly thin and subtile, with power to elude all chemical

tests, and to insinuate itself through the glass receiver and take up its residence in the vacuum of an air-pump.

Q. 45. Has the undulatory theory of light ever been suspected of involving anything that might possibly be injurious to the eye?

A. Yes; as acoustical science continued to become more cautious than correct, some of the prudent opticians, like Tyndall, concluded that this ether ought to be softened a little and reduced to the consistency of something like "jelly." Ether itself was regarded as absolutely harmless, but there was no telling what disastrous results might follow its vibratory dashes into the visual organ when accompanied with whole floods of luminous motion at the rate of 180,000 miles per second and many millions of "transverse" movements in the same short period of time.*

Q. 46. But suppose that science should yet demonstrate and prove beyond all doubt that ether is all and possesses all now claimed in its behalf, could the theory then be held in the light of true science as tenable and correct?

A. Not at all.

Q. 47. Why not?

* But now comes the amusing part of this mathematical abandonment of the corpuscular, and adoption in its stead of the undulatory theory of light. After they had determined, by careful figuring, that the "emission theory" was no good, because its "material light-particles" would put out people's eyes even if they (not the eyes but the particles) weighed only the millionth part of a pound each, they decided to adopt a newly-invented "ether" like a "jelly," "with the properties of a solid" and "possessing inertia." as Tyndall tells us, whose *material* waves would dash into the eye with the velocity of light, and at the rate of only "699,000,000,000,000 waves in a second"! (*Tyndall on Light*, p. 66.) And of course, anybody's eyes ought to stand that much "jelly"!—Dr. Hall, in *Micocosm*, Vol. II., p 351.

A. Because it does not admit the entitative and substantial realm of light. That which is not entitative has nothing more than a phenomenal existence, and that which has no substance has no positive being. It follows, therefore, that that which is built upon a nonentity or a negation must be equally empty of contents, and sooner or later perish from the earth, or only continue to linger as the shadow of a setting sun.

Q. 48. But might not this ether be an immaterial substance of which, as the Substantial Philosophy claims, the universe is full?

A. No. To assume ether to be an immaterial substance would be to abandon the undulatory theory, and at once to do away with the necessity of material waves of any kind for causing the sensation of light, similiar to the supposed air-waves which cause the sensation of sound. If ether were assumed to be an immaterial substance, then of what use would it be in the physical system, since light itself, as an immaterial substance, would answer the same purpose as ether, and could travel from the sun to the eye either as *waves* of force, *pulses* of force, or steady *streams* of force just as the economy of Nature might require? In this way it could reach the eye without any of the complication of first having to act as a substantial force in order to throw the material ether into waves, and then necessarily to accompany these material waves to keep up their mechanical undulations till the eye was reached and the retina was shaken. Surely the simple and harmonious process of the direct action of the substantial force of light upon the eye, radiating from luminous bodies by a law peculiar to such form of force, as here presented, appeals to our reason as well as conforms to the natural fitness of things as observed all around us.

Q. 49. What is to be offered in the place of the undulatory theory of light?

A. The emission theory of immaterial substance.

Q. 50. In what will this theory, when fully formulated, differ from Sir Isaac Newton's corpuscular theory?*

A. Just as immaterial substances differ from material substances—as force differs from matter.

Q. 51. Then the Substantial Philosophy holds that light is a substance and a force?

A. Precisely so. Substantialism has taken this position and can hold it until all the analogies of Nature are deprived of their power to speak the truth, and their harmonious utterances proven false to all the inductive processes of right reason.

Q. 52. Does the Substantial Philosophy teach that light has a substantial existence independent of vibration or motion?

A. Nothing has an existence separately independent of its essential attributes. God Himself could not so exist. Light has attributes and properties, and yet its existence is its own. Vibration, velocity of movement

* The truth is, the fundamental idea of *Substantialism*, which is so deeply taking root in the minds of thoughtful investigators, and upon which the present corpuscular doctrine is based, never entered the mind of Newton. That fundamental idea consists in the 'general classification of *substance*, under two heads—*material* and *immaterial*, *corporeal* and *incorporeal*, *ponderable* and *imponderable*; and that one of these classes is as really and truly substantial or entitative as the other. Had Sir Isaac Newton caught a glimpse of this dual nature of the substantial universe, he would have avoided the inglorious failure of his theory of "material light particles" by never having adopted such a wretched position in science, and all the waste of mathematics in figuring about the required smallness of such "material particles" to avoid putting out one's eyes, would have been saved by him and his friend Huygens.—Dr. Hall, in *Microcosm*, Vol. II., p. 351.

and refrangibility may be properties of light, but cannot in their union of action produce their proprietor.

Q. 53. But would there be anything left of essence or substance if all its attributes or properties were to be separated from it?

A. It is impossible to separate the essential attributes, properties or laws of being from the essence or substance of such being. Essence involves the potentiality of its attributes; and such potentiality has reality even before it is fully actualized. Without such realism, creation is a burlesque, and Comte was right. Substantialism involves a proper realism. *Universalia in re.* The law of diffusion cannot be separated from odor, and yet odor is something more substantial than diffusion. The pulling effect of gravity is inseparable from gravity, where there is anything to pull, and yet gravity is something deeper in the ground of its being. Sound may have intensity, pitch and timbre, and yet sound is a substance back of and in all such sonorous peculiarities. Heat may radiate, and yet it requires something more forcible than mere radiation to move the master-wheels of machinery or to melt the minerals in the furnace. So with light. It may be vibratory in its effects, bend from a straight line by virtue of its refrangibility, and produce colors either by virtue of its rays being differently refrangible as Newton taught, or by virtue of different rates of pulsation as now held, and yet no one but a consummate quack in optical science will say that light is only a mode of vibratory motion, divergency from a straight line when passing through different media, or the color in which, under certain conditions, this substantial force takes modified form.

Q. 54. Since the emission theory of Newton regarded light as consisting of material corpuscles, in what way did he account for the passage of the light through solid bodies, such as diamond, crystal, glass, etc.?

A. He had no possible way of accounting for such fact except the *porosity* of the solid body. As it is an undeniable physical law that no two material substances can occupy the same place at the same time, it follows that the material light-particles of Newton were compelled to find their way through glass by penetrating the pores of that solid material and thus make their visible egress on the other side.

Q. 55. If light could thus pass through glass by penetrating its pores, how did Newton account for the fact that it did not pass through opaque bodies, such as wood, sandstone, burnt bricks, etc.—bodies vastly more porous?

A. He could give no explanation whatever of such fact except the general statement that it was the nature of the material molecules and their crassitude to interfere with the particles of light passing through them. One would have thought that the fact of the free passage of light through distilled and boiled water and through the diamond better than through any other substances, when these bodies are the most imporous of all known substances, would have driven that great investigator to the Substantial Philosophy as a *dernier ressort*, and to the unavoidable recognition of its grand classification of all the objective entities of the universe into material and immaterial substances. But it had no such effect—that revolutionary philosophical idea having never been conceived till within the present decade of years, thereby making the last quarter of the nineteenth century the most memorable for profound and far-reaching philosophical discovery of any similar period in the world's great history.

Q. 56. Do not these same difficulties of opacity, porosity, etc., stand in the way of *ether* and of the undulatory theory of light?

A. Precisely the same. Ether being claimed as a material substance, as much so as our atmosphere, only

more attenuated, could no more pass through a solid except by entering its pores, than could Newton's material light corpuscles. But the undulatory theory teaches that this supposed ether, which has the properties of inertia, weight, rigidity, elasticity, compressibility, etc., and possessing as it does the mechanical nature of a jelly, actually circulates freely through and among the molecules of all bodies, oscillating to and fro in its wave-motions as do the particles of water in a system of water-waves. As all solid bodies, according to Prof. Tyndall and Sir William Thomson, contain this ether circulating among their molecules, as much so as does glass, it becomes the mystery of mysteries, according to that theory, why the ether-waves do not find their way through a sheet of iron as readily as through a sheet of glass, since the latter is so much less porous, and thus make iron transparent.

Q. 57. Do any of these objections and difficulties lie against the substantial theory of light, regarding all the forces of nature as immaterial substances?

A. Not one. The Substantial Philosophy explains every mystery of nature on the principle of the correlation and co-operation of the substantial forces. The substantial force of *cohesion* is indisputably the governing force in all material bodies, since it holds them together as tangible matter; hence it may be inferred that no other form of force can produce the slightest effect upon any mass of matter except in some form of correlation or co-operation with or opposition to this regnant force of cohesion. If one body, such as glass, allows light to pass through it, the whole mystery is explained by the correlation and co-operation of these two forces—light and cohesion—and the manner in which cohesive force has arranged and controls the particles of such material body. If another body will not permit the passage of light, it is simply because the ruling force of cohesion has arranged

the particles differently; and this is often the case even when the two bodies are constituted of the very same material substance.

Q. 58. Is there any direct illustration of this latter statement?

A. Many such illustrations. Take a piece of the most transparent crystal, pulverize it to flour, and then condense it into a solid mass under a powerful hydraulic press. Though it is now constituted of the same substance as before, light will not pass through it, simply because cohesion has its particles now arranged in a different order, being coerced into such new arrangement by the mechanical form of force which did the pulverizing and compressing.

Q. 59. Can cohesive force ever restore this flour of crystal to its old arrangement, or order of particles, so that light can co-operate with it and pass freely through such material substance?

A. Easily; but only in co-operation with another form of substantial but immaterial force called *heat*. Let this force act on the pressed cake of crystal flour till it is melted and brought to a white heat, and it helps cohesion to rearrange the particles as formerly, and thus bring them into such relation to each other that the substantial force of light can now enter and pass unobstructedly through it the same as before.

Q. 60. Are there no other similar illustrations in the action of this governing force of cohesion in its correlation with heat?

A. Yes; the whole realm of physics is full of such instances of correlation and opposition among the forces. An entire volume of such illustrations could be culled from Dr. Hall's writings, in which he has repeatedly shown that no possible solution of nature's mysteries can be looked for except on this principle of the substantial correlation of the various forms of force with that of co-

hesive attraction, and upon which general law this author and discoverer has declared his conviction that no problem in physical research is too profound for this talisman of philosophy to unravel and make clear.

Q. 61. What are a few of these cases of inexplicable mystery, according to any previous theory of science, which this substantial view of the forces and their correlation can explain?

A. Take the melting of platinum, which only occurs at a very high temperature. Why? Because, as already shown in Chapter IV., the cohesive force, which arranges and holds its particles together, refuses to co-operate with heat, or perhaps more correctly, is able in that fortified arrangement of particles to resist the inroads of heat to a vastly greater extent than in its intrenched position among the particles of other bodies, such, for example, as *lead*. But when cohesion in *lead* has been forced to surrender to heat and thus allow this metal to become liquid, a piece of platinum, which, if alone, is able to withstand incandescent heat, yet if immersed in this molten lead, will instantly succumb to the combined heat and cohesion there in action, and will melt at less than one-fifth the temperature before required. In like mystery, when three metals, such as tin, lead and bismuth, are alloyed together by the action of heat in overcoming their respective cohesive arrangements, and thus demoralizing, so to speak, this ruling force, such alloyed mass will now succumb to heat and yield up its cohesive resistance at less than one-half the temperature required for either of the metals when separate, thus showing how cohesive force can be converted into heat, or how it can be made to desert its post and retire to the force-element of Nature. But as there is no room here for these lengthy discussions, the student is referred to the various volumes of the *Microcosm* and the *Scientific Arena*, of which Dr. Hall is the editor.

Q. 62. As light is a substantial force, what relation has *color* to this immaterial entity?

A. The same relation that shape, form, general appearance, or even color holds to a material body, or that any other property of matter may hold to such body. *Color* is a property of *light*, as *timbre* is a property of *sound*. No property, quality, or peculiarity of any substantial thing is an entity, though it may take an entity or several entities or substantial things to constitute a certain property of a substance; as, for example, it takes the combination of matter, cohesion and gravity, all of which are substances, to constitute the property of weight; or as it takes numerous overtones of varying degrees of *pitch*, in combination with a fundamental sound, all substantial entities, to constitute the property of *timbre* or quality in music. In like manner it takes various rays of light, each of a given number of pulses per second, to combine into a mass and form the property of white light; while each ray thus combined is itself of a certain number of pulses, and hence of a certain color when separated. Take out or separate any one ray, representing a certain rate of pulsation, from the white combination or mass of rays, and the quality of its mass-color is changed accordingly. When all the different rays constituting the white light are individually separated, we have the complete colors representing the different pulsation rates of the spectrum, just as the different tones of a mass-sound may be separated by resonators, thus determining the various rates of vibration which go to make up the *timbre* of any given combination of sounds.

Thus, in a word, *color* may be called the *timbre* of light, as *timbre* may be called the *color* of sound, each constituting the property of the substantial force of which it is a characteristic. It is surely as reasonable to assume the color of a separate ray of light to depend on

its special rate of pulsation penetrating the eye or solid crystal, as to assume it to depend on the number of ether-waves which enter the eye, or pass through the prism in a given time. By substituting immaterial pulses of force for material undulations, the action of the prism in dividing a ray of white light into its constituent parts, becomes a simple and understandable process. There is no scientific reason for doubting that a stream or ray of light from a luminous body, as originally set forth in the "Problem of Human Life," may come in the form of a rapid succession of *pulses* on account of the tremulous action of the luminosity which liberates such light-force, something similar to the tremulous action of the sonorous body which sends forth or liberates sound in the form of pulses or jets. In this way the greater or less rate of tremor of a luminous body would bring a greater or less number of these light-pulsations into the eye in a second, producing the color thus represented, a fact which physicists have vainly tried to explain by waves of material ether. Thus, by supposing light-force to come in the form of a given rate of pulses per second, fully accounts for color in light, as pitch is known to be caused by the number of pulses in sound.

Q. 63. Has Substantialism fully formulated its immaterial theory of light so as to explain satisfactorily the interesting phenomena of color?

A. It has not.* No one branch of physical science

*It is now admitted by many that the undulatory theory of light, like the wave-theory of sound, has been shattered in the central pillar of its support, and these persons of negative conversion wish to know what theory will be substituted in its stead. To such, we say, patience, gentlemen, patience, mingled with a modicum of reason and common fairness. If it took the world 200 years to build the undulatory castle, even after the other had been bountifully provided free of charge, is it too much to ask the full limit of one short decade of years to build

can move forward to perfection in advance of kindred branches any more than any one division of an army can move in advance of all other divisions that tarry behind to play the poltroon or parley with the common enemy.

Q. 64. Are these different divisions now moving forward to battle and to victory?

A. They are indeed. The several branches of physical and biological science are moving together against the stronghold of long-intrenched fallacies. The general bugle-blast of Substantialism has been heard along the line, and the lovers of truth are gathering in scientific battle array. The general advance has begun. The result of a few clashing sabers has already demonstrated that the Lord of Hosts is with us. Let the advancing legions examine well the ground and rifle-pits over which they pass, and press onward until they find themselves fairly fortified within the citadel, above whose towers and turrets the banners of truth shall wave in everlasting triumph.

Q. 65. Which banner shall float the highest?

A. The one which is now being carried through the hottest part of the general engagement, and upon which is inscribed "*The True Nature of Sound.*"

Q. 65. What, then, is sound?

A. This question is answered and exhaustively treated in the next chapter.

a scientific citadel of everlasting truth? But whose business is it to supply the world with such a positively correct theory? Does that duty rest exclusively upon the shoulders of Dr. Hall, and his coadjutants in the cause of true science? We dispute the reasonableness of any such assumption. A philanthropist may fire a magazine and blow a pest-house out of the city. Is he, therefore, bound to build a medical college in its stead?

CHAPTER X.

THE NATURE AND PHENOMENA OF SOUND.*

The Substantial Theory of Acoustics.

QUESTION 1. What is sound?

ANSWER. Primarily, sound is that form of physical force by which the sense of hearing in men and animals is addressed and affected.

Q. 2. Has sound any other meaning?

A. Yes; by a *trope* which we call *metonymy* the effect is often put for the cause, and thus sound signifies the *sensation* itself in our consciousness, which we call *hearing*, and by which we distinguish tones, or recognize their various peculiarities.†

* The questions and answers constituting this chapter are condensed, substantially, from the various writings of Dr. A. Wilford Hall on this branch of physical science, as found recorded in his "Problem of Human Life," the five volumes of the *Microcosm*, and the *Scientific Arena*, of which he is editor. This will be partly shown by the copious foot-readings accompanying the text as the discussion proceeds.—J. I. Swander.

† SOUND, LIGHT, HEAT, ODOR, FLAVOR, ETC.

CLAYPOOL, KY.

Dr. Wilford Hall :

DEAR SIR,—I have read some extracts from your "Problem of Human Life" on the subject of Sound, but do not know that I perfectly understand you; hence, I would be pleased to have your definition of sound—what is it, and what relation does it sustain to aural beings?

Q. 3. What are these chief peculiarities of sound?

A. They are intensity, pitch, duration and quality, the latter expressed under the general term *timbre*.

Q. 4. What is meant by the pitch of sound?

A. It is that peculiarity of tone by which we recognize sounds as high or low, sharp or grave.

Q. 5. What is the chief use of pitch in sound?

A. It is the main foundation of all music, and the basis of harmony, as when more sounds than one are employed at the same time. It is also one of the essentials of ordinary vocal expression, by which words are modulated in conversation.

Do you mean that it has any real, extrinsic existence? Or, in other words, do you mean to teach that it has any existence apart from that particular condition of matter found in the structure of the ear? It has occurred to me that sound is only a sensational phenomenon, and, like all other sensations, dependent upon *nerve* matter; but if I perfectly comprehend you I have an incorrect idea of it—that is, if you are correct. Hoping that you will take pleasure in answering my question, I am very respectfully yours,

W. S. JONES, M. D.

REPLY BY THE EDITOR.

Sound, as well as any other of the sensation-producing causes in nature, must of necessity be one of the physical *forces*, and consequently must first exist outside of our sensations before it can act upon the sense-nerves to produce its characteristic effect.

Sound, in its primary sense or signification, is not at all the sensation in our consciousness, as Dr. Jones thinks, which we call *hearing*, and is only used in that sense by accommodation of language, or by metonymy of speech, the effect being put for the cause. Still, the use of such metaphors in our language is both common and proper. The true and unfigurative meaning of scientific terms, however, should always be preferred in our philosophical discussions to any form of trope.

Sound, strictly speaking, is that *force* in nature which by entering the ear, and by contact with the auditory nerve, produces in our consciousness the sensation of hearing. *Light* is that *force* in nature which by entering the eye, and by

Q. 6. What causes pitch in sound?

A. As sound is developed by the vibratory action of some sound-producing body, by which this peculiar form of natural force is generated or liberated from the force-element of nature, it follows, and has been abundantly proved, that the pitch of sound depends upon the number of such vibrations in a given time by which any particular sound is produced and conveyed to the ear.

Q. 7. What is the range or extreme limits of such vibrational rates, for producing the various audible sounds in nature?

A. From the most refined experiments it has been

contact with the optic nerve, produces in our consciousness the sensation called seeing or sight. *Heat* is that *force* in nature which by entering our tactile nerves, which are distributed all over the body, produces in our consciousness the sensation called warmth, and metaphorically also called heat. *Odor* is that *force* in nature which by entering the nose, and coming in contact with the olfactory nerve, produces in our consciousness the sensation we call smell. And *flavor* is that *force* in nature which by contact with the palate and gustatory nerve produces in our consciousness the sensation we call taste.

If there is no such thing as sound in nature outside of our ears and auditory nerves, then there surely is no such thing as light outside of our eyes, no such thing as heat outside of our tactile nerves, no such thing as flavor outside of our gustatory membranes, and no such thing as odor outside of our noses. Are the old theorists, who wish to confine sound to our sensations in order to avoid Substantialism, prepared for the application of their logic to light, heat, flavor and odor? If not, let them do a little sober reflecting before making their points. Let us now put the matter in the form of a few very simple questions and see how it will hold together.

If there is no sound as a physical force outside the ear, is it not plain, as just hinted, that there is no light as a physical force outside the eye? But would not the sun shine just the same if all eyes were put out? Suppose all sensuous beings should shut their eyes at one time; would that extinguish the

determined, that sounds can be heard by the best ears from 16 up to about 16,000 vibrations in a second. (Some authors place this upper limit much higher, but it is manifestly a mistake.) The average range of tone, however, in orchestral music is believed to extend from about 30 to 8000 vibrations per second.

Q. 8. Do any tones exceed the extreme limits of vibration here given for the capacity of human ears?

A. It may be fairly inferred from various natural analogies, that sound-force is really generated both by lower and higher rates of vibration than those named as producing audible sound, but that its form, in such cases, exceeds the capacity of our sensations.

light of the sun? If all light (like sound is claimed to be) is in our sensations, then what produces the chemical effect on a metallic plate, changing it into what we call a daguerreotype? Has that inert, inanimate piece of metal an optic nerve? Would not the same chemical effect have taken place by the action of the light under the same conditions, if there were no eyes in existence? Then again: If heat (like sound is supposed to be) is only in our tactile sensations, and not a physical, substantial force outside of them, how does it burn down a building? Does a frame house possess tactile nerves and a conscious sensation?

Then, coming right home to the question in hand, if sound is only in our sensations, and not a real, substantial force in nature outside of our conscious being, what is it that sets a stretched string into sympathetic vibration? Has a steel wire got ears? Does a tensioned chord possess an auditory nerve and animal consciousness? Would not that stretched wire be thrown into action by sympathy all the same, under the same circumstances, if there were not an ear in existence? If so, what could do it but the external, physical force called *sound*? And how could sound do it, if sound exists only in conscious sensation?

No, Doctor, we may rest assured that the lightnings would flash, and the thunders would roar, and the windows would rattle all the same if there were not an eye or an ear in the universe to take cognizance of them; and that the wild rose would continue to "*blush unseen* and waste its *fragrance* on

Q. 9. From what natural analogies may this be inferred?

A. From all the other sensation-producing causes. Heat, for example, may be so trifling that we cannot feel its warmth, while very refined instruments, such as the most sensitive galvanometers, will plainly detect and show its presence. A light may be so faint as to be wholly unrecognizable by our sensations, yet a cat could so gather and utilize the rays, as to see and distinguish objects. Odor may be entirely unrecognizable by our sense of smell, and yet be intensely recognizable by certain species of hound;* etc., etc. So, in like manner, some

* A hound of a certain breed, with highly-sensitive olfactories, will follow the direction of a fox over hill and dale, through for-

the desert air" all the same if there was not one olfactory nerve on this earth to recognize it.

We feel sure, judging by the candid spirit of Dr. Jones' letter of inquiry, that he is honestly desirous of information concerning the teaching of the new philosophy. And we believe there are hundreds of others in the same state of mental suspense. We have, therefore, taken particular pains to make the answer clear.

It is impossible, however, to elucidate everything involved in the great philosophy of Substantialism in a few paragraphs, or even in a few numbers of the *Arena*, and which has taken us more than a decade of years to elaborate. Had Dr. Jones, and many others who make similar inquiries, read our five volumes of the *Microcosm*, beginning with the "Problem of Human Life," they would have found all such inquiries fully answered in advance. We give due notice to all new readers of the *Arena* that they can, at this late date, scarcely ask a question relating to the elementary laws and principles involved in Substantialism, that has not been discussed and answered in some portion of our previous writings. Still, this is not to forestall inquiries. We desire to receive candid questions on all proper subjects, and we will endeavor to answer all such as have an important bearing on the current discussions in the *Arena*.—From the *Scientific Arena*, Vol. I., p. 73.

animals, such as hares, will hear sounds from a distance entirely too faint for human beings to recognize. It has also been proved by the *microphone*, that even small insects have conversational sounds by which they communicate one with another, but which are far too delicate for our unaided ears; just as animalcules have the visual power to see and pursue each other, even when they are beyond the reach of our natural vision, and in fact of the most powerful microscopes.

Q. 10. What is signified by the *intensity* of sound?

A. Inside of our sensations it signifies loudness, but externally or objectively, intensity signifies the strength or quantity of this force generated, and is that attribute

est and jungle, hours after it has passed, and even when it has reached a score of miles ahead. Yet the hound does not depend on touching the tracks of the fox with his nose, or even of following its exact path; but, as observed by the writer (having seen a fox pass hours before, and noting the exact path taken by its feet), will frequently vary rods from the true path, yet, keeping on in the general direction, will pursue his game with unerring certainty.

So defined and substantial are the odorous particles emanating from the footfalls of the fox, that a dog, on striking a trail hours old, will almost instantly decide, by the arrangement of the atoms in the air, the direction it has taken; but, if momentarily mistaking the back-track, the difference, probably, in the intensity of the surcharged air warns him of his error, and leads him to reverse his course.

Before stopping to quibble about the impossibility of sound being substantial emanations from its inconceivable tenuity, let us try to grasp the marvelous lesson taught by this fox and hound. Though the wind may blow across the trail, carrying off for hours the odorous clouds which have risen from the instantaneous impress of the feet upon the earth, filling thus, perhaps, vast areas along the trail with those magical atoms of perfume, exceeding, possibly, in extent many times the four square miles of air surcharged by the locust, yet sufficient odor remains, extending for rods on both sides of the trail, to enable the hound to pursue his distant game with infallible precision.

of sound by which its range of observable distance is caused and determined.

Q. 11. In what does the intensity of sound, external to our senses, chiefly consist?

A. In the amount or quantity of this force generated or liberated from the force-element of Nature, by the various vibratory processes ordained to that end, just as any other form of force, magnetism for example, may exist with greater or less intensity.

Q. 12. On what law or principle does this sound-force travel when thus generated or liberated from the force-element of Nature?

A. By the same law or analogous principle on which

I now ask the puzzled reader, who fails to see how the locust can fill an area two miles square with sonorous substance and not appreciably reduce its weight, to tell me, approximately, how much *reynard* has reduced his feet in size and weight by the clouds of odor diffused along his track for a hundred miles? Though the feet may have deteriorated by the roughness of the journey and their two hundred thousand impacts upon the hard earth, yet I venture the suggestion that the cubic miles of odorous substance which encompassed the trail and guided the hound, did not diminish the weight of either foot an appreciable fraction of a grain. Yet those miles of odor-saturated atmosphere were filled with *substantial emissions*, as all science unites in assuring us, though not so tenuous, probably, as sonorous substance, yet sufficiently near it to cause the imagination to retire discomfited and confounded.

The reader thus has a rational answer to his question in this somewhat analogous substance of odor, showing that it is not at all among the impossibilities, nor is it even improbable, that the locust should fill such an area with sonorous substance, from this analogue in the fox's feet—whilst not the shadow of an answer can be offered by the advocates of the wave-theory of sound for the reasonableness of corporeal results equal to the mechanical energy of a *million locomotives* ascribed to the physical strength of a single insect.—Dr. Hall, in "Problem of Human Life," p. 135.

any other force of Nature travels, as, for example, electricity, magnetism, light, heat, gravity, etc. Sound travels by a law of conduction or radiation suited to that peculiar form of force, and which law (at present unknown to man) is adapted by the all-wise Author of nature to the various bodies through which sound passes at varying rates of velocity, according as their material particles are variously arranged and held together by the force of cohesive attraction. This involves the law first set forth in the Substantial Philosophy, and alluded to in one of the foregoing chapters of this book, that no form of physical force, aside from cohesion, acts directly upon matter, but that all other forms of force affect matter alone by their co-operation with, or opposition to cohesive force.

Q. 13. What has the vibratory tremor of the conducting body, as, for example, air, to do with sound as a force?

A. Any tremor or vibration observed in air or other sound-conducting medium constitutes no part of sound-force itself, but is either the effect of such force in its action upon material objects, or is incidental to the vibratory process or operation by which sound-force is generated and liberated.

Q. 14. Are there any proofs from natural analogy that this is the correct view?

A. Yes; especially as seen in the case of electricity when generated by the whirling motion of the dynamo-machine. Not only will this generating process produce an incidental tremor of the air, of the conducting wire, and even of the whole building in which the work is carried on, but the electric force itself, thus conducted along the wire, will cause additional motion in an electric engine miles away from the dynamo-machine. As well call this incidental tremor of the wire and of the building, or this running of the distant engine, the electricity

itself, as to call the incidental vibration of the air, or the sympathetic vibration of another instrument near a tuning-fork, the sound-force itself. Both classes of phenomena are equally incidental to, or effects of, these different forms of force, and are no more the force itself, than is the tremor of the flint and steel, when struck, the spark or light-force thus generated and sent forth.* Thus there is not only the incidental motion of

* But the *Standard* critic seems really to have struck a happy thought, and supposes he has effectually caught the substantial philosopher napping at last. He seems to think he has him as safely secured in the meshes of his logical network as any octopus ever had a helpless porgee with his formidable antennae wound about it. He has discovered that if sound is an *entity*, according to Substantialism, and if the locust *generates* these substantial pulses by its stridulation, then the insect actually creates *something out of nothing*, by scraping its legs across the nervures of its wings! This is plain, he thinks, because no sound was there till the scraping began. Or, if this substantial entity is not created out of nothing, then it must be manufactured out of the insect's organism, so that the poor little thing ought soon to use itself up in its own substantial noise! And still worse, what becomes of this sound-substance when it ceases to be audible? Is it annihilated? etc., etc. I have made the case even stronger than did the critic, to give the Substantial Philosophy a rare opportunity to show its powers of solution and explanation. And here its founder comes to the task, by the remark: "How easy it is for even great men to be mistaken, especially when attempting to criticise something they do not understand or have not thoroughly investigated!" a very sensible remark, by the way. He then proceeds substantially thus: According to Substantialism, the incorporeal *force-element* in Nature, from which sensuous sound is generated by whatever sound-producing instruments, *exists in all matter and space*, not as audible sound, of course, but as its elemental basis, and which only requires the vibratory and atomic process ordained in the economy of Nature for transforming this force element and thus calling it forth in that *definite form of force which we recognize as sound*. This same universal but indefinite force-principle, by the process of the battery or dynamo-machine, leaps forth in the definite form

adjacent bodies, as the effort of the vibrating instrument which generates sound, but sound-force itself will also produce vibrations in bodies against which it strikes, as for example, the diaphragms of phonographs, telephones, etc., in close proximity to sounding instruments.

Q. 15. As sound-force is not the incidental tremor of the air or of other conducting medium, is the vibration of the fork or of the string itself, by which the sound is produced, any part of the sound-force thus generated?

A. No; this harmonic or pendulous motion, or in other words this synchronous swing of the fork or other sounding instrument, is no more identical with the

of electricity, with its own peculiar properties, and *which has no existence in that form in the air or battery until so transformed and evolved* from this force-reservoir of Nature. Clouds also act as a battery and produce a similar transformation. The same universal element of force, by the peculiar but mysterious relations of the atoms of the steel magnet, pour out transformed into the shape of *magnetic rays* of real incorporeal substance that will lift a bar of iron at a distance even through impervious glass. So also with the substantial light-rays, which are but another transformation from the same fountain or universal element of force, evolved to the sensible form of *light* by various processes ordained in Nature to that end. But it by no means follows that electricity is created out of nothing or returns back to nothing when its substantial manifestations cease, nor is it created out of the substance of the electro-magnets in the dynamo-machine *which will last indefinitely without the slightest wear or deterioration of their material substance*. So a locust, while thus generating substantial sound-pulses, not out of nothing, but evolving them from this same universal, substantial fountain or *force-element*, uses not a particle of its physical organism as a constituent of such sonorous form of force. The *fire-fly*, as the editor shows in the March *Microcosm* in reply to Prof. Goodenow, though but a hundredth part the size of the locust, can be seen half a mile of a dark night, and, therefore, must fill that much space in all directions with its substantial but incorporeal light-corpuscles which it generates at each flash from its thorax, not out of nothing, but out of that same force

sound-force thus liberated and sent off through the air 1120 feet a second, than is the rotary motion of the dynamo-magnets identical with the electric force sent off through the wire at a velocity of thousands of miles a second. The force and the motions in both cases (both causal and incidental) are entirely distinct from each other. But as the incidental tremor of a building, caused by the running of a dynamo-machine, may also be made to generate other electricity, when properly utilized, so the incidental and synchronous tremor of a conducting medium may itself also cause additional sound. This is illustrated by the sound generated at the distant end of a mechanical telephone wire. The

element which pervades all Nature and supplies each force, when definitely evolved, with properties peculiar to itself. The physical substance of this diminutive insect has nothing to do with constituting that form of substantial force called *light*, since, after thus filling hundreds of cubic miles night after night with actual substance, it has not exhausted its corporeal structure in the least! But what becomes of the *light*, the *sound*, the *electricity*, the *magnetism*, or any other peculiar form of force thus generated, after serving the purpose thus designed in Nature, or after ceasing to manifest itself? It falls back from its definite form into the same indefinite force-element or reservoir from which it was evolved by the process appointed in Nature; and *thus only can the law of the conservation of the forces be true*. Thus also, as the founder of this Substantial Philosophy teaches in his "Problem of Human Life," the vital and mental force of the lower animals at death falls back into the universal fountain of life and mentality from which all substantial life and mind must have originally come, and which reaches back to God himself. He insists that no scientist dares to deny him the right thus to postulate such a universal force-element or fountain from which all forms of manifested force with all their peculiarities come, since this Philosophy solves so many otherwise absolutely inexplicable problems in science, while contradicting nothing that we know surely in any branch of natural philosophy. It would be with an ill grace for scholasticism to deny this right to assume a universal force-element which rationally

sound-force of the voice, caused by the vibration of the vocal organs, may shake the intervening air and set the transmitting diaphragm of the telephone into motion; this communicates the tremor to the conducting wire, which continues it on to the receiving diaphragm, which takes up and communicates these various links of incidental tremors to the air, thus conducting the sound pulses to the ear, all of which vibratory links conspire to keep up reproducing as well as conducting the original sound. Hence, let the vibration of such a mechanical telephone wire be stopped off any where along the line by a rigid vise, and no audible sound will be communi-

solves all the mysterious phenomena of science and which have so long puzzled the schools, when the same scholasticism assumes an all-pervading and *material* luminiferous *ether* for the sole purpose of getting a substance out of which to manufacture light-waves and thus to make light harmonize with an erroneous theory of sound-waves, and all, too, without any rational necessity either for such assumption or such a substance.

But in conclusion, take one more case which the author of the new theory cites as an illustration of the importance of Substantialism in giving a rational solution of Nature's mysterious problems. The flint and steel are perfectly *dark, cold, and silent* bodies. Neither *light, heat, nor sound* addresses our senses as we *look* at them, *feel* of them, or *hold them to our ears*. But bring them together in suitable substantial contact and forthwith there leap away from them a ray of substantial *light*, a flash of substantial *heat*, and a hiss of substantial *sound*! Where were these three substances, or forces, concealed before this contact? Had they no existence in any form, and were they, therefore, created out of nothing? By no manner of means. Plainly, as Substantialism answers, they were all previously locked up, in essence at least, in the all-pervading force-fountain of which we have been speaking, and they only required this substantial contact of the two material bodies to enable them to come forth in the three manifested forms of definite and substantial force as observed. Such are a few of the beauties of the Substantial Philosophy now appealing to the people through the columns of the *Microcosm*.—Eld. Thos. Munnell, in the *Microcosm*, Vol. III., p. 307.

ated to the receiving diaphragm, thus showing how essential is vibration to the usual methods of generating sonorous force.

Q. 16. But does not this view involve the doctrine of sound as a mode of motion?

A. No; sound is one of the forms of physical *force*, and as such, is an objective entity or an immaterial substance. As well call electricity a mode of motion because this form of force moves along a wire, and is usually generated by a motion which shakes the wire as its conducting medium, also shaking the air and the building where the machinery runs. It requires close thinking, but it is scientifically essential to keep up this distinction between any form of *force* liberated and the *mechanical process* or operation which liberates it. Both sound and electricity are usually generated by modes or methods of mechanical motion, but when generated they are analogous forms of force-energy, and are thus real substantial entities.

Q. 17. Is all force necessarily substantial?

A. Yes. Nothing in Nature can directly cause a phenomenon, or produce a positive effect upon our sensuous observation, unless it is a substantial entity or objective thing. Every force of Nature, therefore, must be a substantial entity, as it is the direct or immediate cause of sensation, or of observed phenomena.*

* Having thus reached this field of research, what do we discover? Is it possible in reason that in stepping over this boundary-line of material existences, we have left all real substances behind us when we have parted company with odor? It surely does not seem so to us, or that such a view can be rational to a philosophical investigator. Substantialism teaches, on the contrary, that we have only entered the hitherto unexplored and even almost unrecognized domain of the absolute physical, vital, mental, and spiritual entities which, though immaterial, underlie, manipulate, and control all material bodies, and from which

Q. 18. Does not this make out *motion* itself to be an entity or substantial thing, since it generates or produces *force*—as, for example, in the case of sound and electricity?

A. Not in any strict sense. The exact character or true nature of what is meant by *motion* is somewhat difficult to grasp and define, unless by the most careful mental effort. Strictly speaking, motion is nothing but space, or *position in space changing*. As pure space is nothing, mere position in space, whether stationary or changing, is also nothing. The substance which occupies space, and which is the subject of motion or change of position, is, of course, an entity, as is also that which

domain, as their source. all material worlds have their origin, and from whose delegated power all visible and sensible manifestations are now observed in sensuous phenomena. These real entities, from the most refined spiritual and mental substance in Nature downward through the lower mental powers and instincts and the coarser vital substances of the animal and vegetable kingdoms, still downward through the physical but substantial forces of gravitation, electricity, light, heat, sound, magnetism, etc., are all around us in space as real entitative existences, in ten thousand forms and operations, as Substantialism tells us, had we but the higher mental vision to behold them. And what is peculiar of incorporeal substances, unlike material bodies, they do not interfere with each other in space, but a thousand of such entitative existences can occupy exactly the same corporeal place at the same time. If the physical forces be really immaterial substances, as Substantialism insists, it is plain that gravity not only occupies the minutest molecules of material bodies, but that light, heat, sound, magnetism, and electricity can all occupy the same material atoms at the same instant of time without displacing or in any way interfering with gravity, or one with another.

Thus the mode-of-motion doctrine in the case of magnetism falls to the ground, as it totally fails to account for the action of a magnet on a distant body, leaving magnetic force, as an undeniable incorporeal substance, in peaceable possession of the field. We challenge the scientific world to make any reply to

causes such motion or change of position, which is *force* of some kind. But motion, *per se*, had no existence before the body began to change position, and it has no existence after the body comes to rest, which cannot be said either of the body itself or of the force or energy which caused it to move, both of which, being real objective existences, cannot be annihilated or cease to exist, but must persist in some form. Superficially, therefore, we may say that sound is produced by the motion of the tuning-fork; but, scientifically speaking, sound is produced by the substantial mechanical force or energy which overcomes the inertia of the fork and puts it into motion. As motion is a nonentity, it therefore,

this argument for the absolute existence of immaterial substance—an argument which alone annihilates the mode-of-motion doctrine as applied to other natural forces, leaving them all *entities*, just as required by the Substantial Philosophy. For, plainly, if magnetism is thus proved to be a real substance, by the utter inadequacy of any mere motion of material substance to explain the facts, then gravity must follow as a real, immaterial substance, by applying the very same line of reasoning and illustration: and if these two forces of Nature are thus indubitably shown to be substantial emanations, why not all the others? The argument thus seems absolutely conclusive.

Indeed, may we not claim it to be a truism, so well settled in the very texture of science as to entitle it to be received as axiomatic by any mind capable of philosophical thought, that, as no ponderable body can move of itself, so no body, such as the iron armature referred to, can move unless acted upon by a real substance emanating from some source of power? Can any logical mind dispute such self-evident truth? If not, then have we not, in the most convincing manner, demonstrated in magnetic attraction and repulsion an active, powerful substance existing entirely outside of the domain of materiality, which defies all material conditions or material explanations, and which has not one material property?

True, this magnetic substance appears to cease to exist when it ceases its manifestations. But it does not and cannot cease to exist, in the very nature of things. As it is admitted to be a real *force*, the theory of the “conservation of the forces,” now

in a strict scientific sense, can produce nothing nor cause any effect.

Q. 19. If sound or electricity is generated alone by the mechanical force which gives motion to the fork or magnets, do not these resultant forms of force actually *come into existence* by such process?

A. Yes, in the sense of such manifested or special *forms* of force. But in the sense of the substantial force-element of Nature, the essence of all force, from which these forms of force were liberated or evolved by the physical process named, they did not come into existence by such process, but are the mere conversions from accepted as science, precludes the possibility of such magnetic substance being annihilated. Whatever becomes of it, and however it may be dispersed throughout space, or be diffused so that its active effects cease to be recognized by us, it nevertheless continues to exist in some essential and substantial form, or the so-called "conservation of the forces" of Nature cannot be true.

Here, then, is where *Substantialism* practically began. Here is where it drove its first stake, pitched its tent, and from which point it took its first philosophical bearings. If one of the acknowledged physical forces, namely *magnetism*, is thus shown to be not a mere technical vaguity or meaningless myth of science, but a real immaterial substance, as we have here found it to be, then reason would tell us, yea does tell us, as just intimated, that every other force is equally substantial, *unless some insuperable difficulty shall be found to interfere which necessarily precludes such substantial hypothesis.* But no such interference in any of the forces, after the most critical and searching investigation, occurs. On the contrary, rather, once admit the existence of immaterial substance as a settled fact, as magnetism compels us to do, and then admit four of the natural forces—*magnetism, gravity, electricity* and *heat*—to be really substantial, as the first one irresistibly forces us to do, and is it reasonable or philosophical, after such data, not to include every other natural force, or whatever produces sensuous manifestations, in the same category? Thus logically were we led step by step into Substantialism.—Dr. Hall, in *Microcosm*, Vol. III., pp. 279-311.

such force-element, into these forms of force for special manifestations. As substance in the *primordial* sense can neither absolutely come into existence, nor cease to exist, and as this is an indisputable scientific axiom, hence everything in the universe, material and immaterial, must in its finer essence or ultimate substance have always existed—not as gross matter, nor even as the crude force-element, for that matter, but as the infinitely sublimed primordial and incorporeal element or essence from which and out of which the infinite and intelligent *Ego* created all the manifested forms of substance in the universe. The law of the conservation of force, so universally taught and believed, not only proves force in every form to be an entity, but it precludes the possibility of its destruction, as much so as if it were matter itself. If it would be impossible for matter to be annihilated, or converted into *nothing*, it would be equally impossible for matter or any form of force to be created out of nothing. Hence, it is the rational philosophical view, that all substances in Nature, including the forces as well as the force-element from which the various forms of force emanate, were originally, or in their last analysis, the exterior element or substantial clothing, so to speak, of the infinite, substantial, uncreated, and intelligent First Cause of all the entities in the universe. It is therefore regarded as the more rational and philosophical view to take, that the universe was created out of *something* rather than out of *nothing*, since something in abundance may have existed from eternity, as *the things which are not seen—the invisible things of God*—out of which to create every thing, even without involving the idea of the eternity of matter.*

NEW YORK, September 12, 1885.

* *Dear Dr. Hall :*

Your argument in reply to Dr. Stone in the September *Microcosm* has thrown a flood of light on the subject of Creation.

Q. 20. On what analogical ground should sound be regarded as a substantial entity, and not as a mode of motion, as present science teaches?

A. On the analogical ground of the consistent and harmonious uniformity of Nature's laws and principles of proceeding. As heat, electricity, magnetism, etc.—all phenomena-producing causes in Nature—are among the self-evident substantial or entitative forces of Nature, it would be incongruous and out of all consistent harmony, for sound and light, equally phenomena-producing causes, not likewise to be substantial forces or objective entities. And as the senses of *smell*, *taste*, and *tactility*

Clearly, if Dr. Stone's view is correct, *nothing* must be the exact equivalent of an entity, as you have logically insisted. If I were able to "frame" a house out of *nothing*, as the worlds were supposed by Dr. Stone to be "*framed* by the word of God," even if I possessed infinite power, I should regard *nothing* as a good enough *entity* for all practical purposes of material construction. The very fact that God must be immanent or present in Nature, in order to sustain it, according to the faith of most Christians, and the very fact that without the immaterial force of cohesion, as you have shown, all material bodies would at once disappear, is sufficient proof that it is through and by means of the physical forces that God's presence is made manifest in Nature. And if God is actually present in Nature, and controls it through the immaterial force-element in its various manifested forms, there is nothing illogical or irreverent in supposing that this same immaterial element was the original portion of God's exterior essence out of which the worlds were made. How natural, then, is Paul's statement that the worlds were "framed" of *things that do not appear*, or in other words, of the "*invisible things of Him*." Heb. xi. 3; Rom. i. 20.

The argument advanced by you in reply to the Rev. Dr. Barr, of Philadelphia, as printed in the "Problem of Human Life," at page 52, is one of the strongest scriptural arguments against the *nothing* theory yet presented, and I cannot imagine how any one would attempt to answer it, namely, that the "*Word was God*," and the "*Word was made flesh*." As the flesh of Christ was literally *material*, it is plain that God did, at least in one instance, himself change into *matter*, and it is equally true

can only be addressed, and their sensuous impressions produced by substantial contact with these organs, it would be entirely unwarranted to suppose an abrupt change to nonentitative motion in the sensations of hearing and sight.

Q. 21. Are there any direct and positive proofs that sound does not consist of air-waves, or of condensations and rarefactions, as taught in the present theory of acoustics?

A. Yes, many such proofs. One is, that if sound is constituted of condensations and rarefactions of the air, caused by the to and fro vibrations of the sounding

that the mere flesh of Christ, after its creation, was no more a part of God than is the flesh of any other person. Then the argument is overwhelming, if *God* as the *Word* could be made into *material flesh*, dare we assert that *God* as the *Word* could not be made into a material *World* or a material universe? It is also very plain that in the creation of Adam the soul or spiritual part came direct from God, as a part of his own spiritual essence, and by which man was made in the image of God. Is it likely that God made one half of Adam out of his own essential being, and that the other half (or that out of which it was made) came from nothing? Is it not more probable that the whole man, soul, body and spirit, came directly or indirectly from the substantial being of God? Would it not be well for those who advocate the *nothing* hypothesis to stop raising trivial objections long enough to answer a few of your strong arguments?

Query,—If God was in the habit of making *things* out of *nothing*, why did he change his plan and make Adam's body out of the *dust of the earth*? Why did he not consistently adhere to his uniform process and make Adam's body out of *nothing*? If it was actually necessary for God to use some previously existing substance out of which to make so *small a thing* as Adam's body, is it at all likely that he could make larger things, such as *worlds*, out of *nothing*?

ROBERT ROGERS, Office Editor of the *Scientific Arena*.
—*Micocosm*, Vol. V., page 45. See also Chapter I. of this volume.

body, it would follow that the vibrating body of a given size, which makes the greatest condensation and rarefaction of the air, or which swings furthest at a given rate of vibrations per second, should necessarily cause the most intense sound, and consequently should be heard throughout the greatest range of distance.

Q. 22. Are there any exceptions to such a principle in sounding bodies? That is to say, are there any sounding instruments which produce *little vibration or mechanical effects on the air*, and which, at the same time, produce more sound than other instruments of the same pitch of vibrational number which produce *vastly greater atmospheric condensations and rarefactions*?

A. Yes; there are many such conclusive illustrations among sounding bodies. For example, let us strike a tuning-fork heavily when held in the fingers, or thrum a heavy string when stretched over iron supports, and neither of them can be heard more than six or eight feet away, notwithstanding its powerful action on the air in generating so-called condensations and rarefactions. Yet a species of locust, an insect not a thousandth part as heavy, and with not a tenth part as much vibratory motion as the tuning-fork or string, though of the same rate and pitch of tone. when sitting on a green leaf, can be heard a mile in all directions, or more than eight hundred times further away, than can either the fork or the string, while by the actual space filled with its tone, it generates more than 80,000,000 times as much sound. This is conclusive proof that sound does not in any manner consist of air-waves, or of atmospheric condensations or rarefactions, as claimed by former physicists.*

* Now it is a fact that a tuning-fork of the largest size, when caused to vibrate at its best, cannot be heard, held in the open air, half-a-dozen feet away, while one of these locusts, having not a tenth part as much surface by which to act on the air.

Q. 23. Is it possible to generate sound without the vibrating instrument producing condensations of the air?

A. Yes; when the vibrating instrument moves through the air at a velocity so low, that the mobility of the air suffices to restore its equilibrium without its undergoing compression.

Q. 24. Has any such exceedingly slow vibratory velocity ever been observed and measured?

A. Yes; it has been mathematically determined by

and not a tenth the vibratory action or distance of swing, can be distinctly heard more than a mile away, and so loud is its sound when within a few feet of it, that it is almost deafening! If, then, both this insect and the tuning-fork produce their sound by the air-pulses sent off, and by nothing else, will some Prof. Mayer, Tyndall, Stokes, Rood, Helmholtz, Lord Raleigh, or Sir Wm. Thomson rise and explain why it is that the vastly larger and more powerful air-waves or condensations and rarefactions sent off from the the tuning-fork make no sensible tone six feet away from their source, while the vastly less agitation of the air by the vastly less surface and less extent of swing of the locust is distinctly audible a mile in all directions? Come, gentlemen, this is a serious matter for your theory, and must be explained unless you intend to abandon it. You dare not ignore the difficulty, or pretend that it is of no consequence. It is of the greatest consequence, because of its great simplicity in reaching the popular mind. The smallest child in school and the most unscientific old lady in the land can see its force against the wave-theory, if they ever saw a tuning-fork or ever heard a locust stridulate. Were the problem involved as deep and abstruse as the density and elasticity formula with Laplace's generation of sonorous heat, or as the mobility and compressibility problem discussed this month, then you might hope that its popular effect would be limited. But you have no such hope in this case. Schoolgirls will soon begin to laugh at the wave-theory of sound as an absurdity, unless you explain how the diminutive locust, not one-thousandth part as heavy as the tuning-fork, with not one-hundredth part as much air-wave-producing effect, can be heard a mile away, while the fork cannot be heard six feet, and still sound be nothing but air-waves!—Dr. Hall, in the *Microcosm*, Vol. III, page 218.

absolute mechanical measurement, that a tuning-fork will sound audibly, held in the fingers, when its prongs, though alternating rapidly, have so nearly come to rest, and consequently when they are moving over such an infinitesimal space at each swing, that their actual velocity of travel, at the swiftest portion of the oscillation, is less than at the rate of *one inch in two years, or about twenty-five thousand times slower than the hour hand of a family clock!*

Q. 25. By what mechanical process is it possible to measure such slow motion?

A. It is done by a method discovered and first announced by A. Wilford Hall, founder of the Substantial Philosophy, as set forth in the *Microcosm*, Vol. III., page 90, and carried out mathematically by Capt. R. Kelso Carter, Professor of Higher Mathematics in Pennsylvania Military Institute, as set forth in the same volume, page 154. This method, though very simple, requires too much space for these answers; so the reader is referred to the volume containing it.*

* We have *demonstrated*, in the *mathematical* sense of the term (and we will not keep the *modus operandi* a secret), that a tuning-fork will sound audibly, held in the fingers, when its prongs are not traveling *to and fro* a distance of the *one sixteen-millionth of an inch!* Doubling this distance, for the swing both ways, and we have the *one eight-millionth* of an inch as the entire travel of the prong through one complete vibration. Let us then use a fork having 256 vibrations in a second and we have the entire distance traveled by such prong but the *one thirty-thousandth of an inch in a second!* Counting the swiftest velocity of the prong's travel at its centre of swing as three times this aggregate distance passed over, which is more than the facts require, and we have, as the unanswerable result, *a fork sounding audibly when its prongs are traveling only at a velocity of the one ten-thousandth of an inch in a second at its swiftest motion, or at the rate of about one-third of an inch in an hour!* Is any professor of physics in America or elsewhere prepared to assert that such velocity of travel by a tuning-fork's prong will con-

Q. 26. By what law of physics is the necessary velocity of a body moving in a free fluid determined in order to outstrip mobility and begin to produce compression?

A. By what Dr. Hall was first to announce as the *union-limit* in every fluid between its mobility and its compressibility, or the point at which velocity of motion has so increased that mobility alone cannot restore displacement quick enough, and compression must therefore begin. This union-limit is lowest of course in the lighter and more compressible gases, and becomes higher and higher, requiring greater and greater velocity of the moving body, as the compressibility of the fluid increases.

dense the air and send off air-waves at the velocity of sound, or 1120 feet in a second? Yet it is a positive fact that Prof. Tyndall describes this very motion of the prong—*one third of an inch in an hour*—as “*swiftly* advancing,” while the greatest living physicist—Prof. Helmholtz—declares that such prong, in order to produce sound, must travel “*very much faster*” than the pendulum of a clock in full swing! Is it possible that the professors of our great colleges will not be able to see and feel the annihilating force of this demonstration against the received theory of acoustics?

But the scientific student naturally asks, and has a right to ask, how is it possible for you to “demonstrate” mathematically and mechanically such an astonishing result, and thus actually measure the travel of a prong when swinging to and fro a distance of only the one *sixteen-millionth* of an inch? We answer, easily enough. It only requires a little practical, original common sense, after first entirely ignoring the misleading text-books on the subject, and any beginner in natural philosophy, having a good tuning-fork, can make the same demonstration. Here it is, and let wave-theorists take particular notice.

From *Microcosm*, Vol. III, page 91. The following is Capt. Carter’s confirmation and description of Dr. Hall’s demonstration:

CAPT. CARTER’S REPORT.

DEAR DR. HALL,—According to my promise, as printed in the November *Microcosm*, I now proceed to give you my report of experiments on the slow motion of a tuning-fork’s prongs, in confirmation of your “finishing demonstration” as given in

The union-limit for such compression-velocity is rationally to be calculated from the two factors, namely, the superficial area of the moving body, and the density of the fluid.

Q. 27. What general proof is there that this law of union-limit between mobility and compressibility must hold good?

A. The fact that water is practically incompressible, except when great mechanical force is employed, and the ease with which mobility entirely suffices for restoring equilibrium when the weakest fishes can make rapid headway through it, thereby allowing of easy displace-

reply to Prof. Stahr, in the October *Microcosm*. The following are the results of my experiments:

I used a large Koenig fork of 256 vibrations. Striking it heavily and holding it upright in my fingers, I found that its sound was clearly audible (either held to the ear or through a long rubber tube.) at the end of *four minutes*. By means of a finely graduated scale I easily measured the amplitude of the fork's swing. I found it to be at first 4-60 (1-15) of an inch. At the end of fifteen seconds it had reduced to 1-60 of an inch amplitude. At the end of fifteen seconds more, its motion was barely visible against the sky. Now I can easily see a line of 1-240 of an inch in breadth, which proves that the amplitude had again diminished to one-fourth. In the third fifteen seconds, the motion had become totally invisible, even through a good magnifier. Safe to assume another fourth, or a reduction of amplitude to 1-960 of an inch for each swing.

Now there are sixteen times fifteen seconds in four minutes, hence I have the 1-15 of an inch swing reduced by four as a divisor, sixteen times, or in round numbers to 1-64,000,000,000 of an inch at each swing. As the prong swings through this amplitude, counting both directions, 512 times in a second, we have the entire distance the prong travels, while still sounding audibly, but the 1-123,000,000 of an inch in a second. There are in round numbers 31,500,000 seconds in a year. Hence the prong moves at the rate of only about *one inch in four years!* Allowing one-half for the swifter travel of the prong at the center as compared with its average travel throughout a swing,

ments and restorations of this fluid by mobility alone. Then the additional fact that water, even if this small fraction of remaining compressibility were removed, would still be practically as mobile as it is now, causing fishes to experience no more inconvenience in making headway through it than at present, is a clear proof that mobility in air is all that is needed for the restoration of equilibrium without compression, especially when a body moves slowly through it, as is the case with all vibrating instruments, their very swiftest travel being of less velocity than a dozen feet in a second. Should the remaining small fraction of compressibility be removed from

and we have the astounding fact that the fork continues to produce audible sound *while its prongs, at their swiftest motion, are not traveling at a velocity of more than one inch in two years!* As your demonstration only brought down the prong's swiftest travel while still sounding to *one inch in three hours*, I have, therefore, made the proof more than 5000 times stronger against the wave-theory than you had it, instead of 400 times, as I promised last month. Let physicists dispose of these figures if they can, or forever after hold their peace.

Yours, for the truth,

R. KELSO CARTER.

REMARKS ON THE FOREGOING, BY DR. HALL.

We sincerely thank our excellent contributor, Captain Carter, for his efficient aid in carrying out our demonstration against the wave-theory to its legitimate result, by means of his superior fork and his mathematical skill. Think of the astonishing fact of a fork sounding audibly when the swiftest travel of its prongs is only at a velocity of *one inch in two years*, and then compare this with the well-known teaching of the text-books! As proof that this demonstration leaves the wave-theory hopelessly broken down, we simply quote the following from Prof. Tyndall's text-book, which is a standard authority on acoustics in all colleges:

"Imagine one of the prongs of the vibrating fork *swiftly advancing*. It compresses the air immediately in front of it, and when it retreats it leaves a *partial vacuum* behind, the process being repeated at every subsequent advance and retreat. The *whole function* of the tuning-fork is to *carve the air into*

water, the union-limit in such case would rise to infinity, mobility alone answering every purpose of restoring equilibrium and adjusting displacements, whatever the velocity or superficial area of the displacing body might be.

Q. 28. What is the logical inference intended to be drawn from the foregoing facts and laws?

A. If mobility alone could suffice for the restoration of all displacements, even if a cannon ball should pass under full velocity through such a fluid, and without necessitating any compression whatever, is it not positive proof that the velocity of a moving prong 25,000 times less than that of the hour hand of a clock, does not condense the air at all? This being so, is it not proof equally positive, that the sound heard in the case of such slow motion, is not the result of air-waves, but that it

these condensations and rarefactions."—*Lecture on Sound*, p. 62.

Professor Helmholtz, the highest living authority on acoustics, maintains the same view: and insists in various ways, that the vibrating prong or string must pass swiftly through the air, in order to condense it and send off air-waves. Here is a specimen of his teaching:

"The pendulum swings from the right to the left with a uniform motion. . . . Near to either end of its path it moves slowly, and in the middle *fast*. Among sonorous bodies which move in the same way, only *very much faster*, we may mention *tuning-forks*."—*Sensations of Tone*, p. 28.

How preposterous all this now appears after reading the startling facts as arrayed in Capt. Carter's Report!

We now earnestly ask every candid student of science to examine this unavoidable teaching of the wave-theory in the light of the absolute facts here developed that the prong instead of "*swiftly advancing*," sounds audibly *when moving more than 25,000 times slower than the hour-hand of a family clock, and more than 300,000,000 times slower than any clock-pendulum ever constructed, instead of "very much faster," as Helmholtz teaches!*—*Microcosm*, Vol. III, pages 154, 155.

must be a substantial force, evolved and sent off, analogous to electricity?*

Q. 29. If air-waves, or atmospheric condensations and rarefactions, do not constitute sound, how are we to account for the fact that no sound is heard from a ringing bell in an exhausted receiver?

A. Substantial sound-force requires a conducting medium as much as substantial electric force. The air being the ordinary conductor of sound, it follows that the sound of a perfectly insulated bell in an exhausted receiver has no medium of conduction to the outside air,

* Having thus premised, let us in all seriousness come directly to the merits of the discussion, and see if this controversy cannot be ended. Now I assert, as a scientific proposition, that the motion of a body *below a certain velocity* in a mobile fluid *can produce no compression or condensation whatever, either at the commencement of the motion or at any part of its continuance.* In other words, I undertake to show that *mobility alone* is abundantly sufficient to provide the facilities for restoring equilibrium in the disturbance of every mobile fluid, and thus to prevent any possible condensation of its particles *if the velocity of motion causing the disturbance is below a certain rate*, which rate I will approximately assign as the discussion advances. But as the reasoning and proofs leading to these important conclusions necessarily involve laws and principles of physics never before presented, and not of course to be found in any scientific book, I will be compelled to be somewhat prolix in their introduction, so that one addicted to the old grooves of science like yourself may comprehend their force and bearing.

In the first place allow me to state that *mobility* and *compressibility* in a given fluid, such as air or water, are two separate and distinct properties of matter; but they necessarily cooperate in the phenomena of condensations, rarefactions, pulses, etc., such as we are here discussing. Now let me state a law before attempting to go further. That law is this, that in a given fluid the properties of *mobility* and *compressibility* have a point of *union-limit* as to velocity for co-operation; below this limit no velocity of a moving body can produce compression either at its start or anywhere else. That is to say, the *mobility*

and hence cannot be heard. But let the bell rest on the wooden bed of the receiver, and it can be heard about as well in the vacuum as with the receiver full of air, since the wood now becomes the sound-conductor to the outside air, and through it to the ear.

Q. 30. What part does resonance play in the production of sound?

A. It augments or multiplies sound by more widely distributing this substantial force through the air, some-

of the fluid has such effect as to restore equilibrium or equalize the displacement of particles before and behind the displacing body without any compression whatever taking place until the velocity of motion has reached this point of *union-limit* between the two properties, when compression first begins, and then increases more and more in the exact ratio as the velocity of motion is augmented. Thus we begin to see light shining upon a problem which your bare assertions about the commencement or the "first instant" of a motion exceeding the limits of mobility, would leave forever in the dark.

If the compressibility of a fluid be very low, that is, if it requires very little force to compress it, as in the case of air, then the *union-limit* of the two properties in that fluid is correspondingly low, and the velocity of motion required to compress is low in the same ratio; that is to say, it requires but a very moderate velocity to reach this compression-point or limit and begin condensation. But if the compressibility of a fluid be high, that is, if it require great force to compress it, as in the case of water or quicksilver, then the *union-limit* in that fluid, as well as the velocity of motion needed to begin compression, must be correspondingly high. Hence a condensation in such a fluid (nearly incompressible like water) requires manifold greater velocity in the moving body than in air.

Now, I purpose to startle you by an assertion which, if correct, upsets all you have written or ever can write on this subject, but which assertion will be borne out by facts and reason, namely, that *there is absolutely no limit to the property of mobility in a mobile fluid like air or water, and that no motion of a body, however high its velocity, could overcome the effect of mobility to restore equilibrium without condensation even in air if this property were alone involved.* But compressibility comes

thing as heat-force of a given quantity would have a more intensified radiation if spread out over the surface of suitable metal.

Q. 31. Is not the resonant increase or augmentation of sound caused by the increased vibratory surface of the sound-boards employed in musical instruments, such as pianos, harps, violins, etc.

A. No, not in the slightest degree. A tuning-fork, for example, will increase its sound a hundredfold in

in as a correlated property of fluids, and as soon as the restoring effect of *mobility* has reached their *union-limit* of velocity, compressibility joins in the effect, and then part of the effect which mobility, if alone, would easily have accomplished in producing restoration of equilibrium is converted into condensation and a consequent pulse through this co-operating property of compressibility. Let me now demonstrate this law and general statement to be true in science. Air is known to be fully 10,000 times as compressible as water, yet the mobility of water is the same exactly as that of air, so far as any difference can be detected by science. Now, as water is almost wholly incompressible, it is reasonable to believe if it were reduced to absolute *incompressibility* that it would still be just as mobile as it is now, since no lessening of mobility occurs in 10,000 reductions of compressibility from that of air. The grand scientific result and conclusion follow, and which annihilate your pivotal argument, and with it of course the wave-theory, that in such an incompressible fluid *the mobility of the particles alone would allow any and all displacements to be restored, whatever the velocity or size of the moving body, since, as a matter of course, no condensation or pulse could occur, under whatever velocity, in an incompressible fluid!* Hence mobility, *per se*, is absolutely without limit in its capacity for allowing, when necessary, the restoration of displaced particles in a mobile fluid.

Thus our new scientific law is sustained, and your supposed overwhelming argument, to save the wave-theory, and upon which you have fatally staked the whole controversy, has been logically turned against you, since you must see how easy it is for our position to be correct, that mobility is all-sufficient to permit the restoration of equilibrium among air-particles, *under very low velocity*, without touching the *union-limit* of com-

range and intensity if held against a block of suitable resonant wood of no more surface area to act on the air than the fork itself; while, if held against a piece of iron of the same size, and causing an equal augmentation of atmospheric disturbance as will the block of wood, this added iron surface will not add perceptibly to the volume of tone caused by the naked fork, thus proving that the increased tremulous action on the air is not the cause of resonance.

pressibility, and without the slightest condensation or pulse resulting either at the commencement of the motion or at any other part of it, *since this same mobility would defy the highest possible velocity in air, and alone adjust all disturbances but for the mere contingency of the presence of the correlated property of compressibility!* When *mobility alone*, in an incompressible fluid, would be all-sufficient to restore any possible displacement without a condensation, as you now find yourself forced to admit, have you any logical right to deny our velocity-limit in air, up to which mobility alone suffices for restoring equilibrium without calling to its aid the other property of compressibility?

Let me, however, before leaving this revolutionary point, tighten up the cords a little about the neck of the now already strangled theory of "condensations and rarefactions" as constituting sound, by asking a few questions: Would you pretend to believe that a fish now moves its fins any easier owing to the present inappreciable fraction of compressibility remaining in water? Do you seriously believe that a tadpole swims by actually compressing the water and by sending off condensations and rarefactions as it waggles its tail? Or do you take the common-sense view, as I have just presented it, that the *mobility* alone of this almost incompressible fluid is all-sufficient for the needs of the tadpole in its displacing operations? But finally—I put the question in all candor: Suppose the remainder of the water's small fraction of compressibility were removed, would not a fish displace the water with its fins just as easily as it does now? and would it not make its usual headway by using the *mobility of the water alone for displacement, just as at present?*—Dr. Hall, in *Microcosm*, Vol. IV., p. 313; written at request of Dr. Henry A. Mott, in reply to one of his scientific correspondents.

Q. 32. Is there any difference in the velocity of sounds of different pitch or different intensity?

A. No; the velocity of sound is the same in a given medium, whether the sounds be soft or loud, high or low, simple or complex. The velocity of all sounds in air is about 1120 feet in a second, at the temperature of 60 deg. F. If colder, a rearrangement of the air-particles takes place under the action of cohesive force, causing sound to travel slower. This fact of the uniform velocity of all sounds in air at a given temperature is verified by listening to the playing of a band of music at a distance, all the sounds, however varying in intensity and pitch, reaching the observer in perfect time.

Q. 33. What causes all sounds to travel at a given velocity in a given body?

A. This natural law of sound-conduction in different bodies, like the law of resonance or sound-augmentation, is not entirely known at present, any more than it is known on just what law or principle electricity travels with greater facility through some substances than through others, and will not even travel at all, *perceptibly*, through some bodies—as, for instance, glass. The most rational solution of these differences is given in the correlation of the physical forces. The substantial force of cohesion, which originally arranged and now holds the particles of all bodies together, co-operates with the other physical forces such as sound, light, heat, electricity, etc., in their passage through material bodies, thus permitting their passage with greater or less freedom, or refusing their passage altogether.

Q. 34. Has not the relation of density and elasticity something to do with this rate of sound-velocity through different bodies?

A. No; since this old formula of the ratio of sound-travel is contradicted in almost every separate substance tested. Lead, for example, one of the most inelastic, as

well as one of the densest of bodies, conveys sound many times faster than does air, one of the least dense, and one of the most elastic of all known bodies.

Q. 35. But has not the relation of density to elasticity in *air* been proved exactly to correspond to the observed velocity of sound at different temperatures?

A. No, but right the reverse. Sir Isaac Newton, who formulated this law of the relation of density to elasticity in air and other bodies, as the basis of the current theory of sound-velocity, found that the observed velocity of sound in air exceeded such formula by 174 feet a second, or nearly one-sixth of the velocity, thus himself breaking down the wave-theory of sound by the very law upon which it was based. But not supposing any other theory of sound possible than that of wave-motion, or of the condensations and rarefactions of the air, Newton was at a total loss to explain this apparently fatal discrepancy between the formulated theory and actual observation.

Q. 36. Has there been no explanation of this discrepancy since Newton's time by which to make this theory of sound-velocity in air conform to observation?

A. Yes; there has been a hypothesis suggested by Laplace, and elaborately illustrated by Prof. Tyndall, that the condensations and rarefactions of the air, supposed to constitute sound, alternately generate heat and cold by squeezing the particles of air together and by which the elasticity of the air is augmented sufficiently to increase the velocity of sound one-sixth or 174 feet a second. In other words that the sound itself, in passing through the air, so changes the relation of its density to its elasticity, by the alternate condensations and rarefactions of the sound-waves themselves, as to make up this discrepancy found by Newton a hypothesis which no scientist since the time of Laplace has questioned.

Q. 37. Is it really possible that this explanation or solution, as invented by Laplace, is now adopted by the colleges and universities of the world as an essential part of the wave-theory of sound?

A. Undoubtedly. Scientists could conceive no other theory of sound, save that of air-waves, and although the theory itself was fairly broken down by Newton, they clung to it as better than no theory at all, and hence accepted the hypothesis of Laplace, weak as it was, which is now set forth in our text-books, and is universally taught in our colleges and universities as an essential part of the wave-theory of sound, since to abandon this solution of Laplace would be to abandon the theory itself.

Q. 38. What evidence is there that sound itself cannot thus generate heat, and augment the elasticity of the air as Laplace supposes, sufficiently to add 174 feet a second to sound-velocity?

A. Such evidence exists in the very nature of the mechanical operation producing sound according to the wave-theory. No compression of the air can be produced at a distance from the sounding body, by which such sensible heat can be generated as to add this large per cent of velocity (one sixth) to the sound itself, unless that compressing energy be actually exerted mechanically by the vibrating instrument itself. This would seem to be a mechanical truism, requiring no proof. Now to increase the elasticity of the air one sixth throughout the known range of sound, by the added heat thus caused by mechanical pressure, must require an enormous squeezing force to be exerted by these sound-waves as they travel, all of which mechanical force must be originally exerted by the vibratory motion of the sounding instrument itself at the origin of this system of condensation and rarefaction. But the worst feature of this supposed generation of heat by atmospheric condensations, is the fact that it was shown by the new law discovered by Dr. Hall, that

no appreciable heat is generated by the compression of air, the intensified heat observed in suddenly compressed air, being almost solely the heat which was in the air before compression began, such observed heat being merely the original heat concentrated to a smaller space.*

Q. 39. Can any special example be furnished in which such mechanical result as supposed by Laplace would be impossible, even if heat is generated by compression?

A. Yes; take the locust for example, which weighs but a few grains and can exert but a correspondingly minute mechanical force upon the air, yet whose sound can be heard more than a mile in all directions, thus filling four cubic miles of air with these supposed condensations and rarefactions. If the view of Laplace be correct, this enormous mass of air must be so compressed and rarefied by the physical energy exerted by this trifling insect alone, as to add one sixth to the elasticity of the air, and thus augment the velocity of the insect's sound, 174 feet a second.

Q. 40. Has any high authority in this department of physics ever calculated the real mechanical energy which is exerted in the compression of a sound-wave by which such a requisite amount of heat and electricity can be added to the air as required by the solution of Laplace?

A. Yes; Prof. Alfred M. Mayer, of the Stevens Institute, Hoboken, N. J., the highest authority on the subject in the United States, in his article on sound in "Appleton's New American Encyclopedia," says:

"This compresssion gives for the compressed half of the wave an increase of 1-679th *to the ordinary density of the atmosphere!*"

Now as each cubic inch of air in the four cubic miles

*See the new law of the cause of heat in compressed air, as first announced by Dr. Hall, copied near the close of the Eighth Chapter.

filled by the insect's sound is either compressed or expanded 1-679th more than the ordinary air (and it requires the same mechanical energy to rarefy as to condense, at least up to fifteen pounds rarefaction), it follows that this insect must exert a mechanical compressing and expanding energy of more than 5,000,000,000 tons on this mass of air, in order to change it 1-679 from its normal density, and thus make the sound of the locust fit the formula of Laplace. Any one can verify our figures by a little effort.*

*This want of scientific intelligence, however, is not a mere mental lapse on the part of our eminent physicist, but is chargeable chiefly to the inherent incongruity of a theory of science false to the very core. Daniels, of Scotland, the author of the ablest text-book on physics ever published, and which has recently been issued, falls into the same prodigious error in trying to account for the wonderful difference in loudness of various sounding bodies, which, as observation assures us, is out of all proportion to the mechanical effects they exert upon the air, and which so clearly conflicts with modern science. Being wholly unaware of the aid which Substantialism renders in such cases, and without one ray of light from the wave-theory to help him, he grasps wildly in the dark at the only straw in reach, namely, that the observed loudness of certain insects, for example, *is due to their pitch—that is, to their great number of vibrations in a second!* (See Daniels on "Principles of Physics, p. 368.) Had this high authority chanced to read the "Problem of Human Life," or several recent articles in this magazine on that question, he would have been informed to his surprise that the famous locust, which can be heard a mile, makes the loudest part of its stridulation at the pitch of A (440 vibrations in a second), at which pitch a naked tuning-fork, with more than ten times as much mechanical effect upon the air as that exerted by the insect, *cannot be heard six feet away, and consequently can produce but the 1-80,000,000 as much volume of sound as does the insect!*—See *Microcosm*, Vol. IV., pp. 318, 331; Vol. V., p. 38.

Had Prof. Daniels stopped to reflect, he would have been overwhelmed with confusion by the simple fact that a very small tuning-fork held in the fingers, or a very fine, short wire

Q. 41. Is not the great force of sound which is exhibited in the destructive effects of magazine explosions, such as the destruction of buildings and the breaking of windows miles away, favorable to the hypothesis of Laplace?

A. These destructive effects observed as the results of magazine explosions, are not caused by the sound at all, as mistakenly supposed, but result from the instantaneous

stretched over rigid iron supports, *when vibrating four thousand times in a second, can be heard no farther away than when vibrating one-fiftieth as often, or only eighty times a second!* Indeed, the facts in the case are directly the reverse of what Prof. Daniels sets forth, since the tuning-fork of very high pitch cannot be heard nearly as far as one of a vastly less number of vibrations! How neatly would this simple little fact have wiped out his "insect" illustration of the supposed cause of the marvelous loudness of such sounds based on their supposed pitch! Yet that famed authority was not capable of evolving so simple an overturn to his fallacious explanation.

His oversight, however, was manifestly due to his theory, and not to his intellect. He was prevented by the misleading nature of that theory from grasping the essential LAW of physical science: *that sound, instead of being the mechanical effect produced upon the air by the vibrating instrument, and conveyed through it in pulses or atmospheric waves, is a real substantial, but immaterial force, and depends for its intensity or quantity upon the sonorous character of the sounding instrument itself vastly more than upon its mechanical motion, just as the amount of substantial electricity issued from a dynamo machine depends chiefly upon the electrical quality of the magnetic apparatus, and secondarily upon the mechanical rotation given it.*

This important law we have given in substance in the different editorials to which we referred a moment ago, but we have not before emphasized it as we now do, as an impregnable *law* of science, upon which the substantial character of sound as one of the forces of Nature may alone rely without the fear of successful assault. It stands, as a new and overwhelming discovery, in the same relation to *sound* that the law announced last month (page 160) occupies in relation to the substantial nature of *heat*, and these two laws should be placed side by side in the ultimate formula of the Substantial Philosophy.

generation of an enormous quantity of powder-gas, which, by its expansive force, drives the air away on all sides in a condensed wave, and which produces all the destruction witnessed. This addition of gas and this condensation of the surrounding air thereby, occurring as they frequently do to distant observers simultaneously with the sound-report, have been mistaken by physicists for the sound itself, and hence the most learned investigators, including such men as Profs. Tyndall, Mayer and Helmholtz,

We thus begin to realize the revolutionary value of the fact so frequently reiterated in these pages that the locust with one-tenth as much vibratory action on the air as that produced by a tuning-fork of the same pitch, can be heard 880 times farther away, while it actually generates 80,000,000 times as much sound! This beautiful revelation of science, which has been hidden from the eyes of the world through ages past, remained for the Substantial Philosophy to unfold. No better proof of the far-reaching value of Substantialism can be required than the marked contrast thus pointed out between the best outgivings of modern science and the new departures in the realm of physics here unfolded.

In the light of such discoveries (and this is but one in a score equally important recently announced in the *Microcosm*), how invincibly must the Substantial Philosophy appeal to the intelligence of mankind in its mighty sweep through the wildering mazes and mysteries of physical science! Substantialism sees no more difficulty in solving the seeming inexplicable problem of the vastly varying intensities of different sounds, without any reference to atmospheric disturbance, against which Daniels, Mayer, Tyndall, and Helmholtz stagger and turn pale, than it originally saw in correctly explaining the blowing out of a candle by the clapping of two books at one end of a long tin tube, or in solving the mystery of the breaking of windows by a "sound-pulse" miles away from a magazine explosion, upon which Prof. Tyndall found himself and his theory totally at sea. Had the great physicists we are noticing possessed the magnanimity and fairness which should characterize all true scientific investigators, they would long since have cheerfully accepted the aid in their perplexing physical researches which the Substantial Philosophy alone can give.—Dr. Hall's reply to Prof. Mayer, *Microcosm*, Vol. V., page 231.

have taught that it was the *noise* or *sound-wave* which caused the observed destructive effects near exploding magazines. Whereas the sound-report of such explosion *per se* would not stir the feather of a bird, except by sympathetic vibration, which exerts no appreciable mechanical force.

Q. 42. Is there any direct proof that sound itself has nothing to do with these destructive effects, and that all scientific writers on acoustics have heretofore been mistaken?

A. Yes; there is the direct proof that the most intense sound-report which ever addressed human ears—as in the case of a crash of thunder right in the building where the bolt strikes, produces no destructive effect whatever, not a pane of glass being cracked or disturbed, except in the very path of the electric bolt in reaching the earth. The reason for this is plain, namely, that this thunder-peal is unaccompanied by any addition of gas by which a condensed air-wave is generated and sent forth on its destructive errand.

Q. 43. Why has not this apparently self-evident solution of the problem in question been given by former physicists?

A. Because the wave-theory, which teaches that sound consists of condensations and rarefactions of the air, had a blinding and misleading effect on the minds of its adherents, causing them, without due reflection, to jump to the conclusion that the manifest condensation observed at a magazine explosion, by which windows are crushed miles away, must be that of the sound itself, which occurs at the same time. Having accepted an impossible theory of science, they were naturally led to distort irrelevant phenomena in its favor.

Q. 44. Is there any way of proving that the sound-report and the condensed wave of air at an explosion of powder, are two separate and distinct phenomena?

A. Yes, by a plan originally suggested in the "Problem of Human Life," by its author, to arrange and cause an explosion of powder to occur at a definite instant, and then to time the separate arrivals of the sound-report and of the compressed wave, at stations fixed at different distances away, tested and recorded by suitable instruments. It was predicted, and will no doubt be verified by experiment, that at or near the start, in case of a heavy explosion, the compressed wave, or the atmospheric concussion, will vastly outstrip the sound, while at a greater distance they will arrive simultaneously, but at a still greater distance, that the sound will pass and outstrip the lagging concussive shock by some seconds. The reason given for this probability is, that sound travels at a uniform rate of velocity, by its law of conduction, throughout its entire range, while it is equally evident that the condensed air-wave, caused by the instantaneous addition of gas, must travel much faster at the start of its journey than after it has progressed some distance, or after it has become weakened in force by increasing the quantity of air under compression, according to the well-known law of the square of the distance from the explosion.

Q. 45. Will sound-force, *per se*, produce any sensible effect in disturbing or displacing material bodies?

A. Yes, it will, as recently hinted, move a body unisonantly into sympathetic vibration. Such body, however, must be capable, firstly, of itself producing sound, and secondly, must be tuned in unison with the actuating instrument in order to be stirred sympathetically. The substantial sound-force, issuing from the sounding instrument in sonorous pulses or jets of force corresponding to its vibrational number, strikes the unison instrument, which being tuned to the same pitch, stands ready to act sympathetically and respond by absorbing the force, so to speak, thus reproducing the same tone, though with much less intensity. There is nothing

more surprising in this sympathetic action of a suitable instrument by substantial sound-force, than in the action of substantial magnetism, which draws a piece of metal which happens to be in sympathy with it, such as *iron*, for example, while producing no physical effect whatever upon unsympathetic metals, such as gold, silver, copper, etc.

Q. 46. Would not sound if constituted of air-waves, also explain sympathetic vibration in a distant unison instrument, by the continuous dashing of such waves against it synchronously with its own vibrational number, until it finally gets into motion?

A. No; in the first place it would be physically and mechanically impossible for a vibrating tuning-fork, for example, to send off air-waves or atmospheric pulses 180 feet, and thus put another fork into motion by their material contact with the prongs. Yet one fork, heavily bowed, has been known to start another that distance apart, both being in sympathetic unison and mounted on their resonant cases so as to have their sympathies augmented by the sonorous or resonant quality of these wooden cases.

Q. 47. What experiment, if any, will tend to confirm this view, namely, that it is the substantial sound-force which affects and starts the distant forks into sympathetic action, and not the condensations and rarefactions of the air, as the wave-theory teaches?

A. Remove the two forks from these resonant cases of *wood*, and place them on *iron* cases of the same size, which will vibrate and disturb the air with even more mechanical force than will the wooden cases, though with but a small fraction of the volume of sound; and however heavily the actuating fork may be bowed and set into vibration, no sympathetic effect will be produced on the other fork, even if only one-tenth that distance or eighteen feet away, notwithstanding the same or even

greater action is thereby transferred to the air. The reason for this is plain, that the sympathetic effect is only caused by, and proportional to, the sound-force which reaches the distant unbowed fork, and has nothing whatever to do with the supposed air-waves sent against the distant fork or its resonant case.*

Q. 48. How about the law of *sound-interference*, by which two systems of sound-waves may travel in such relation to each other, as to extinguish both sounds and thus cause total silence?

A. There is no truth in that law, though it has always been taught as an essential part of the wave-theory, and should be true if there is any truth in that theory. It was naturally inferred, since sound consisted, as supposed, of atmospheric undulations, that the same inter-

* As a proof that the sympathetic vibration of a unison body is not caused by the periodic impulses imparted to it through air-waves sent off from the actuating string or fork, I refer the reader to the unanswerable fact that a body may vibrate or oscillate ever so nearly to another body tuned in perfect synchronism with its own swing, and ever so rapidly, but so long as no audible tone is produced by these vibrations no motion whatever will be communicated to the unison neighbor, though it necessarily and continuously receives the synchronous air-waves driven against it by the actuating body. I have carefully tested this in the following manner: I arranged two pendulum-balls, with very short rods of equal length, to cause rapid swings as closely together as possible without touching, being careful that their supports had no immediate connection (except the air) by which any impulse might be communicated from the moving ball to the one at rest. Though their swings were in perfect synchronism, *moving with twice the aggregate velocity of a tuning-fork's prongs*, and although they were so near together that the air-disturbances caused by the moving pendulum must necessarily strike the other periodically, or as nearly so as it is possible for air-waves to travel, yet no motion whatever was communicated to the one at rest, for the best of all possible reasons—*there was no tone produced*.

This is also illustrated in the case of a sonometer-string, if

ference should necessarily take place in sound-waves, as in the case of water-waves where undulations do actually exist. In water-waves it is well known, that if two equal systems of waves so travel together that the crests of one system shall fall into the troughs or sinuses of the other system, the two will substantially neutralize each other, and cause a quiescence of the water. Now if sound in air consists of waves of condensations and rarefactions, it is plain, if two sounds or systems of sonorous air-waves, of equal wave-length (pitch), and of equal degree of condensation and rarefaction (intensity), should so travel together that the condensations of one system shall fall into the rarefactions of the other system, etc., that quiescence should result as truly in air-waves

taken from its sounding-board and stretched over isolated pieces of rigid iron; though it will vibrate when plucked just the same, and "carve" or "mold" the air into waves, as Prof. Tyndall expresses it, just to the same extent exactly as when in connection with its sounding-tray, yet its sounds can scarcely be heard by a person standing near it, for the want of a resonant body to augment its tone by diffusion, as will be explained after a little. A string in this condition will not start a unison body into sympathetic vibration even if but a few inches distant, and then only in exact proportion to the intensity of its sound, and not at all in proportion to the amplitude of the air-waves "molded," "carved," and sent off by its oscillations, which are exactly the same whether such string is connected with the sounding-board or not. If the air-waves are really molded and sent off by the harp-string, with "condensations and rarefactions" traveling 1120 feet a second, as so explicitly taught by Prof. Tyndall see extracts 7 and 8, pp. 78, 79, and if these air-waves are really the cause of sympathetic vibration in a distant unison string or fork, then pray tell us why the sonometer-string can cause no response to its unison neighbor a foot from it, though it "carves," "molds," and sends off the same air-waves it does when placed on its sounding-board? The air-wave hypothesis must therefore completely break down as the solution of sympathetic vibration.—Dr. Hall, in "Problem of Human Life," p. 81.

as in the case of water-waves, and that consequently the sound, which consists only of such atmospheric disturbances, should cease to be heard by such interference.

Q. 49. Is this the law of interference as taught in the wave-theory of sound, or as at present taught in our schools?

A. Yes; this is the law as laid down in all text-books on acoustics, and it is taught, or at least was taught, as settled scientific truth in every college on earth, previous to the publication of the "Problem of Human Life," a few schools and colleges since that time having abandoned the wave-theory for the substantial theory as was announced and maintained by Dr. Hall, and as here, for the first time, put into formulated shape.

Q. 50. Does any text-book plainly teach, in accordance with this law, that if two unison instruments were sounded half a wave-length apart, they would neutralize or destroy each other's sound?

A. Yes, in the plainest language imaginable. Prof. Tyndal's book on sound, for example, lays it down as an experimental fact, that two unison forks so sounded, half a wave-length apart, will totally destroy each other's sound by causing quiescence in the air, on the same principle as quiescence in the case of water-waves is super-induced when in a state of interference; and, as it would seem, lest the scientific student of his book, or the teacher should fail to grasp the fact, Prof. Tyndall illustrates it by a diagram of two turning-forks thus placed, first a wave-length apart (with dark and light shadings of the air) so as to augment each other's sound, and then a half wave-length apart, in which position, by an even or uniform tint, he graphically represents quiescence of the air or absolute silence.

Q. 51. Have any counter-experiments been actually tried by which to disprove the alleged truth of this law

of interference as illustrated by the sounding of unison instruments half a wave-length apart?

A. Yes, repeatedly, no effect whatever being observable in the intensity of the sounds when the two instruments are placed and sounded variously, first in supporting relation, or a whole wave-length apart, and then in a supposed interfering relation, or half a wave-length apart. The student of science can instantly prove (by having two assistants sound unison instruments in all possible relations as to distance apart, and then listening in all directions from them) that this fundamental law of interference, on which the wave-theory is based, is without a shadow of foundation in fact.

Q. 52. Are there no experiments or phenomena referred to by scientists by which to prove the truth of this supposed law?

A. Yes, several; but each one of which is an entire misapprehension of the phenomena observed and referred to as proofs. Take the one instance most commonly referred to, namely, the fact that the two prongs of a tuning-fork will so interfere that if held cornerwise close to the ear, there will be no sound perceived. But so far from this having anything to do with the supposed law of interference in the two supposed systems of sound-waves sent off from the two prongs of the fork, the essential theoretic half wave-length, absolutely necessary to this law, has to be entirely ignored, since the two prongs are within an eighth or a quarter of an inch of each other; whereas in an A-fork the half wave-length should be fifteen and one-quarter inches, or in other words these prongs, in order that their unison-waves should interfere, should be fifteen and one-quarter inches apart. Then instead of only interfering cornerwise, they should produce silence in all directions, especially in the direction of the swing of the two prongs. As this silence is thus shown not to be interference of atmospheric undulations

at all, according to the wave-theory, it remains what it manifestly is, a mere vacancy or absence of sound-force in the direction of these prong-corners, caused by the peculiar manner in which a tuning-fork liberates its sound from the force-element of Nature.

Q. 53. Is not the interference of the double-siren, as shown by the experiments of Profs. Tyndall and Helmholtz, a confirmation of the truth of this law of half-wave-length interference?

A. There is no interference at all produced in the case of the double-siren, nor anything that can be construed into it, according to the plain admissions of both those eminent physicists. When the two perforated disks of the siren (each having twelve apertures) were arranged in such relation to each other that their respective series of puffs should alternate, or in other words, when the twelve puffs of one disk were adjusted to occur in the spaces or between the puffs of the other, it is plain that this would make twenty-four puffs, instead of twelve, at each turn of the spindle to which the disks were secured; and as the two sirens of twelve puffs each, when occurring simultaneously, produced a loud fundamental tone, it is manifest to any acoustician that when placed alternately, and producing twenty-four separate puffs to each rotation, they would produce an exact octave of this fundamental tone, but greatly weakened in its intensity. Now, strange as it may seem, this is exactly what both Prof. Tyndall and Prof. Helmholtz heard, and they confessed it to be the real result, even after claiming the double-siren as a clear proof of the law of interference, and that the two disks when so adjusted as to puff alternately would interfere and thus produce the absolute extinction of both sirens. Thus is it shown in like manner to turn out with every experiment which has ever been claimed by advocates of the wave-theory to favor this law. The facts when analyzed do not show in-

terference at all; and yet the theory has been held and taught and explained for centuries in this way, just because no other theory could be imagined as accounting for the facts, phenomena, and appearances of sound.

Q. 54. Does not the decrease of sound-intensity or loudness as the square of the distance from the center of motion, go to favor the wave-theory?

A. Even if it were a fact that sound-intensity (in the sense of loudness), does decrease as the square of the distance from its source, which is not the case, it does not oppose the theory that sound is a substantial force, radiating from a center like light and heat, and that it must become less in quantity according to this same law. Surely if the substantial atmosphere becomes less in quantity as the square of the distance from the center, substantial sound, light, and heat, ought to do the same thing.

Q. 55. But if the *quantity* of substantial sound-force actually does become less or decrease as the square of the distance from the center, the same as the quantity of air, how is it that the *intensity* or *loudness* of sound does not decrease by the same law?

A. The actual *quantity* of sound and the actual *loudness* of sound have no necessary relation to each other. The quantity of sound relates to the external force itself, whether it is heard or not, while the intensity of sound, in the sense of loudness, relates to the sensation produced in the animal consciousness. A sound may be just as loud to our conscious sensation as another sound of many times its absolute quantity of sonorous force, simply because our auditory capacity is not capable of receiving and perceiving, as loudness, more than a certain limited quantity of this force. It is plain, if sounds too low or too high for our capacity cannot be perceived, that sounds too little, or overplus sounds too much, for our capacity would be of no effect on our sensation.

Q. 56. What does this teach as to the decrease of sound as the square of the distance?

A. It teaches, that while sound itself, as a substantial physical force, must decrease as the square of the distance from the center, like all other radiating forces, its loudness or intensity in our sensations depends on the nature of the sound itself, and its external intensity or absolute quantity at the source. A very powerful sound might thus be just as loud to a sensitive ear fifty feet away as ten feet away from its source; whereas there are twenty-five times as much sound in a cubic foot of air ten feet from such source of sound as at fifty feet away. The reason why the loudness might be the same in our sensations in the one case as in the other is, that our auditory apparatus can utilize no more than its full capacity, just as a pinch of sugar scattered over the gustatory membrane will taste as sweet as a whole mouthful.

Q. 57. Has there been any experiment to show that the loudness of sound does not decrease according to this law of squared distance inverse?

A. Yes; Capt. R. Kelso Carter, Professor of Mathematics in the Pennsylvania Military Institute at Chester, in the summer of 1881, at the suggestion of Dr. Hall, instituted careful experiments with suitable apparatus and competent observers, and after repeated trials in an open field, the fact was abundantly demonstrated, that with common pitch-pipes the supposed law completely broke down, and as Capt. Carter reported:

“Of one thing I am certain, that a pitch-pipe blown at one yard and at ten yards does not vary in loudness more than one half.”

According to the law of squared distance inverse, the one blown at one yard should be a hundred times as loud as the one blown at ten yards away.

Q. 58. Is the *timbre*, or quality of sound, consistent

with the doctrine that sound is a substantial force and not a mode of motion?

A. Entirely so. The notion that the overtones or auxiliary tones of a loud fundamental sound (which are known to constitute the *timbre*, or quality of sound), consist of the superposition of different sizes and forms of air-waves, is too irrational a view ever to have been accepted as science but for the fact that the wave-theory of sound was looked upon as a foregone necessity, no other theory being conceivable to the minds of past or even present physicists up to the appearance of the "Problem of Human Life."

Q. 59. By what experiment is the existence of these over-tones, which constitute the quality or *timbre* of sound, determined?

A. By what is called a *resonator*, an instrument which can be tuned in unison with any particular supposed overtone in a given fundamental sound, and being in unison with that particular tone, it will augment it while obscuring all other sounds, thus enabling the listener to hear it if it is present. By thus adjusting the resonator to every supposed or probable overtone in a given fundamental, the presence of all such supplementary sounds can be detected and noted.

Q. 60. How many such supplementary sounds or over-tones have been detected mixed up in any one given fundamental?

A. As many as six or eight, or even more tones of different intensities and rates of vibration or pitches, have been plainly detected by a patient search with a nicely adjusted resonator; and even several of these more prominent overtones, such as the *octave*, the *fifth*, the *third* and the *sixteenth*, have been plainly distinguished in some fundamental tones by a cultivated ear, and by a powerful act of attention, even without the aid of a resonator. But the supposition is inconceivable that

this number of air-waves, all of different forms, sizes, and vibrational rates, can be superimposed and occupy the same space at the same time, making the same number of movements in the ear membrane. The reason for this is, that it is a self-evident and inflexible law of mechanics, that no particle of matter can occupy more than one determinate position, have more than one determinate motion, in one determinate direction, and with one determinate velocity, at the same time. To suppose the contrary is to make a draft on human credulity that reason will not approve, since our experience furnishes no analogous example in any other department of science. Yet if these various sounds, contained in a single fundamental tone, are caused by air-waves, and if our distinct recognition of a hundred different sounds at one instant, produced by an orchestra of as many instruments, depends on the superimposed motions of the air leading to the tympanic membrane—a column no larger than a common lead pencil—then it must follow that the above self-evident and inflexible law of mechanics is false, and that these air-particles, filling the passage to the ear, must be capable of occupying scores of different positions, taking scores of different directions, under scores of different velocities, all at one and the same time. This stupendous error of science is actually taught and insisted upon by every advocate of the current theory of acoustics, though no doubt without realizing that he is in open defiance of the physical laws.

Q. 61. Is there anything in Nature and science that would go to support the substantial theory of sound-force in the light of this problem of *timbre*, as caused by over-tones?

A. Yes; this substantial view of mixed tones, by which the quality of a fundamental sound is produced, is plainly corroborated and easily shown by the innumerable qualities of mixed odor, which the whole scientific world

admits to be substantial, and in no possible sense superimposed waves. An experienced perfumer will instantly detect by the nose alone, a number of different perfumes promiscuously mixed together in the same bottle, naming each separate ingredient constituting the mass of fragrance, both fundamental and supplementary, and of course there is no such thing as superimposed air-waves, or odor-waves of numerous vibrational directions or velocities to untangle, but simply an analysis, by means of a sense-organ alone, of a combination of substantial entities, which go to make up this quality of *timbre* of the odor in question. And while a human being can thus analyze a mixture of half a dozen of odorous ingredients, and point out the presence of each, a certain species of fox-hound can analyze and untangle a hundred mixed smells, selecting out one, and following it in spite of all the confusion or odorous complications, which the ingenuity of man has the power to invent.*

* Readers of this surprising story of facts (the tracing of negro convicts by southern hounds), who have previously been inclined to doubt the basic principles of Substantialism, can now open their eyes and see for themselves. If a dog has the ability to select and isolate one single form of odor from a hundred other almost exactly similar forms, with these various forms of smell intermingled in the most confused and tangled manner possible, as here shown, and, at the same time, with odor a real objective *substance*, as the whole scientific world admits, is it not reasonable to suppose that the well-known ability of a practiced ear to select and isolate one single tone from an orchestra of a hundred different instruments, must come in like manner from the *substantial nature of sound*? If not, then what sense or meaning can there be in the so-called analogies of Nature?

The attempted reconciliation with the wave-theory of this single orchestral fact has cost many ponderous volumes on acoustics, involving the most abstruse mathematical calculation and theorizing. Lord Rayleigh, the eminent English scientist, has produced a book on sound of some four or five hundred pages, devoted almost entirely to these singular mathematical

Q. 62. As it has been proved by experiment that sound will reflect according to the angle of incidence in a manner similar to light, does not this constitute a proof that sound consists of air-waves?

A. No; it is right the opposite, since there is no such thing as true reflection in any kind of wave-motion, according to this law of the angle of incidence. Water-waves, striking a perpendicular wall at an angle, give no trace of true reflection, according to this law, but fall back and break up in confusion among succeeding waves, thus instantly losing their identity. Nothing can reflect which has not a substantial forward movement. A wave

wave-formulas, by which to vindicate the practical possibility of the truth of the current theory, and to show how the almost infinite complexity of air-motions, necessary to the hearing of so many sounds at one time, can result by the intermingling of condensations and rarefactions, and the superposition of various systems of air-waves upon each other.

He may have succeeded in representing all this on paper, by which to prove that one little membrane called the tympanum—not a third of an inch in diameter—shall take on all these superimposed forms of wave-motion at one time, and thus communicate them intelligibly to the brain. But the fatal difficulty in the way of all this complexity of mathematical theorizing by Lord Rayleigh can surely apply only to the air, or, rather, to his printed formulas, as it can never be reproduced as motions in the ear-drum of any living creature. This is proved from the fact that the tympanic membrane is not a stretched or tensioned diaphragm at all, but is a loose or flaccid mass of sensitive tissue incapable of any sound-vibrations whatever.

For centuries the scientific world has labored under the misapprehension that the tympanum is a “drumskin” stretched across the passage leading to the inner ear, ready to respond by sympathy and reproduce all the supposed complex motions of the air as formulated by Lord Rayleigh’s mathematical ingenuity. But this notion concerning the ear-drum, so long in vogue is totally false, as now proved by anatomy, and hence all this laborious effort, to show mathematically what is possible as to complex motion in the air, turns out to be a pitiable scientific

is only the forward movement of the form of the water's disturbance, and not of the water itself, the particles constituting the wave having only an oscillatory motion to and fro in a direction at right angles with the direction of the wave or swell itself. This is even seen in a field of gram, and especially of flax in blossom, in which true waves are produced by wind, but in which it is evident no reflection at the angle of incidence is possible. This law of angular reflection is only conceivable in bodily forward movement, under velocity, of the very substance which is reflected. A discharge of rubber balls from a gun against a plain surface, at an angle, gives a correct

abortion, since no vibrations are possible in such a flabby piece of tendinous tissue as this ear-drum.

In contrast with this incomprehensible mathematical mystification by Lord Rayleigh, how easy and simple is it to conceive of the possible hearing and analyzing of any number of the most complex sounds at one time, on the basis of the contact of substantial sound-force against this delicate and sensitive auditory membrane, especially in view of the demonstrable illustration just given of a hound snuffing a hundred complex but substantial odors at the same breath, and by means of his nasal membrane alone, without any vibratory motion whatever, isolating one of these smells out of the hundred and retaining it in spite of all the complications that could be invented by man! Of what use, then, in the name of all that is reasonable in science, is this complex superposition of air-waves in accounting for sound-sensations, when in the adjoining sense next to it, namely, that of smell, every purpose of nature is served by the substantial contact of odor, and that, too, amid a confusion of conflicting smells which would make a volume of Lord Rayleigh's worst mathematical superpositions appear like simple reading?

But suppose odor to consist of vibratory motion, which certainly should be the case if it is true of sound, and then imagine that poor dog, before selecting the special form of odor he was to follow, being obliged to figure out with his nose over a little patch of dirt one of the easiest of Lord Rayleigh's superpositions as applied to odoriferous condensations and rarefactions in order to determine which angle of the parallelogram to select before he could start on the track of the right convict! Then imagine

illustration of this angle of incidence at which light and sound reflect, each ball rebounding at the same angle of direction it had in striking the plane surface, thus showing the true law of all reflection, especially of both sound and light as substantial entities having an analogous forward and bodily motion.

Q. 53. Is this law of substantial forward motion also in harmony with the well known method of concentrating sounds to a focal point, as in an ear-trumpet, and other funnel-shaped tubes?

A. Yes; the concentration of sound by an ear-trumpet, is only a succession of reflections of forward-moving

these odorous vibrations caused by the impacts of the convict's shoes to have been made an hour in advance of the dog's starting—pray how could his olfactory membrane be made to respond sympathetically to such vibrations an hour after their motions had ceased to exist?

Justing aside, why cannot Lord Rayleigh be induced to give us a book on the mathematical superposition of odor-waves, with suitable geometrical diagrams for showing the blending curves and cross-angles of three or more fundamental smells, including their harmonics, by which to explain in his usual lucid style how this hound succeeded in tracking the convict, as the effect of the combination chord of odorous vibrations as they tickled his olfactory nerve? Then let the distinguished savant write an appendix to the same work, formulating the scientific law of the *conservation of nothing*, or the *persistence of motion*, by which to prove that the vibratory effluvium from the convict's clothes could easily keep up their fragrant tremors against the twigs of the bushes during the two hours the "red dog" was swinging around the circle. Such a book would, no doubt, sell as a fitting companion-piece to his corresponding work on sound, and would be equally as scientific in every respect.

The truth is, this simple and serious fact that odor is a substantial force, impressing the nasal membrane of this dog and thus producing its complex sensations by substantial contact alone, and with which vibratory motion has nothing to do, is conclusive analogical evidence that sound sensations are produced in a similar manner. This beautiful and consistent view

substantial sound-force, following this angle of incidence, rebounding from side to side of that funnel, like infinitesimal india-rubber balls, thus collecting the larger quantity of sound-force admitted into the big end of the tube into a condensed form at the smaller end, just as substantial light rays, by the same law of reflection, would rebound from side to side of a similar trumpet-shaped tube, having its inner surface polished, and thus causing an intense focus of light and heat at the smaller end.

Q. 64. Does not the fact, that the sound of two books, when clapped together, will blow out a candle at the small end of a long tube, as illustrated in Prof. Tyndall's

of Nature would have been reasoned out long ago from the necessary analogies of physical science based on substantial odor alone, had the rational classification of all substances into material and immaterial entities suggested itself to any of our distinguished physical philosophers. But regarding nothing as substantial but matter, and stopping there, has hitherto barred the path of progressive advancement until Substantialism, with one fortunate stroke of its leveling ax, broke down this chief barricade of materialism.

Now we can see and understand, with but a modicum of rational reflection, that if the nose of that Georgia hound is capable of analyzing a hundred mixed smells on the basis of substantial odor, it would be the height of physical inconsistency to charge Nature with upsetting this substantial order of things by abruptly introducing for the next higher sensation a nonentitative mode of motion. We repeat our original statement, as given in the "Problem of Human Life," that a man who can suppose such an unnecessary incongruity in Nature's harmonious plans as a leap from actual substantial contact in one sensation to mere motion for the sensation next adjoining, when the latter sensation only requires a more refined form of substance to answer every purpose, has too trifling a conception of Nature to be reasoned with or to reason logically on any matter of science.

Dr. Hall's remarks on the exciting narrative of the tracing of convicts at the Georgia Penitentiary, by blood hounds.—*Scientific Arena*, Vol. I., p. 51.

lectures, prove that sound consists of air-waves instead of immaterial substance?*

A. Prof. Tyndall was mistaken, and so are all professors and teachers who repeat his experiments. It was not the sound from the clapped books which blew out the candle, but a puff of air driven through the tube, since a thin paper bag tied over the small end of the tube, with the atmosphere all pressed out, will be expanded and filled with the same puff of air which blew out the candle; and this will occur as often as the books are clapped in such a manner as to drive the air-wave into the large end of the tube. Surely we cannot bag up immaterial sound-force!

Q. 65. How has Prof. Tyndall, and how have all other physicists been so deceived by this experiment, if sound itself has nothing to do with the effect of extinguishing the candle?

A. They have all taken for granted that the wave-theory of sound must be true, since to them no other theory has seemed possible. Hence, it was easy to fall into this error, and to suppose that it must be the sound-

* "At the distant end of the tube I place a lighted candle, c, fig. 4. When I clap my hands at this end, the flame instantly *ducks down*. It is not quite extinguished, but it is forcibly depressed. When I clap two books, B B, together, *I blow the candle out*. You may here observe, in a rough way, *the speed with which the sound-wave is propagated*. The instant I clap, the flame is extinguished; there is no sensible interval between the clap and the extinction of the flame. I do not say that the time required by the *sound to travel through this tube* is immeasurably short, but simply that the interval is too short for your senses to appreciate it. To show you that it is a *pulse* and not a *puff of air*, I fill *one end of the tube with smoke of brown paper*. On clapping the books together, *no trace of this smoke is ejected from the other end*. The *pulse has passed through both smoke and air without carrying either of them along with it*."—"Lectures on Sound," p. 12, copied "Problem of Human Life," p. 271.

pulse which blew out the candle, when the books were clapped, instead of the puff of air which was driven away from the books into the open tube at the same instant. This superficial error is almost precisely similar to that which led physicists to suppose that it was the sound-pulse or noise which broke windows at a distance from a magazine explosion, instead of the wave of air caused by the added gas, as examined in answers 41, 42, and 43.*

Q. 66. Are there any other direct proofs besides the paper-bag test to show this tin-tube experiment to be erroneous?

A. Yes, many. Let the books be clapped in a direction away from the open mouth of the tube, so as not to force any air into it, and whatever the intensity of the sound thus generated and passed through the tube, no effect will be produced on the candle flame at the small end. But a better test is to strike a bell or gong right at

* "The most striking example of this *inflection* of a *sonorous wave* that I have ever seen, was exhibited at Erith after the tremendous explosion of a powder magazine which occurred there in 1864. The village of Erith was some miles distant from the magazine, but in nearly all cases the windows were shattered: and it was noticeable that the *windows turned away from the origin of the explosion suffered almost as much as those which faced it*. [This effect is simply explained by the tremendous shove given to the air, causing it to compress around the buildings equally on all sides. Professor Tyndall thinks it was the "sonorous wave" which *inflected*, and doubled its two ends around the building, thus crushing the windows!] Lead sashes were employed in Erith church, and these being in some degree flexible, enabled the windows to yield to the pressure without much fracture of the glass. Every window in the church, front and back, was bent inward. In fact, as the *sound-wave* reached the church it separated right and left, and for a moment the edifice was clasped by a *girdle of intensely compressed air*,"— *Lectures on Sound*, p. 23. Quoted and criticised in "Problem of Human Life," at page 105.

the large mouth of the tube, and although the sound may be almost deafening, no effect is produced on the candle flame, notwithstanding this sound is concentrated upon it in great intensity at the small end of the tube. Then to reverse the original experiment, let the two books be clapped as was done by Prof. Tyndall, but, let them be prevented from coming entirely together by a piece of soft rubber secured between them, and though no sound will be produced, yet the candle will be blown out all the same and alone by the puff of air sent off in both instances.

Q. 67. As puffs of air do not thus appear to constitute sound, does the movement of air impede or aid the travel of sound?

A. Not perceptibly to our sensuous observation. Yet it is evident in strict science, that so much must be added to or deducted from sound-velocity, as will correspond with the bodily movement of the conducting medium, either with the sound or in the opposite direction. To illustrate: As sound travels in still air at sixty deg., at a velocity of 1120 feet a second, it is manifest if the air itself were traveling in the same direction, in a breeze of thirty feet a second (or about twenty miles an hour), that we would have to add these thirty feet to the real velocity of sound as measured from one fixed station to another, making it 1150 feet a second instead of 1120. But, if we change stations, and send the sound against the breeze, we must necessarily deduct the thirty feet a second from the actual velocity of the sound, making it only 1090 feet instead of 1120. So it would be with electricity traveling through a wire by an analogous law of conduction at, say, 1000 miles a second. If by any means we could cause the wire to move one mile a second at the same time, this mile of travel would have to be either added to or deducted from the velocity of the

electricity, according as the wire moved either with or against the electric current.

Q. 68. Are there any experimental proofs that sound is not perceptibly impeded when traveling against a wind?

A. Many such proofs are on record, as observed from coast signaling stations, in which fog-horns and steam-sirens have been heard for miles against a heavy gale, when they could not be heard half as far with the wind. Also there are many proofs that steam-sirens and signal-guns which have not been heard by observers stationed a few miles out at sea, were plainly audible to other observers far beyond the first.

Q. 69. How are such erratic phenomena of a sound to be explained according to any possible theory of acoustics?

A. They are rationally explicable according to the Substantial Philosophy which makes all the forces or forms of energy real, substantial entities, instead of mere modes of motion. If sound is such a substantial form of force, analogous to electricity, it must travel through any material body by its laws of conduction in correlation or co-operation with the governing force of cohesion which arranges and holds the particles of all conducting mediums together, as explained in answers to 33 and 34. Now, it is readily supposable that the arrangement of air-particles is constantly undergoing change by the action of heat and cohesion, aided by the presence or absence of aqueous vapor, barometric changes, electricity, etc. Hence, there might be much more favorable conditions and arrangement of air-particles for the travel of sound against a given wind than in the opposite direction; and even the *grain* of the atmosphere, so to speak (as known to be the case with the different cohesive arrangements of particles in the *grain* or fibrous structure of wood), might thus prevent the travel of sound through certain masses

of air, causing it to bound back, thus producing an echo, or to glance over the heads of observers therein stationed, and thus reach others more favorably surrounded many miles beyond.

Q. 70. Are not such atmospheric conditions equally favorable to the wave-theory?

A. They are directly opposed to it, because air-waves are merely mechanical displacements or material disturbances, and no difference what the cohesive arrangement or conductive grain of the air may be, or what vapors might be present, mere mechanical undulations would not be affected one way or the other by which to cause such conductive phenomena as echoes, or the glancing of sounds over the heads of near observers, while reaching those still further distant.

Q. 71. Are there any analogies which go to favor this substantial view?

A. Yes. Let a rod have two branches close together, one of copper and the other of iron. Now, as copper is a better conductor of heat than iron, owing to the cohesive arrangements of its substance, let us place the end of the rod in fire, and it will be found that the heat, in traveling along the rod, by its law of conduction, in co-operation with the force of cohesion, will glance around the iron branch, following the copper texture as better suited to it under the correlation of the forces. Try a powerful current of electricity through the same rod, and it, too, by sufficiently fine tests, will be found to glance around the iron, and to follow the copper with much greater tenacity. Then try sound, and by the same correlation of force, it will be found to prefer the iron to the copper, glancing around the latter, and accepting the iron as better adapted to its co-operation with the ruling force of cohesion, which holds the seat of honor in all material bodies.

Q. 72. Is not the greater elasticity of the iron, and its less density over the copper, the true reason why sound selects it and travels through it with greater facility?

A. Not at all. This is abundantly proved by an iron pipe, open at both ends, and extending for a few miles. Let a sound be made at one end by striking the pipe, and it will be found that this sound will travel seventeen times faster through the metal than through the air of the tube, though the air is one of the most elastic as well as one of the least dense of known bodies. By the formula of Sir Isaac Newton (which assures us that the velocity of sound should increase in proportion as the *elasticity* of a conducting body is great and its *density* is small, and *vice versa*) it is manifest that sound should travel many hundred times faster through air than through soft iron; and as this is the formula on which the current theory of sound is based—the law of necessity breaks down the theory in iron, as its founder also proved it to break down the theory in air. See, also, answers to Questions 33 and 34.

Q. 73. As the generation of sound-force was attributed, near the commencement of this chapter, to the vibration of some sound-producing body, are there any other means known to science than vibratory action for sound-generation?

A. Yes, by the conversion of one force into another. It has been proved that an intermittent ray of light directed against certain substances, such as lampblack, cotton fiber, etc., inclosed in a glass tube, will cause an audible sound to issue from the tube of a pitch corresponding to the intermittent beam of light. As light has been proved to exert no perceptible mechanical effect in displacing a material body, however powerfully concentrated upon it, it is fair to infer that sensible vibrations of the glass tube or of its contents could not have

been produced by the impact of such ray; and as no changes from heat to cold, causing vibrational expansion and contraction, could possibly take place with sufficient rapidity to produce a high pitch of tone, it follows unavoidably that the light-force thus intermittently projected against the tube must have been directly converted into sound.

Q. 74. Is there any proof that other forms of force have ever been directly converted into sound, or that one form of force can be certainly converted into another?

A. Yes; we have many proofs of such conversion of the forces. It is well known that an electric telephone will convey sounds without any vibration having been produced, first, by converting such sounds into electricity, thus augmenting the intensity of the current, and then at the receiving diaphragm reconvertng the electricity into sound, making the words audible, and that, too, without any mechanical vibration occurring at either diaphragm.

Q. 75. By what experimental proof, if any, is it known that no vibration occurred at the transmitting diaphragm of the telephone referred to when the message was spoken against it?

A. It has been repeatedly shown that the vibration of a disk at the transmitting end is not at all essential to the conveyance of speech over the electric wire. This has been done by substituting a solid and rigid disk of iron, an inch thick, for the flexible disk commonly employed, and it has been found that words have been distinctly conveyed thereby over the wire. Indeed, messages have been spoken against the naked ends of the transmitting magnet, without any disk at all, and the words have still been sent, and heard at the receiving end all right. And as no vibration at the receiving disk could be detected by the finest tests that could be applied, and the message heard, even when no receiving

diaphragm was used, it was but reasonable to infer that the spoken sounds striking the magnet were converted directly into electricity, conveyed in this form to the far end of the wire, and there reconverted into sounds.*

Q. 76. Is there any direct proof that electricity is ever converted into other forms of force besides sound?

A. Yes; many such proofs. Electricity passed through a wire, will, by sufficiently increasing its intensity, be converted into *heat* till it will melt platinum. In doing this it is also converted into the most intense light by incandescence, and it can also be converted into another form of light, evolving no heat, as seen in the *aurora borealis*. But the most indubitable proof of force-conversion, is in the passage of a current of electricity several times around a piece of soft iron, thus con-

* But the phenomena of the *Telephone* are entirely different. It is true its diaphragm may vibrate when spoken to with force, as does that of the phonograph; but such vibratory motion is not necessary to the conveyance of a message through the electric wire. It has been proved by Dr. R. M. Ferguson, Ph. D., F. R. S., the eminent Scotch physicist, as published in the *Scientific American Supplement*, No. 120. and also by Count Du Moncel, the renowned French electrician, as published in his work on the telephone, that the action which is conveyed from the telephone through the electric conductor, and which is heard at the receiving instrument, must be regarded as "*molecular*," since the most refined observation shows no vibratory motion whatever in the receiving diaphragm. In fact, both these high authorities have shown that no diaphragm is necessary either at the receiving or transmitting end of the line, since *messages have been sent by speaking against the naked poles of the magnet*, and heard at the receiver without any diaphragm or other body capable of vibration. Hence, they have recently announced to the scientific world that the theory of sound will have to be reconstructed, since *molecular action* of some kind is forced to take the place of the supposed vibratory motion in the telephone. This is no doubt correct, as far as it goes, but we may reasonably expect that these eminent scientists will go still further, and in due time make another announcement, that the entire *wave*

verting the electric force into magnetism, a form of force entirely different from that of electricity, since the magnetic form of force requires no conductor, but will pass through all bodies alike, and as freely as if nothing intervened, while electricity not only needs a conductor, but is almost completely stopped by certain substances such glass. Heat, also, as in a thermal pile, is not only converted into a powerful current of electricity, but can be converted into the most brilliant incandescent light if sufficiently intensified. Now, if all these conversions of one form of physical force into another is rationally evident, is it not reasonably manifest that both light-force and electric force, as substantial entities, may be converted into sound-force, in accordance with the illustrations here given?

Q. 77. If sound is a substantial force, analogous to

theory will have to give way to the molecular and corpuscular hypothesis.

As sound-pulses are thus shown, by the highest authorities on the subject in Europe, to pass through the electric conductor without wave or vibratory motion, I may safely claim one-half of my new departure as accepted, and for the remaining half it will only be necessary to arrive at a better understanding of the correlation and interconvertibility of these incorporeal substances, such as sound, electricity, light, heat, etc., and we will readily comprehend how substantial sound-pulses, spoken against the magnetized transmitter, may combine with the substantial electric fluid, and thus be conveyed in its embrace, so to speak, to the distant receiver without the assistance of any corporeal movement whatever of the wire, magnet, or diaphragm. This view, of course, involves *molecular* motion, not of the material substance of the magnet or wire, as these physicists have hastily supposed, but rather the molecular and corpuscular motion of the two blending and correlated substances—*sound and electricity*—the only active substances involved in this operation. The explanation thus given is not only consistent with the phenomena in question, but it fully corroborates the view of sound taken in this monograph, as any one can see who will take the trouble to read it.—Dr. Hall, in "Problem of Human Life," p. 334.

electricity or heat, as these answers show, and if the air-pulse theory is a mistake, why is it that the velocity of sound through air, inclosed in a long tube, is the same exactly as that of a condensed atmospheric pulse caused by suddenly forcing a piston into one end of such tube?

A. This concluding premise is not correct. The highest authorities in physical science have assumed such to be a fact, but without ever having tried the experiment. The reason for such confident assumption is manifest and unavoidable in the very necessities of the wave-theory of sound. As all sounds, loud and soft, were universally believed to consist of air-pulses, or atmospheric condensations and rarefactions, and as all sounds were known to travel through air at the same uniform velocity, hence the doctrine stood unquestioned that a pulse, caused to pass through a tube by forcing a piston into one end of it, would necessarily obey this law of sound-velocity, no matter what force should be applied to the piston, what degree of condensation the piston should produce, or what distance it should be instantaneously driven into the tube. Dr. Hall was the first writer to call this law in question, as he was the first to announce the numerous abrupt departures from physical science set forth in this chapter.*

* The foregoing being the unperverted and undeniable logic of physicists, let us for a few minutes turn to the record. By reference to "Appleton's American Encyclopedia" and its elegantly written article on "Sound," fortunately within the reach of all students desiring to investigate the matter, Prof. Mayer, the highest authority on sound in this country and called by many the Helmholtz of America, makes use of this very illustration of the tube with a movable piston at one end, and actually assumes and teaches that the velocity of the atmospheric condensation caused by a sudden shove of the piston must necessarily be the same as that of sound, or must of necessity travel 1090 feet in a second at a temperature of thirty-two degrees Fahrenheit, since that is the admitted velocity of sound. As surprising as it may seem to the unscientific reader, and in exact conformity to the foregoing argument, this physicist makes

Q. 78. On what ground is it assumed that this old law of pulse-travel and velocity through a long tube, must be incorrect?

A. The assumption is based on the self-evident principle of mechanics that the greater the force with which a body is projected, other things being equal, the swifter will it go; and that, by the same necessary law, the greater the condensation produced instantaneously in the air of one end of the tube by a movement of the piston, the swifter must such condensed pulse travel toward the other end. Hence, if sound consists of air-pulses, as the old theory teaches, it must as certainly follow that loud sounds, constituted of heavy condensations of air, will travel faster than faint sounds. As this is known not to be the case (see answer 32), it follows that the wave-theory cannot be true, and therefore that sound must consist of something besides atmospheric pulses. What else is there for sound to be, unless it be a substantial force?

no distinction whatever in the velocity of the condensed wave thus generated, whether the piston is moved one inch or ten feet so the movement is instantaneous; and, consequently, he points out no difference in the speed of such a pulse, whether the spring-force of the condensation generated by the piston's movement be equal to a pressure of one ounce or one thousand pounds! He assumes this velocity of the condensed wave along the tube to be the same as that of sound—nothing more and nothing less—and hence it must be the same necessarily, whatever the spring-force employed to drive it, since the velocity of sound through this tube at any definite temperature, as already shown, is always the same.

As this writer fails to note this distinction, but rather ignores it, the same as did Prof. Tyndall in reference to the magazine explosion and the destruction of the windows at Erith by a "sound-wave," I am therefore compelled, as I did in the other case, to definitely point out the law governing the transmission both of the sound and of the atmospheric condensation through this tube, and thus to indicate the manifest difference between them, which science and its exponents so far have failed to do.

Q. 79. Has this new and opposing theory of pulse-velocity ever been tested by which to show that the wave-theory of sound cannot be true?

A. No. The originator of this substantial theory simply makes the prediction, based on his general discoveries, that whenever any college shall go to the expense and trouble of making the test with suitable tubing, the result will be found to conform to the law he has announced, namely, that the pulse thus generated by moving a piston into one end of a tube, will necessarily travel with varying velocity, just in proportion to the distance the piston is instantly moved and the strength of the spring-power of the pulse thus generated. The founder of the Substantial Philosophy willingly risks the fate of Substantialism upon the absolute truth of this revolutionary position.

Q. 80. Does the same law of sound-conduction, according to the substantial theory, prevail in solids, liquids, and gases?

Let us suppose the piston to be moved instantaneously into the tube a certain distance by the blow of a hammer, which also makes a sharp report at the same time. This simultaneous sound of the blow and atmospheric wave produced by the movement of the piston might or might not travel with the same velocity toward the far end of the tube. It would, of course, depend entirely upon the distance the piston was driven by the blow of the hammer, or, in other words, upon the quantity of air (in effect) thereby added to the atmosphere of the tube. It is evident that a true distance for the piston suddenly to move by this blow might be arrived at by experiment which would furnish just enough spring-force to carry the condensed wave through the tube with a velocity equal to but not exceeding that of the sound-pulse caused by the same blow of the hammer. But it is likewise evident that a distance might be selected for the piston to move (say *one-sixteenth of an inch*) which would produce so little compression of the air in front as to cause the condensed wave to lag behind, and possibly not travel one-tenth as fast as the sound of the hammer. In this case, however, the

A. Precisely the same, namely, the cohesive arrangement of the particles of the various material substances serving as sound-conducting mediums, and the correlation of cohesive force and sound-force in relation to these various arrangements of such material particles. Just as electric-force or light-force will travel better through some bodies than through others by the co-operation or opposition of the regnant force of cohesion, and without any reference whatever to the elasticity, density, mobility, or compressibility of such material bodies, so will sound-force travel through air, the various gases, water, wood, iron, glass, etc., by the same correlation or co-operation with cohesive force, and the various different ways in which that force has arranged and now maintains the material particles of various bodies to facilitate or impede such sound conduction.

Q. 81. At the twenty-ninth answer it is taught that the sounding bell in vacuo is not heard outside of the re-

condensation, as before remarked, would probably travel through the tube at a uniform velocity from end to end, though the sound would vastly outstrip it. The speed of so slight a condensation would resemble that of a condensed wave from a magazine explosion when it had nearly spent itself by expansion and rarefaction, as already explained. And, finally, it is evident that a distance could be determined for the piston to move (say ten, twenty, or forty feet) simultaneously with the blow of the hammer, provided it could be instantaneous, which would add sufficient spring-force to carry the condensed wave with a velocity twice or even three times that of sound. Is not this simple and clear.

Yet these palpable and manifest distinctions, lying at the very basis of pneumatics and acoustics, as any analytical mind must perceive, have never entered the thoughts of these great physicists. Why? The answer is plain. Simply because the universally accepted wave-theory of sound is obliged to lay down as its fundamental principle that a sound-pulse of any kind consists in and is propagated by means of a *condensation* of the

ceiver for want of a conducting medium for its sound-pulses. Does the bell in vacuo thus struck by clock-work generate sound-force the same as if it were in air?

A. Yes, just as a dynamo-machine in vacuo, and perfectly insulated from outside objects, would generate electricity. But in both cases the force thus generated, not having a conducting medium by which to manifest itself outside, returns to the force-element or force-reservoir of nature whence it came, thus losing its form or identity as fast as liberated by the appropriate processes for its generation.

Q. 82. Would not a bell thus rung continuously in

air, and can only travel as such compressed atmospheric pulse. Hence, after starting out with this fallacy, it became necessary, in order to harmonize natural phenomena, to compel all kinds of atmospheric condensations to conform to this law, and thus to travel at the observed velocity of sound! As physicists were unable to separate the concussive shock of a magazine explosion from its sound-report, but must suppose the two necessarily to be one and the same thing, according to this wave-hypothesis, it is asking altogether too much of them now to distinguish between the velocity of a condensed wave in a tube and its accompanying sound derived simultaneously from the blow of a hammer! It is owing entirely to the blinding effect of this all-pervading fallacy of atmospheric sound-waves having "condensations and rarefractions," generating thereby "heat," and thus adding "one-sixth" to the elasticity of the air and the velocity of sound, that we see Prof. Tyndall deliberately and almost pitifully jumbling a "sound-wave" or a "sonorous pulse" with the "girdle of intensely compressed air" *which crushed in the windows at Erith!* And it is owing to the same reason that we see Prof. Mayer, one of the most brilliant intellects of America, laying down his law that the velocity of a condensed wave in a tube, caused by the sudden shove of a piston, must necessarily be 1090 feet a second, or, in other words, must conform to the observed velocity of sound, without the least regard to the amount of condensation the piston produced, or the force thus brought to bear in propelling the wave.—Dr. Hall, in the "Problem of Human Life," p. 109:

vacuo be reduced in its material substance, and finally be entirely dissipated in the form of sound-force?

A. No. Herein lies the superficial mistake of those who oppose the Substantial Philosophy. They do not grasp the broad distinction between material and immaterial substances. A ringing bell gives off none of its material substance in the production of sound, and is only the material instrument by which the force-element of nature is reached and this peculiar form of force developed and manifested to our senses through proper conducting media. Lucretius vaguely caught the same idea of sound that Newton taught for light in his emission theory, namely, that by exercising our vocal organs, material sound-particles were emitted, thus in time wearing out the voice, causing hoarseness, consumption, etc. It was impossible for any investigator to grasp the true nature of light and sound, as in no way constituted of the material particles of the luminous and sonorous bodies, until the Substantial Philosophy had classified the substances of nature into material and immaterial entities.

Q. 83. But would not a bell continuously rung, finally be worn out?

A. Yes. Any body which requires its own vibratory action or tremor in order to generate or liberate a given form of natural force, must, in the nature of things, disintegrate or reduce itself by continuous wear in such process of liberating force. But surely, a student of science should be able to see that such wear and deterioration of the instrument is no more a part of the immaterial force thus liberated, than are the particles of the mill-stones worn off and dissipated in the process of grinding wheat a part of the flour thus produced. A bell may be worn and partly dissipated to dust in the process of vibrating and sounding, but every part of that dust still remains in existence as metallic matter, and if

collected would again produce the same bell intact by recasting.

Q. 84. Is this reasoning applicable to the generation and liberation of light-force by a consuming taper or other luminous body?

A. Yes. The process of consumption in a burning candle, or the substance thus undergoing disintegration or dissipation, constitutes no part of the luminous rays which pass off into space by the unknown law of luminous radiation at a velocity of nearly 200,000 miles a second. This process of disintegration in the luminous body does not change one particle of the material body into light-force, just as the disintegrating process of the liquid battery does not change one particle of the zinc or acid into electricity, since such a battery, operated for days and so inclosed as to avoid loss by evaporation, will weigh the same, notwithstanding the thousands of volts of dynamic electricity which have passed away from this battery to do mechanical work at a distance. The true solution of these various material processes, for liberating different forms of physical force, rests on the same general law, namely, the wear or disintegration of some form of matter by which, through certain disturbances of cohesive force, to tap the force-element of Nature, and thus develop and liberate that form of force desired, without such form of force consisting in the slightest degree of the matter thus disintegrated.

Q. 85. As luminosity in the consuming taper is both caused and accompanied by heat, is heat also evolved from this universal force-fountain of Nature?

A. Not always directly, but more often by the conversion of other forms of force into heat. The property of combustibility in matter, which is owing to the peculiar cohesive arrangement of its particles, is a powerful condition for the conversion of cohesive force into heat. Thus a spark may start a conflagration which, after the

initial conversion, expands by what it feeds on. No particle of the combustive material is consumed or destroyed in the absolute sense, but it exists as completely as before, though in different forms, such as ashes, vapors, gases, etc. The great manifestation of light and heat-energy witnessed in a conflagration, is but the substantial force of cohesion, which held the combustible matter together, changing its form to that of heat and light. The light and heat, thus resulting from the breaking up and conversion of cohesive force, after their energy is expended, find their way into the force-element of Nature, where, by correlation with other forms of expended force, they become one, and whence they are again ready to emerge by the demands of natural law in the same or other forms of force, but especially that of cohesion in its process of rebuilding forests of combustible material out of the ashes, vapors, and gases into which heat had separated those existing before.

Q. 86. But is disintegration necessary to the development of every form of force known to science?

A. No; some forms of force, after having been separated from the force-fountain of Nature, become permanently fixed or located in material bodies for definite manifestation. Cohesive force, for example, as also gravital force, has, by the economy of nature, been definitely located in all matter to its infinitesimal constituents, and there resides always ready to act. So with magnetic force, as seen in the loadstone or permanent magnet. Such magnet, by the peculiar relation of cohesive force with its constituent particles, is enabled to draw continuously from the force-element of Nature this form of force called magnetism, and thus pour it off in cycling currents, by which other material bodies, whose cohesive arrangement of particles puts them in sympathetic relation with these magnetic streams, are dynamically drawn or repelled, as the case may be. Thus harmoni-

ously are all the forces or forms of energy in Nature brought into consistent relationship one to another under the magical solving power of Substantialism, without forcing us to resort to so-called modes of motion in physics which neither accomplish nor explain anything.

Q. 87. What is meant by the wave-lengths of sound, and what relation, if any, do they sustain to the Substantial Theory of Acoustics?

A. As the Substantial Theory does not recognize air-waves as constituting any part of sound-force, it has no use for wave-lengths in sound. Besides, the idea of wave-length where there is no wave-amplitude, or no to-and-fro motion of the wave-substance (since no such amplitude as constituting sound, aside from incidental tremor, has ever been seen even under a microscope), is an incongruity so repugnant to reason as to be at once discarded by an unbiased student of science.

Q. 88. What are some of the wave-lengths of sound according to the current theory, and in what way do they conflict with our reason?

A. This theoretic idea of wave-lengths depends upon the velocity of sound in different mediums, and the number of vibrations of the sounding instrument required to make any given pitch of tone. The higher the pitch of sound, and the slower its velocity, the shorter the wave-lengths become; and *vice versa*. To obtain the wave-length of any given sound through any given substance, according to the theory, divide the velocity per second by the number of vibrations per second. Thus, as the velocity of sound in air is 1120 feet per second, it follows that the note A, or the sound made by the second string of the violin, having 440 vibrations per second, must have wave-lengths of thirty and one-half inches. The highest note in the common orchestra (*D* of the piccolo flute) gives a wave-length of about three inches, which is determined by dividing the velocity of sound

(1120 feet), by about 4,700 vibrations per second. The lowest note of the church organ (sixteen vibrations per second) gives a wave-length in air of seventy feet. Were this note to be sounded in water, in which sound travels with four times its velocity in air, its wave-length would be 280 feet from condensation to condensation, or from the center of one wave to the center of the next. But if this organ pipe should be sounded in connection with an extended mass of iron (in which sound travels seventeen times faster than in air), its system of waves from center to center of two adjoining ones, would have the prodigious wave-length of 1190 feet, or several times the wave-lengths of the largest ocean billows. But notwithstanding these actual wave-lengths of nearly a quarter of a mile from the center of one iron undulation to that of another, there is no amplitude or to-and-fro motion of the iron particles discoverable under the microscope.*

* But I have not yet reached the culmination of these logical and common-sense reasons for rejecting air-waves as the principle of sonorous propagation, nor have I touched upon the greatest absurdities which such an assumption necessarily involves. I have already stated the logical fact, that, if *sound-waves in air* constitute *air-waves*, as Prof. Brockett teaches, and as admitted by all writers on the subject, then *sound-waves in iron* constitute *iron-waves*. It is impossible to evade this. Further, as atmospheric sound-waves are formed by "a small excursion to and fro" of the *air particles*, thus constituting their "amplitude," without which air-waves could not exist (see many quotations to this effect, *Evolution of Sound*, p. 70), it follows that *iron sound-waves* must also be formed by "a small excursion to and fro" of the *iron particles*, thus constituting the necessary "amplitude" of *iron-waves*, and without which a "wave" is a nonentity! But as no such "excursion to and fro" of the iron particles occurs in a solid mass of iron when conducting sound, even when examined under the most powerful lenses, and consequently no "amplitude" exists in such supposed iron undulations, it demonstrates that there is no *wave-motion* in iron as the result of sound, and hence that sound

All correct ideas of undulatory or wave-motion should make water billows, having a wave-length of 1190 feet, at least 100 feet high from crest to sinus, according to the proportion which prevails in all systems of water-waves. Another insurmountable difficulty connected with this theory of enormous *wave-lengths* in sound is this: As sound can only travel in *waves* through any substance, it follows that the sound of this organ-pipe could not be heard passing through iron, say ten feet thick, since it would only furnish room for less than the one-hundredth part of one wave at a time! How could such waves be appropriated as sound, with 1180 feet of each wave missing for want of a piece of iron big enough? Thus does reason revolt at the very foundation of the wave-theory as an undulatory movement based upon

must pass through iron by some other law; and if through iron then through air, as there evidently can be no two different modes or principles of sound-propagation through different substances—one *wave-motion*, and another something else! Hence, the undulatory theory of sound, even in air, breaks down of its own inherent weakness.

Should it be said, here, that in the propagation of sound through iron the particles may move "to and fro," producing the necessary "amplitude" as required in all wave-motion, but not sufficiently to be visible under a microscope, then I answer that such *invisible* and *infinitesimal* motion, even if it occurs, would not constitute sound capable of addressing the human *ear*, because the *eye* is admittedly one of the most refined and sensitive of the avenues to perception; and this being so, these supposed motions of the iron particles, which can be so easily heard by the unassisted ear, should, if they take place at all, be plainly visible to the naked eye! But as this assumed "amplitude" or motion of the particles cannot be seen when the sight is magnified a million-fold, it is conclusive evidence, on its face, that such motion, if it takes place at all, is a million times too trifling to be heard! Thus, again, does wave-motion in *iron* break down; and with it, as a necessary corollary, wave-motion in *air*.—Dr. Hall, in the "Problem of Human Life," p. 339.

enormous wave-lengths, having an infinitesimal amplitude that is purely imaginary, and which exists only in theory.

Q. 89. What is the general conclusion to be drawn from this catechetical investigation of the nature and phenomena of sound?

A. From the various incongruities of the current theory and necessarily attaching to it, as developed in these questions and answers, notwithstanding the wisdom of ages and the ripest scholarship in science the world has ever known have been applied to its formulation and defense, it follows rationally that such a theory cannot be true. While the harmonious consistency and the internal evidence of correctness which attach to the substantial theory, as here set forth at its very first formulation into a text-book, would seem to indicate to a logical, scientific, and unbiased mind that such a system of acoustical science cannot be false.

[We add the following, referred to in one of the previous chapters, as a specimen of Dr. Hall's method of solving physical problems:]

HYDROSTATIC PRESSURE—A MECHANICAL PARADOX.

NEW YORK, Oct. 11, 1886.

A. Wilford Hall, Ph. D., LL. D.:

DEAR SIR,—Will you kindly give the readers of the *Scientific Arena* a rational explanation of hydrostatic pressure? The problem may be stated substantially thus: Suppose a frictionless piston of one square inch superficial area entering a tank full of water. Now, if I press my finger against this piston to the extent of one pound, I produce a pressure of one pound upon every superficial inch of the inner surface of the tank, as well as upon the surface of every object immersed in the contained water,

even should such objects amount to tens of thousands of square feet of tinfoil, so separated that the water may circulate freely between the sheets.

This problem is appropriately styled the "hydrostatic paradox," and, no doubt, involves the most profound mystery of any problem known to physical science. Having failed to find an explanation of this enigma in any work on physics, I appeal to you as the one most likely, in my opinion, to solve it. By giving it your early and careful consideration you will greatly oblige me as well as render a most valuable service to the scientific world,

Yours very cordially,

DR. HENRY A. MOTT.

REPLY BY THE EDITOR.

THE problem of hydrostatic pressure is truly the problem of problems in physics, and its rational solution is unquestionably of the greatest importance to the scientific world. It is every way fitting, therefore, that this solution should appear first in the columns of the *Scientific Arena*, and we are glad that Dr. Mott, led by his very careful investigations square up against this problem, should so judiciously have thought of this journal. We shall, therefore, try as briefly as may be to give him and our readers what we believe to be the first detailed scientific explanation of this supposed mechanical paradox ever published.

Before commencing our solution let us prepare the way by a gradual introduction and consideration of minor mechanical problems involving precisely similar results, but so much more simple or less complex than the main problem here propounded that they are observed and passed over by physical investigators without at all considering their paradoxical character. Take, for example, the simplest of all facts in mechanics—if we press down a pound weight on two sheets of paper lying one on the other, we manifestly press two pounds on the two

sheets of paper, since the actual pressure is substantially the same on each, the transfer of the pound pressure being direct from the one to the other. If instead of two sheets of paper we press one pound upon Webster's Unabridged Dictionary, consisting of 1000 sheets of paper closely piled one upon another, it is evident that we press one pound on each separate sheet of paper constituting the book, thus making the pressure on all the sheets 1000 pounds. Nay, this is not all; each sheet of paper not only receives the pound pressure transferred from the one above it, but each sheet below retransfers back upon the sheet above it, by reaction, the same pound pressure it had received, making one pound of actual pressure on each side of each leaf of the book, or 2000 pounds pressure in all. This is no less apparently paradoxical than the more complex problem involved in hydrostatic pressure acting in all directions upon the inner surface of an inclosed tank of water by the movement of a piston as described. Indeed, there is no more real mystery involved in such a complex mechanical effect, when fully understood, than in the fact of the simplest mechanical action and reaction, such, for example, as if we press one pound with our finger against a table, the table must press one pound against our finger, thus making two pounds of actual pressure.

The whole problem, as presented by Dr. Mott, will be found involved in this simple law of mechanics: that action and reaction are always and of necessity equal, and therefore that reaction is a simple duplication of action and a necessary repetition of the original force of such action, however many times transferred from body to body by means of the various mechanical powers such as lever, wedge, screw, incline plane, pulley, etc., all of which are but mechanical modifications of the lever and its effects. The man who can solve the simple paradox of the one pound pressure of his finger against the table

producing one pound pressure of the table against his finger, can master this mighty hydrostatic paradox or any other complexity in mechanics, as will soon appear.

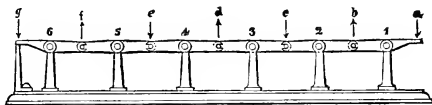
But before coming to the details of hydrostatic or fluid pressure infinitely repeated, let us try further to prepare the reader's mind for the more mysterious phase of the problem by simpler stages of this fundamental law of action and reaction, and thus show how its duplication and repetition may be extended on *ad infinitum*, and still be as simple as if but transferred a single time from our finger to the table, and by reaction from the table to our finger, thus duplicating the pressure once.

Take, for example, a number of common spring-balances hooked one to another, as a step toward these minor illustrations. Now it is evident if we pull one pound on the end balance, supposing the series to lie at zero on a frictionless table, we will pull one pound on each and every balance in the string, and the dial or graduated scale of each balance will record one pound even should the chain of instruments be a mile long. This is a beautiful illustration of the endless effect of action and reaction without the slightest loss of force, if the mechanical conditions are favorable. One of these mechanical conditions for the registering of one pound by each balance, is the fact that the mechanical *motion* of the pound pull must be duplicated for each balance added, since such *motion* or distance traveled by the pound pressure, represents the work done upon each spring in causing its duplicate registry of this same pound.

The problem thus illustrated involves the same principle in mechanics as the raising of a hundred-inch piston, entering a tank of water and loaded with one hundred pounds, by pressing down one pound on a one-inch piston entering the same tank. The large piston will be raised only *one-hundredth* as far as the small piston

is pressed into the tank, on the universal law of leverage, that what is gained in power must be lost in motion. But this forms no part of the explanation of the great problem of hydrostatic pressure, as some have mistakenly supposed. Such pressure involves no appreciable mechanical work, since it involves only an infinitesimal motion among the particles of the fluid employed. Let us illustrate the real paradox in the case by the imperfect action of a system of levers whose ends simply *press*, but which do not *move* so as to perform mechanical work.

Take a series of rigid, straight levers with fulcrums in the center, and with their connected ends hinged to each other, the end of the last lever in the system being prevented from moving by a stop, as shown in the accompanying cut. By a careful examination of this diagram



the student of physics will see the law of action and reaction exemplified in its simplest as well as in its most intricate relations to mechanics, and thus better than in any other way have his mind prepared for the true solution of the hydrostatic paradox in hand, and for a comprehension of the real form of mechanical power which applies directly to that problem.

Referring to our diagram, let us for the moment confine our experiment to the first lever, extending from *a* to *b*, and let us suppose it to be frictionless as it hinges on the fulcrum at 1, with its end at *b* fixed. Now if we press down with our finger one pound at *a*, we just as certainly press up one pound against the fixed support at *b*, while with equal certainty we press down two pounds at the fulcrum at 1, thus making four pounds of pressure on that lever. But this is not all: by reaction the end of

the lever at *a* presses upward against our finger precisely with the same force that our finger presses downward upon it, thus making two pounds of pressure at that point. The same, of course, must occur between the other end of the lever and its stop, the two surfaces of contact mutually pressing a pound apiece against each other; while the pin in the fulcrum, at 1, returns by reaction against the lever the same two pounds of pressure there borne down upon said fulcrum, thus fairly and mechanically producing eight pounds of actual pressure through that lever by the communication of a single pound downward pressure at *a*. How can there be imagined a more startling paradox than this?

But the enigma becomes more complex and mysterious when we discover that if the first lever is connected with a series of similar frictionless levers, the same eight pounds of mechanical pressure will be transferred and produced in each lever added to the series, first down at *a*, then up at *b*, down at *c*, up at *d*; first *action*, then *reaction*, and so on to the end of the series, even should the system of levers extend for miles, and should they be so connected as to operate in all conceivable directions—up, down, laterally, diagonally, criss-cross, etc. We have thus not the slightest difficulty in seeing how a tank could be ingeniously filled with minute levers and fulcrums, and even by connected systems of levers piled on systems by which an approximate paradoxical pressure in all directions could be produced similar to the one in hand.

But this is by no means the solution of this great problem, nor does it begin to grapple with the mystery involved, although by such a conclusive illustration of the unlimited duplication of pressure by action and reaction, the reader's mind is no doubt by this time thoroughly prepared for the real solution when it comes. Plainly nothing similar to rigid levers could be imagined

as existing among the infinitesimal particles of any fluid substance in order to cause an infinite duplication of the pressure between them, and by which they are forced apart and separated in all directions.

Since leverage, proper, will not solve the problem, what other form of the mechanical powers will meet the case, since it is manifest that it can only be accomplished by mechanical power in some form? We answer that the mystery is completely and satisfactorily solved by the action of the *wedge*, and that it can be solved by no other form of mechanical power.

Let us first show the application of this form of mechanism to the separation of two objects only, before extending the principle. We have first to suppose a perfectly frictionless *wedge* of infinite taper, entered between two frictionless bodies. Now it is plain that if a pound force be applied to this wedge, it will act with a pound pressure against each of the two bodies in the tendency to separate them. If this frictionless wedge should have an infinite taper in all directions, approximately like the point of a needle, it is plain, should it be pressed between a nest of frictionless bodies, all touching it, that each of these bodies would be forced outwardly with the pound of pressure the same as if the wedge acted upon but two bodies. Then let us suppose that all of the bodies thus pressed outwardly are themselves also frictionless wedges of infinite taper, each entering between similar nests of bodies, which again are of the same wedge construction; and, finally, let us suppose that every particle of matter, to its infinitesimal size, which fills the tank, is itself a frictionless wedge of infinite taper, and at once we see how the initial pound pressure against the first entering wedge-particle is duplicated and repeated by action and reaction against every similar wedge-shaped particle in the tank, and consequently against every part of the inner surface of the tank itself, as well as every object within

the tank against which such frictionless wedges can come into contact.

Now it is a fact that a tank of water, constituted of a substantially infinite number of frictionless particles, each of infinitesimal size, is practically made up of just such a system of frictionless wedges as we have described, since being infinitesimal in size they are equivalent to an infinitely tapering wedge. Then we have only to begin our experiments with an imaginary piston entering this tank, of the diameter of a single one of these frictionless wedges, and we can see at a glance how the particular wedge against which the piston is pressed with a given power must be forced between other similar particles, these between others, and so on throughout the entire mass of water, thus giving the full pressure of the piston against every infinitesimal particle or wedge the tank contains, as well as against every similar particle of the tank's surface. If this be true, and if it gives a rational view of the question with reference to the action of such a piston, it is unquestionably true and rational with reference to a larger piston, *such frictionless wedge-pressure in all directions corresponding exactly to the force applied to the piston and the number of infinitesimal wedge-particles against which the piston presses.*

This is the solution and this is the law of hydrostatic pressure; and thus only can the apparent paradox be explained.

CHAPTER XI.

LIFE.

QUESTION 1. What is Life?*

ANSWER. This question is one of the most difficult ever propounded to the wisdom of the world—a question to which no satisfactory answer can be given without a recognition of the existence of immaterial substance in being. It stands next to the question: What is God? Man's encouragement to find it out by searching lies in the fact that life is not necessarily infinite. An attempted investigation into its nature is therefore not necessarily a piece of presumption on the part of finite man. Such searching after the nature of life and the origin of its existence becomes presumptuous folly only when man attempts it without acknowledging the eternal existence of a Personal One—the Fountain and Giver of all life.

Q. 2. Have all philosophers who have believed in the absolute existence of a personal God held correct views of life?

* In the author's college-days he listened to an elaborate lecture upon this subject by a very learned educator. The profound speaker introduced his theme with the above question: "What is life?" Continuing, he remarked: "We know nothing of life except by its phenomena." In the course of his address he reached the climax of his circular syllogism in the expression: "*Life is action.*" He failed to see; at least, he failed to tell us that "action" is "phenomena."

A. They have not.

Q. 3. What has been their most fundamental error?

A. They have virtually denied the proper substantiality of God's being.

Q. 4. What further?

A. They have failed to conceive of finite life as a form of entitative being and a substantial force-element in the animated portion of creation.

Q. 5. What are the present conflicting theories of the origin and nature of life?

A. As to the origin of life these theories separate themselves into two classes, viz: *The Spontaneous Development* theory and that of *Biogenesis*.

Q. 6. What is the spontaneous development theory?

A. That life is the product of matter.

Q. 7. Who have been its leading advocates?

A. Thales in his water cosmogony taught that water is the mother of all living.

Dr. Bastian of England is probably the fairest modern representative of this spontaneous theory. He belongs to what is known as the school of heterogenists who teach that life is generated in the womb of matter.

Prof. Haeckel of Berlin is another very able advocate of this doctrine, although he employs different terminology in the expression of his views, and the advocacy of his position. He defines life as "material atoms placed together in a most varied manner."

Herbert Spencer defines his concept of life as "the continuous adjustment of internal arrangements to external relations," or "perfect correspondence."

Q. 8. What modern philosophers are upon record as over against this general theory of spontaneous generation?

A. Tyndall and Huxley of England, Ulrici and Lotze of Germany, Dr. McCosh of Princeton, and Joseph Cook of all around the world have opposed it without the ability to do it very much harm or to give the world anything very much better. While these great men, as well as the respective schools of philosophy which they represent, are antagonistic to each other, they all agree that "life can come only from previous life."—*Omne vivum ex vivo*.

Harvey's proverb—*Omne animal ex ovo*—although satisfactory for awhile, soon lost its superficial plausibility after men became thoughtful enough to inquire as to who produced the seed or laid the egg.

Dr. Beale has satisfied himself and some others that life starts in the bioplasts* or little specks of protoplasm

* Such bioplasts are always busy at work in building up new tissue or repairing old, and can be seen under a powerful glass, moving hither and thither as things of life, picking up and distributing atoms of nutrition to strengthen muscle, tendon, vein, nerve, etc., and then these great authorities apparently conclude that they have struck the keynote to the solution, and have reached the lowest or basic stratum of life-substance in the human organism, thus framing an impregnable breastwork and barrier, as they suppose, to the onslaughts of materialism. How vain is this hope! Not a bioplast leaves the body at death. These atoms of so-called life-substance are but a part of the physical structure, and cease to move at dissolution, the same as do the larger organs of the body, and consequently have nothing more to do with the true solution of our problem than have the veins and arteries, with their myriad blood-corpuscles, which also cease to act at death. Bioplasts, with all the useful knowledge they have furnished us, as to the formation of organic tissue, do not touch the question of life itself—what it is, how it exists, or what becomes of it—and no more meet the objections urged by the materialist than would the analysis of the outer cuticle of our flesh. Hence every argument employed in illustrating the work of the bioplasts, as a refutation of materialism, is so much labor lost.—"Problem of Human Life," p. 46.

seen to be at work constructing new cells and tissue in all organic forms of being.

Q. 9. What is radically wrong with all these theories?

A. They are defective in that they have no starting point—no *genesis*.* The life of the creature can come only from previous life. There is no primordial previous life except the life of the Creator. He who adopts the proper theory or truth of biogenesis will find himself carried back by its inexorable logic to the unavoidable conclusion that all life, whatever it may be as to its

* “No change of substance, no modification of environment, no chemistry, no electricity, nor any form of energy, nor any evolution can endow any single atom of the mineral world with the attribute of Life.”—Drummond’s “Nat. Law,” p. 68.

That the life principle of living organic bodies is not simply phenomenal, but that it is a distinctive entity, is a proposition that has so many proofs in nature, and goes so far in explanation of other facts, that it seems remarkable that a contrary assumption could be held by scientists. But still it is set forth by biologists as simply a resultant of organization and the play of chemical force, like as growth is the result of assimilation, and combination that of affinity.

This latter assumption is incidental to efforts in other directions, and comes not from any intelligent conclusion, when the subject of life is made that of primary or specific investigation. It is wonderful what vagaries men will fall into when they are fanatically disposed, or intent in theorizing.

The preservation of species cannot be satisfactorily accounted for other than by reference to the distinctiveness of the life force, which controls and conditions assimilation and development. Nor is the growth of the plant, or body of the animal alone thus conditioned; the seed and ovum are so as well.

When all allowance is made for modifying circumstances, which occasion varieties in species, there is yet found a boundary, up to which alone any encroachment can come: and, as soon as the modifying causes are removed, a relapse takes place and the sharp characteristics of the species are again established. This tendency to relapse has been the subject of battling effort with hybridizers.

essence, must have come originally from a Life that never had beginning back of itself—it must have come from a Self-existent God, and as a vital spark of His undiminshable Self. Men who fail to see this truth, or seeing, hesitate to apply it in all its logical bearings, find themselves floundering upon a shoreless sea with nothing to grasp but the floating forms of false philosophy. Even Prof. Drummond of Edinburgh, after a very able discussion of the question of life and its origin through two extended chapters of his good book, simmers his philosophy down to a definition of life not entirely satisfactory to men who are thirsting after a more entitative and enduring substance. “To live is to correspond, and to correspond is to live,” says the rising young philosopher of old Caledonia.

Dr. Frederick A. Rouch gets much nearer to the truth in his Anthropology. He says (on p. 22) that life is a plastic power placed in matter by the Divine will, and can no more be seen with the eye than any other power.

Q. 10. What is still better?

A. The teachings of the Substantial Philosophy.

Q. 11. What are its teachings upon this point?

While, on the other hand, we observe the various life processes to be very *similar*, the results are very *dissimilar*. The food of animals and their life habits may be identical; yet their specific characteristics are absolute in distinctness. The *man*, the *dog*, and the *cat*, may eat, and live on precisely the same food; and be subject to the same life habits; but yet how distinct are their specific characteristics! Hybridizing efforts superadded will avail nothing in breaking down the distinction. Away back of the forms in the development is to be found the cause of this distinction. It is in the life principle which is resident in the seed or ovum. When a cell is nucleated, as a condition of new being, this nucleation is not accidental, nor yet the result simply of favorably disposed surroundings, or force of habit. As a condition precedent there *must be a life principle*.—Chancellor John Kost, M. D., LL. D., in *Arena*, Vol. I., p. 68.

A. It affirms that life is the highest form of force; that all finite life is an efflux from the Divine, Self-existent One.*

Q. 12. Is each living individual a distinct and separate creation?

A. God is the creator of each and every individual in the domain of finite life, but after creating the first parents of each distinctive species, by a creative act of his sovereign will through the creative word of his omnipotent power, in the creative transmission directly of his own substantial life, he now carries forward his creative work through the agency of progenitors. Hence, living beings are now created mediately. This process of propagating

* It is a universal axiom of science that "from nothing, nothing comes." As this incorporeal organism has been demonstrated to be an entity—a real counterpart of the physical structure, since it is only through it that inheritance can take place and transmissions can occur—it must, therefore, be a part of some actual substance which had a previous existence; and as the existence of a God has been scientifically demonstrated, who was capable of producing living organisms out of inorganic matter, such a God, therefore, must be a substantial and intelligent entity. Just as certain as that our material organism necessarily had to come from a source or fountain of pre-existing matter, just so sure must this mental and vital organism pervading every living creature *have come from a source or fountain of pre-existing mind and life.*

"I lay down the position, without the fear of its ever being successfully met, that no substantial effect can be produced on any object without an absolute substance of some kind connecting the cause with the effect. . . . I conceive it a principle of philosophy that life and mind are substantial entities as really and truly as are the most ponderable physical objects."—"Problem of Human Life," p. 494. "I believe that until this great underlying truth shall be duly comprehended and recognized, physiologists, with all their laborious and histologic researches, even with the most powerful microscopes to aid them, will never penetrate even the cuticle of science as regards the true cause of physiological phenomena,"—p. 466. "As organic life is

the species results from the fact that the life first imparted to the parental head of the species involved the possibility of and tendency toward organic multiplication into numerous individuals.

Q. 13. But is not Substantialism, according to the above, a mere revival of the old doctrine of realism, as it appeared in the arena of philosophical war during the Middle Ages?

A. After the Substantial Philosophy becomes a fully formulated system, it will be found to involve much truth previously taught in other systems of philosophy, even as Christianity incorporated doctrines previously held in Judaism, and as Protestantism conserved and carried forward much that was true and valuable in the Church of Rome; but, like Christianity and Protestantism, Substantialism brings forward and announces a distinct and revolutionary principle never previously an-

a substantial entity and could only come from a pre-existing fountain of life, hence the solution is clear that the life and mental powers of every organic creature originated primordially as infinitesimal atoms of God's own self-existent, vital and mental being; and thus it becomes as naturally and consistently a scientific solution of the origin of life as that the existence of God [as the author claims to have shown on p. 444] is an unavoidable scientific truth,"—p. 472.

Thus the way is logically made clear for the assumption that the vital and mental organism of each living creature consists of a mere drop from out the fountain of God's own infinite vital and mental substance. To the primal and miraculously created parents of each species the Creative Will must then have transferred an infinitesimal drop of His own being, constituting not only the real entities of these primal parents, but the perpetual specific germ for transmitting the same entity to offspring, and the only part of an organic being not liable to displacement and substitution, as so clearly shown in the preceding chapter, while the primordial stock of knowledge given to the parents of each species, necessary to their primitive conditions of life, was also but a drop out of His own infinite intelligence.—“*Problem of Human Life*,” p. 469.

nounced to the world in any form. It is, therefore, the revival of no defunct hypothesis, theory or system of philosophy. While it is not Realism, as taught in the days of Abalard, as over against Nominalism, Substantialism involves realism in its moderate, positive, and proper sense. It accepts of the formula, *universalia in re*—the concrete general *in* the particular—and insists that reality is predicable of potentiality; yet it looks with grave suspicion upon *conceptualism*, fearing that that term is designed to convey the false idea that concrete universals are not real until a *subjective concept* gives them reality. While the Substantial Philosophy involves proper realism, its realism is in such intimate relation with *all* truth that it is equally antithetic and antagonistic to the Nominalism of Rascelin, the Pantheism of Spinoza, the Idealism of Berkeley, the Sensationalism of Locke, and the whole general school of Materialism across the continent and throughout the world.

Q. 14. In how many spheres or kingdoms does this God-given life manifest itself in Nature?

A. Three. As the different rays of light are productive of different colors, so the

“Bright effluence of bright essence increate,” according to the substance of the Divine Nature and the pleasure of the Divine Will, passes into different orders of animate beings—vegetable, animal and human.*

Q. 15. What are the general lines of distinction between these three?

A. The vegetable has the least possibilities and the most limited environments; the animal has a higher plane of existence, it has both life and a low order of mentality, and consequently a larger circle of correspond-

* The author is not now treating of angelic being, neither of Christianity, which is a higher form of humanity, as shown in the last three chapters of this volume.

encies; the human has life involving all the grand possibilities of the finite, culminating in that form of being which stands by the threshold of the infinite and next to the throne of the Divine.

Q. 16. But did not God also create the rocks of the earth and the stars of heaven, and if so, are they not also an effluence of Himself?

A. By Him all things were made, and as nothing could have been created out of nothing, all created things must have come as to their primordial substance from His substantial Self.*

* In maintaining my position that the universe was made of God's all-pervading substance, it does not seem to me unscientific or irrational to assert that even a substance so highly attenuated might be condensed into a solid body, like this earth, since the great scientific investigator, Dr. Lockyer, has given reasons for believing that all tangible substances, from platinum up to the most tenuous gases, are resolvable into one single elemental substance, vastly more attenuated than that of hydrogen gas. Would it not, therefore, beautifully complete the scientific chain of continuity to assume this sub-element of which all worlds are constituted, as the first condensation of a fraction of the substance of God's exterior nature, and as His initial act in the process of framing the corporeal universe? If all material substances are absolutely traceable to a single element, far beyond the reach of our senses, may we not assume that all substances, whether material or immaterial, might be rationally traced one step further and resolved into the one primordial substance of the Deity Himself, from an atom of which, in the first place, this sub-element was condensed, and then out of which all other substances and forms were made.

Though I verbally distinguish between *material* and *immaterial*, between *corporeal* and *incorporeal* substances, one being generally applied to tangible, and the other to intangible things, yet that does not preclude the idea that the corporeal may have been condensed from the incorporeal substances of Nature. The marvelous discoveries of modern science, under the investigations of such physicists as Lockyer, Crookes, Fairfield, and others, are clearly pointing to results as wonderful as this, while they all tend to confirm the broad position first announced

Q. 17. What then is the difference between the living and the non-living creature?

A. To the living creature God has given to have life in itself; the non-living is moved and manipulated by life or some other substantial force not vitally connected with itself.

Q. 18. In what other particular does the living creature differ from the non-living?

A. The living creature has *organic* being, while the non-living holds its existence as either a mechanism or in mere element.

Q. 19. What does Substantialism teach concerning mechanisms?

in my treatise on Sound, that even sonorous pulses may consist of absolute substance, in opposition to the universally accepted theory of the undulating motion of air-waves. In view of the discovery of this single sub-element announced by Lockyer, out of which all the grosser physical elements and substances have been evolved, does not such a grasp of the almost intangible render the hypothesis probable, aside from proof, that electricity, magnetism, light, heat, gravitation, and even *sound* are but other forms of the same primordial substance out of which this sub-element was probably condensed? * * * While it may, therefore, be rationally assumed that an incorporeal substance might be condensed into a material form, by the application of Almighty power, yet to assert that *something can be made out of nothing*, even by God Himself, is irrational and unscientific, not to use a stronger adjective.

Since *air* has been condensed by the skill and power of puny man, into a permanent liquid of the gravity of water, and through the limited appliances within his reach, does it seem "irrational" to believe that an infinite God might also condense an incorporeal substance, such as electricity, for instance, into granite rock, or something equally dense? And if this be not irrational nor insupposable, does it exceed the bounds of reason and probability that the same infinite Artificer might condense a mere atom of His own omnipresent but exterior substance into a world like this, and if into one world, might He not thus have created the universe?—"Problem of Human Life," p. 64.

A. That the outward form of the mechanism is the externalization of an ideal which originated elsewhere and had its existence previous to its being clothed upon in such outer form.*

Q. 20. In whom do such ideals originate?

A. They are potentially involved in the substance of the human mind which came with all its powers and possibilities from God.†

Q. 21. Then God is the primordial fountain of all ideals which are given form in mechanisms?

A. He is.

Q. 22. Is God then the originator of the ideal of an infernal machine?

A. When God communicates of his own substance in the creation of rational beings he delegates in and with such substance the possibility and the power of perver-

* Such a conception would be as impossible, in the very nature of things, as when looking upon a complicated time-piece to conceive of it as having originally come into existence by the accidental falling together of cogwheels, journals and journal-boxes, without an intelligent designer or mechanical constructor. It is true, that individual time-pieces now examined, may have been turned out by ingenious machinery, and may not have cost a single minute's serious thought on the part of the mechanic or artisan who put them together and set them to keeping time. But leaving this individual machine-made clock or watch, let us go back to its earliest progenitor—the first clock or watch that was ever made—and conceive of it, if we can, coming into existence by the unconscious mingling of journals, cogwheels, etc.—“Problem,” p. 362.

† No watch, engine or other device was ever conceived by man that was not already perfected in the mind of God, and which did not already exist as a reality—a fact of creation in the spirit-realm. In this way we can truly believe that “there is nothing new under the sun.” The inventor in conceiving of a new machine, only grasps with his soul-eyes, in his imagination or his dreams, the real wheels, and levers, and springs that already exist incorporeally—*Microcosm* Vol II., p. 36.

tion to the extent that such rational creatures may become either devils or their angels. Thus man's power and possibility of working out the invention of a good thing for a good purpose may be perverted in the conception of an ideal, and clothe it with an infernal machine to execute an infernal purpose.

Q. 23. Then God is not responsible for the results?

A. God glorifies himself in withholding no good thing from man, and man is responsible for any perverse use he makes of the divine gifts, and will be held morally accountable.

Q. 24. What becomes of the ideal when the mechanism is destroyed?

A. As no outward power can compel the ideal to clothe itself in a mechanical form, so the destruction of the latter does not involve the destruction of the former—the ideal remains intact.

Q. 25. Has such an ideal substantial existence?

A. It is an indelible impress self-stamped upon the substantial mind in the exercise of the God-given power which the mind involves.

Q. 26. But what becomes of the ideal when the mental powers or faculties of the person are deranged?

A. The ideal or impress is not erased or absolutely obliterated, yet it cannot be actualized or clothed upon during any such season of entire mental derangement.

Q. 27. What if the mental faculties be all restored again to their normal working condition?

A. The ideal will also be fully restored with a full re-invigoration of its youth—the impress will stand out again in its former bold and beautiful relief upon the real tablet of the possessor's substantial mentality.

Q. 28. But what becomes of the ideal or the impress when the person dies?

A. If the Substantial Philosophy be true, the person

does not really die, but retains the essential integrity of his organized substantial being, despite the throes and threats of physical dissolution. The ideal or the power to renew it, under a renewal of favorable environments, will accompany the person into the state of the dead and externalize itself again as soon as the person emerges from such death-state into a broader, brighter realm of more favorable environments beyond.*

Q. 29. What does the Substantial Philosophy teach with reference to organisms?†

* No poet or musician ever grasped a rhyme, conceived a rhythm, or dreamt a harmony in music, that did not exist in the mind of God as a reality before the world was, and yet there are ten thousand million new combinations of rhyme, music and rhythm in the mind of that same great fountain of all intellectuality that poets and musicians will never work out till they are clothed upon with their psychical robes, and are in free access to their psychical environment unencumbered by mortal surroundings—Dr. Hall, in *Microcosm*.

This question receives more special consideration in Chapters XIII and XIV.

† What forms the invisible pattern (for *pattern* there must be) around which and through which the bioplasts are guided in their work of constructing nerves, muscles, bones, ligaments, etc., and by which they are thus prevented from making mistakes, substituting a nerve for an artery, a ligament for a muscle, etc.? I answer again, it is *life*, which, could we see it after the body dies, would stand out a transparent *manikin*—with every outline of the human body intact—a perfect representation of our organic form in all its parts, as would a manikin of the arteries, veins and nerves, could they alone be lifted from the body without disturbing their relative positions. Without the aid of this substantial but invisible organism, the working bioplasts of Dr. Beale can no more touch the problem of life, than can Prof. Haeckel's material atoms "placed together in a most varied manner." Without this view, every effort of modern science and philosophy will fail to satisfy the longing, craving wants of honest but doubting souls, as to a rational solution of what life is, and how it is related to an organic structure, so as to be viewed scientifically, philosophically,

A. That all organisms have a dual nature, and that the two are inter-related and vitally united when both are in their normal condition.

Q. 30. What is the highest form of such dual organism?

and religiously, as a substantial basis for immortality and personal identity in another life. I have tried in this chapter to furnish such a solution of man's dual organism, with such analogical proofs drawn from Nature and illustrations so framed upon the principles of science, philosophy, and art, as may give a reasonable ground of hope to the candid inquirer that death does not end all, but that though we die yet shall we live—that though the "outer *man*" perish, the "inner *man*" shall surely survive; and that though our *earthly house* of this tabernacle shall be dissolved, we may still hope for a building of God, a house not made with hands, eternal in the heavens.—"Problem of Human Life," p. 46.

I will here repeat that it is only by such an inter-related and co-ordinated organism, existing within and vitalizing the corporeal structure, that any of the phenomena of inheritance, propagation, variation, development, growth, reproduction of parts, and healing of wounds, can take place in a living creature, whether such creature be high or low in the scale of being.

A single phenomenon may here be named in addition to those to which I have already referred, completely corroborating this hypothesis of a vital and mental organism residing within each physical structure as its counterpart and visible expression, while the wonderful fact of sensation will be thus seen to depend wholly on this essential entity, which constitutes the real identity of every living creature.

I refer to the remarkable fact that amputated limbs of animals have been frequently known to reproduce themselves from the stump by a process of mysterious vital action hitherto regarded by physiologists as wholly inexplicable. It is simply impossible, on the physical or purely monistic view of organic beings, to tell why the segments of a polyp will each reproduce a perfect being, or why the leg of a salamander when cut off will be reproduced with the foot and toes in every respect perfect. Cases are recorded in which a supernumerary finger has been amputated from a child's hand, which, in time, would be

A. Man.

Q. 31. Then a human individual is a twofold being—an inner man and an outer man?

A. Revelation teaches this doctrine, and Substantialism brings out its scientific beauty.

reproduced, with the nail and joints complete. Who can give an explanation of these astonishing phenomena based on the purely physical hypothesis of organic being? Why should not a toe have been developed in the place of the child's finger, or another tail in place of the salamander's amputated leg? No physical view of organism can give the least information on this problem, while I undertake to say that the view here maintained of a vital substantial organism, co-existing within the corporeal as its exact counterpart, is a solution at once conclusive, and as simple as it is satisfactory.

According to this hypothesis, there is a vital, intangible, but substantial *salamander*, in perfect form and outline, embraced within the physical structure of that reptile. This invisible organism, so far as its vital characteristics are concerned, consists of the pure substance of life itself, and by means of its correlation in all its parts with the corresponding parts of the corporeal body, thus constituting an exact organic homologue, all the phenomena of growth, sensation, reproduction of parts, and healing of wounds, must, as stated, necessarily result. To the mental eye, the reproduction of the salamander's corporeal leg, under the control and direction of the vital leg, is plainly visible.

Could we with our physical eyes see what really exists, namely, the essential leg of that animal still connected with its body, perfect in all its parts—cuticle, joints, muscles, bones, ligaments, nerves, veins and arteries—after the physical leg is amputated and destroyed, we would see at once how the corporeal atoms from the body of the salamander through its circulation are built out from the stump into a new leg, by following the exact but substantial outline of the vital structure; and how they are thus deposited one by one, each atom in due order, within the exact part to which it belongs, till the whole leg, to the ends of its very toes, is perfected—just as a honey-bee builds up its wonderful cell by depositing atom by atom the wax in its exact place to form the ideal geometrical outline.

Without such a vital and substantial leg really remaining

Q. 32. Have animals also this dual organism?

A. Yes, animals and plants. Man possesses a higher order of mentality as well as an outward organism superior to that of the animals. Revelation teaches that man, both as to his outer and inner self, is fearfully and

connected with this complete vital organism, there would be no guide or outline for the atoms to follow; and it is utterly inconceivable as to how the form of the new leg is preserved by unconscious laws of Nature, except by the direct intervention of a creative mind. Physiologists are obliged, therefore, either to accept my hypothesis as a scientific explanation of the phenomena attending the reproduction of a limb or to have recourse to miraculous intervention, since there is no other conceivable solution.

The same is true of the healing of an ordinary wound. However deep may be a cut in the flesh, the vital or intangible flesh, so to speak, remains uncut, and the work of healing is but the deposition of organic molecules within this vital substance till the wound is filled up.

There is not the least difference between the reproduction of a part, the healing of a wound, and the development of the embryonic being from the ovule. The vital and substantial germ of the embryo must be present before any development can commence. Professor Paget corroborates this when he says:

“The powers of development from the embryo *are identical* with those exercised for the restoration from injuries.”—“Lectures on Pathology,” 1853, p. 152.

Yet, should you ask this great scientist by what means the organic atoms are guided to each particular part, even to the maintenance of their exact shades of color, in the restoration of a salamander's leg, he would be utterly lost, and unable to enlighten you—since, in common with the entire profession, he has no conception of this dual organic structure of each living creature, so absolutely essential to the solution of the problem.

The reproduction of a part when amputated must depend upon the nature and density of the life-substance constituting the vital organism of the part. But few animals, as observation proves, are able thus to reproduce a lost limb; and but few children would possess that density of vital substance in the hand which would be sufficiently compact to conduct the or-

wonderfully made. The human form, if not prostituted, is in some sense the image of Deity. There is nothing in creation that compares with the human face for God-likeness and significance of expression. There is also a beautiful and significant prophecy in man's upright post-

ganic atoms with that force necessary to restore an amputated finger. Yet certain worms have such an intensified life-essence—the *nais*, for example—that they can be cut into many pieces, and each part retain sufficient life-substance to lead to the reproduction of the whole being. .

This is explained on the same principle as that a given mass of normal atmosphere may be subdivided into a dozen equal parts and passed into as many different vacuums, each the size of the original mass. It is plain that each vacuum would be filled with air, though of but one-twelfth its normal density. So a *nais*, if subdivided into a dozen sections, instead of its dense vital organism being cut up into corresponding sections, it would be subdivided by dilution or reduction of density, each segment retaining the complete vital form and outline of the worm, though in a rarefied condition. Still, although thus diluted, the vital form of this creature connected with each section of its physical structure is sufficiently dense to form the conducting medium of the corporeal atoms which are thus guided along the line of the organism, each one taking its place till the corporeal being is perfectly reproduced. No physiologist, anatomist, or naturalist, I again insist, can propose even the shadow of an explanation of this overwhelming problem based on the monistic view of organic forms of being—holding, as they all do, that there is nothing substantial but the tangible in a living creature.

It is well known that no two persons are exactly alike as to the facility with which a wound will heal. With some a scarless cicatrice will form almost immediately, while with others a cut with difficulty heals at all. This is generally attributed to the purity or impurity of the blood. Though this may be a partial cause of the difference, it is but a scintilla of the true reason. When physiologists and pathologists shall come to fully comprehend the grand idea involved in the duality of man's organic nature, the science of medicine will have made a long stride in advance of the present standard of scientific knowledge.

ure, by virtue of which he may ever have his eyes turned upward toward the great Original.

Q. 33. Does man image his Maker merely by way of reflection, as the shadow of an object is mirrored back from a looking-glass?

I add but one other corroborative class of phenomena to confirm the truth of my hypothesis, on which so much depends, that every living creature possesses a dual organism—a substantial vital and physical structure. This class of phenomena consists in the well-known fact that when a human arm or leg is amputated the sufferer distinctly and for a long time afterward feels pains and itching sensations in the fingers or toes of the lost limb. I had an abundant, though unpleasant, opportunity to witness a demonstration of this fact in the case of my own brother, who lost his leg by accident. For months after the amputation he would complain of the terrible itching sensation in his toes, and would even at times involuntarily attempt to place his hand on the lost foot. Little did I think then (over forty years ago) that his actual foot was there to all intents and purposes as much as before the corporeal flesh had disappeared!

This experience is not confined to human sufferers. A dog which had lost its leg has been frequently seen to attempt to lick its absent foot, showing that the true source of all sensation is the vital and mental organism, and that upon this foundation alone are based all the issues of life and all biological phenomena. The destruction of the flesh does not therefore necessarily put an end to the actual identity of the being, the difference between the human and the lower forms of life alone remaining to complete the solution of this beautiful and interesting problem, which I will attempt to give prior to the close of this chapter.—“The Problem of Human Life,” p. 460.

A single case will beautifully illustrate the view of leading physiologists on these questions of abnormal variations in children, and the utter confusion resulting from a want of recognition of this inner organism, which I maintain constitutes the essential nature of every living creature. Mr. Carpenter, perhaps one of the greatest of physiological writers, makes the following statement:

“Numerous cases were recorded a few years since, in which *malformations* in the infant appeared distinctly traceable to

A. The image of God in man signifies more. It implies that man, though finite, has something in common with Deity, and something of Deity in his personal constitution.

Q. 34. But the animal also has something in common with God—it has life.

strong impressions made on the mind of the mother some months preciously to parturition.—"Human Physiology," p. 991.

While this author records the facts, he nevertheless expresses himself as entirely unable to comprehend how it is possible for such an impression to reach and deform the embryo, since there is no *system of nerves* connecting the mother and the child, but supposes it must be possible for it to be accomplished through the circulation of the blood, though of even this he is in doubt!

Here, then, after recording these cases of monstrosity as having taken place through the *mental impression* of the mother, this great author at once ignores the mind itself as the connecting cause—takes not the slightest notice of the living, thinking part of the mother, as a substantial entity, and the vastly more important portion of her dual organism, which might link the mother and child, but goes at once in search of some physical system of umbilic nerves connecting them: and because he cannot find such a system, he is thrown into bewildering confusion, for which the circulation of the blood of the mother affords but a poor relief, since how did this mental impression fasten itself upon the blood? Now, all this goes to show us the inexplicable mystery in which physiological phenomena are involved, in the minds of the greatest authors, by a non-recognition of the sublime fundamental truth I have been trying to impress upon the reader. It demonstrates the fact that the mind itself and the vital incorporeal essence of the mother, which pervade her entire structure as a super-material substance, the same as incorporeal electricity might be supposed to pervade her, are the true and only means by which the impression of the monstrous, frightful object, though even seen at a distance, was conveyed to the plastic form of the embryonic being. I verily believe that until this great underlying truth shall be duly comprehended and recognized, physiologists, with all their laborious and histologic researches, even with the most powerful microscopes to aid them, will never penetrate even the

A. So has the plant life. It is not the possession of life but of that *order* of life involving progress, which can rise to a consciousness of itself, and which is endowed with immortality that raises man so high in the scale of being. By virtue of these superior possessions

cuticle of science as regards the true causes of physiological phenomena.

By this hitherto unrecognized principle—and, as I believe, by it alone—that each living creature is formed of a dual substance and organism, half corporeal and half incorporeal—will all the biological and physiological mysteries involved in the animal economy be ultimately solved. In the light of this elementary truth we can see at once why no two children appear or can appear alike, because it is utterly impossible for any mother to pass during gestation through the same number, kind, and intensity of mental shocks and vital perturbations. The law of chances mathematically forbids it. Applying this principle to the lower animals (and I will prove positively after a little that they are controlled by the same law), it becomes at once plain why no two sheep, out of the almost countless millions now on earth, are alike, and why in a thousand million births no two lambs could look alike, even if the ewes were fed on exactly the same kind of food and subjected as nearly as possible to the same environments, since the same vital and mental impressions could not be experienced by any two mothers in all respects alike; though the nearer the mental and vital shocks or perturbations could come to *nil* the nearer any particular lamb would be an exact cross, partaking equally the resemblance of father and mother, while lambs so produced from the same parents from year to year, with the least possible mental and vital perturbations, would no doubt in time come the nearest to perfect resemblance of each other possible to attain in Nature.

How clearly this is illustrated by the well-known fact that human *twins* look so much more alike than children of separate births, even by the same parents. They have, as a matter of course, during gestation, received alike the good as well as the ill effects of the same mental perturbations and vital shocks of the mother, and precisely at the same times, which have tended in some cases to produce such perfect resemblance between them as almost to make them indistinguishable. It is, perhaps, safe to venture the belief, that, but for the differently transmitted

man is constitutionally further from the brute than he is from God.

Q. 35. But are not the brutes immortal? If not, why not?

A. Though they received their life from the primordial source of all life, it was given to them for a different purpose. They were not formed for immortality. They could make no use of it. It would be no bless-

impressions from the father upon the two life-germs, which, as I have before assumed, must control the developing embryo, twins would be absolutely and in all cases so much alike as to be indistinguishable.

That the mental impression of the mother does actually fasten upon the child through her incorporeal vital organism, whether such impression be in the form of a sudden shock or of a lasting memory, is proved by the well-authenticated fact that many times children by a second husband resemble the first much more nearly than they do their real father, alone through the vivid memory of the mother and her appreciation of the long dead but cherished first love. Mr. Darwin admits this, but actually insists, from his purely corporeal ideas of organic beings, that this fact results from the physical impression left upon the mother's organization by the first husband, which will be utterly exploded when I come to apply these facts directly to the hypothesis for which I am now preparing, though the fact is equally well authenticated that many a mother, through the cherished memory of an early love, and who died before marriage, has given to her future children the likeness of the lost one, with whom she sustained only mental relationship.

No one who has given attention to this subject doubts but that children are frequently marked and even deformed by the longing desire of the mother for some particular object which deeply impressed her thoughts. I could give a list of more than a score of such marks, which have fallen under my own observation, where well defined pictures of fruits, fishes, and other objects, have been imprinted upon various parts of the bodies of children, recognized by the mothers, and the very times and circumstances recollected which produced them.—“*Problem of Human Life,*” pp. 466-8.

ing to them. They are not wronged in being deprived of it.*

Q. 36. Does the highest conception of man's being consist and culminate in immortality?

A. It does not. Man's true dignity is in his *personality*—his true destiny involves immortality. Man is immortal because he is a person, and he can have a blessed immortality only as he is in a blessed normal relation to God, who is the ground and giver of his personality.

Q. 37. What then is the difference between an *individual* and a *person*?

A. An individual is an organic being whose continued

* And here, accidentally, we again come back to the starting point—the real, intrinsic, and essential difference between man and the lower animals. Here it is, in a condensed form. While the lower animals receive at birth their specific stores of knowledge suited to their environment (without the capacity of teaching or being taught, except to a very limited specific extent), thus adapting them exclusively to this single state of existence, the human being receives no knowledge at birth—not a single idea of inherited intelligence—but, as before observed, an unlimited blank capacity for being taught, having an interior organism capable of being cultivated and expanded to eternity. This alone constitutes a wall as broad as the earth and as high as the heavens between the man and the brute.

But, as a necessary psychological corollary and scientific outgrowth of this sublime demarkation, lower animals cannot have the slightest conception of a future life, since their vital and mental organisms, as well as their specific stores of inherited knowledge, are only suited to and limited within a temporary existence. Hence, a future life of conscious activity, being unanticipated, undesired, and wholly unconceived of, by lower species, would be of not the least advantage even to the most cultivated orang-outang, and would be unappreciated by such creatures even if they had it, since it would be but an eternal sameness without the eternal advances in culture necessary to make it otherwise, of which their very organic natures are wholly unsusceptible.

existence as such depends upon the continued union of all its parts by virtue of a common and all-pervading life-force. The individual cannot be totally divided or separated into many parts without the destruction of its organic integrity—it is an *un-di-vide-u-al*:

A person is also an undivided with a common life-pervading bond of union, but “*one that is awake in itself, that has found and laid hold of itself. That which is wanting in individuality to make it personality, is a soul capable of thinking and willing.*”*

Q. 38. The young infant has no soul capable of thinking and willing: is it therefore not a person?

* “*Rauch’s Psychology, p. 175.*”

The greatest and most important difference between man and the lower animal, even including the higher apes—that difference which may be properly called the distinguishing characteristic—consists in the fact that no animal below man has or can have a conception of life after death, from the very nature of their instinctive knowledge and the manner of its reception. Whatever other differences may exist, and they are numberless and startling, this is incomparably the most intrinsic and universal.

All this limitation to earthly objects, however, is exactly the reverse with man. With his unlimited blank capacity at birth for receiving instruction, he immediately acquires with his ordinary and rudimental intelligence, even if not specially taught it, a conception of living on forever; and not only such a conception of a future existence, but a desire for and appreciation of such an endless opportunity of acquiring knowledge. There is no reasonable or scientific ground for supposing that a long-anticipated and a universal aspiration for a life beyond death could have been thus made an indestructible part of man’s mental organism were there no such a possibility as a future life in the divine economy of the universe. This blank capacity for unlimited cultivation and eternal advancement in knowledge becomes the guarantee of man’s immortality—while the lower animal, having no such a capacity as a title-deed to a future life, gives back at death the mental and vital drop of its essential

A. The above interrogative proposition is too broad for unqualified truth. An infant *has* a soul capable of development to the thinking and willing stage of its existence. It is therefore a person in passivity—a man in search of himself.

Q. 39. Is an insane individual, or a maniac, a person after he has lost his ability to think clearly and will deliberately?

A. He is still a person. The Substantial Philosophy holds and teaches that the mind is a substance. To derange the faculties or activities of an organized substance does not destroy such substance; neither does such derangement of faculties destroy the integrity of the organ-

entity, which, instead of being annihilated or in any sense lost or blotted out, exists forever—not as an identity of being, but falls back and is reabsorbed into the great and infinite fountain of life and intelligence from which it originally came as a spark of being—the same as a drop of water which rises from the sea in the form of vapory mist, and after being carried by clouds to distant lands and caused to descend in rain to water the soil, serving thereby its temporary use, percolates to the river, through whose channel it at last finds its way back to the original fountain whence it came, where, by liquidation, it forever loses its identity in the bosom of the mother ocean, without an atom of its substance being annihilated.

Even the infant, at birth, or before it has a conscious thought, is thus the heir by title-deed to immortal life, though its actual knowledge is not the millionth part that of the pig or puppy of the same age. It starts, thus, a blank as to intelligence; but, having the infinite endorsement of its father and mother, which involves the undeveloped capability of analyzing the stars and weighing the planets, it holds wrapped up in its vital and mental organism the ego of an indestructible personal identity; and should it thus die untaught, and even unconscious of its own being, its *magna charta* of selfhood will be its passport to the primary college of the angels, and thence to the university over whose entrance is written in letters of life--The Garden of Eternal Progress.—“ Problem,” p. 471.

ism in which they hold their being, and of which they are faculties. If the mind were but the motion or phenomena of something else, mental disease would be impossible, because as a mere motion the mind could not get sick, or, if sick, it would not be curable, since mere phenomena cannot be medicated. It follows, therefore, that the insane person is a person still. The maniac is a person with a deranged will. An imbecile is a person with all faculties out of harmony or in a state of suspension, just as an infant is a person with its faculties not yet developed. A crazy man is a person who has lost himself. An infant is a person who has not yet found itself. These views can be consistently held and logically developed only in the light of the Substantial Philosophy. According to any other system of psychology there is nothing to lose nor find but motion, and motion has no more existence than space. Any psychology which denies the substantiality and proper entity of the soul is the most sublimated idiocy in the sphere of mental science. Its only good fortune lies in the fact that idiots never get crazy.

Q. 40. Have individuality and personality the same source?

A. In common with all other finite forms of being, individuals and persons have the same origin; yet personality is derived from God in such a way and for such a purpose as to bring with it the inherent impress of its great personal original.

Q. 41. Are faculties predicable of the soul or mind?

A. Faculties, like immortality, belong to the person, rather than to any one side of his being; and yet there is no impropriety in speaking of mental faculties.

Q. 42. What are these faculties?

A. Among them may be named *memory*—that faculty or activity of the person by which he looks to past ex-

perience or observation; *imagination*—that faculty by which the person turns to the future or to the mystic realm of fancy; and as the substantial person unfolds his character, he exercises himself in the higher activities of his being, such as *reason* and *will*.

Q. 43. Are these faculties so many substantial entities?

A. They are not. There is but one entitative life-principle in each person. This remains the same and indivisible whether the person remembers, imagines, thinks or wills.

Q. 44. Then loving, thinking and willing are not substantial entities?

A. They are modes of personal motion or activity, and differ according to the peculiarity of the impulse prompting it, the degree in which the personal life-force is exerted and the object toward which the movement is made.

Q. 45. What is the highest faculty predicable of man's personality?

A. *Will*. Choice is the highest exercise or activity of which a rational being is capable. It is in virtue of this capability that man may rise high in the ethical sphere of being, choose the good, and thus determine his own happiness and glory forever.

Q. 46. Does not such will-power imply and include the possibility of choosing the evil, and also of suffering the consequences of an unwise choice?

A. It does indeed; and the philosopher, as well as the philanthropist, regrets the fact that such possibility has been actualized in the form of sin and death, as shown in the next chapter.

CHAPTER XII.

DEATH.

QUESTION 1. What is death?

ANSWER. This undefinable negation flits constantly across the path of life, all robed in sombrous garments of impenetrable mystery.

Q. 2. May not science approximate an exhaustive definition of the term?

A. Some definitions may be given by fragments, and yet when all the fragments are put together they do not constitute a satisfactory whole.

Q. 3. What is the latest definition of death as given by science?

A. "*A falling out of correspondence with environments.*"

Q. 4. Is this definition of Herbert Spencer satisfactory to those who seek and see the truth in the light of the Substantial Philosophy?

A. It is not reasonable to suppose that it can be, since it proceeds from a materialistic conception of life.*

Q. 5. What definition does Substantialism give of death?

A. If, as already seen, life is the highest form of force in the universe, death must be defined in such terms as to represent it in some way antithetic thereto.

* See different definition of life, Chap. XI.

The withdrawal of life force for want of favorable conditions, or for want of ability to remain in any given substance, leaves such substance under the negative power of death. The withdrawal of life results in death.

Q. 6. Is death an entity?

A. A death agent may have positive contents of being, but death itself is a nonentity—a weakness—an empty negation—a solemn silence.

Q. 7. Is death a process?

A. In the present order of things it is the indispensable accompaniment and negative counterpart of a positive life-process. Decomposition and recomposition complement each other in filling up the measure of the world's history.

Q. 8. In death, what dies?

A. Nothing really entitative and substantive can die. Combinations cease; relations change; heterogeneous substances dissolve. That which did not come from nothing can never go to nothing. In the sense of annihilation it cannot die.

Q. 9. Then death is mere dissolution or separation.

A. We may go far and fare worse in search of a better definition.

Q. 10. Does this definition apply to all the departments of finite being?

A. Under certain modifications it does. In the chemical domain dissolution is decomposition; in physical forces it is dissipation; in the realm of biology it is disorganization.

Q. 11. If, then, nothing is destroyed by death, how are the substantive elements affected?

A. They are relegated to the immediate source of their respective beings—matter to matter, force to force, spirit to God.

Q. 12. Is death always the simple result of the ex-

pending of the force at work in any given individual or order of being?

A. This is the ordinary or usual occasion of what we denominate death.

Q. 13. Then death is the mere absence of life?

A. When an accomplished fact, it is usually the result of life's mission having been finished, and its consequent departure from that particular field of its operations.

Q. 14. But may not foreign, adventitious forces invade any one of the several departments of being, and hurry forward the process of dissolution?

A. The history of the world is a boundless volume of testimony establishing the affirmative of the foregoing question.

Q. 15. Then such foreign power of dissolution is not confined to the chemical domain, and its work to the decomposition of compound matter?

A. It is not. Death not only "reigned from Adam to Moses," but with limited sway it still continues to invade and reign in all orders of being from atoms of matter to some of the angels which once excelled in finite force. It enters as a dissolvent and puts asunder all heterogeneous masses of material substance. It invades the realm of physics and takes advantage of the resolvability of forces to disperse them abroad, or to transform them into their correlatives. It enters all finite orders of organic being, and, when not met and driven out by some superior indwelling force, refuses to leave until, in its exit, it hangs its crape upon the door. Salt waters from the ocean overflow the living productions of the land; and forces from the continents destroy all that is destructible in the denizens of the seas. Minerals may poison plants and shorten the lives of animals. The vegetable may send agents of death to the animal, and the animal kingdom may delegate a worm to gnaw the vitals out of many a Jonah's gourd.

Q. 16. Is the rational order of being also subject to such foreign invasion?

A. It is no exception to the general rule under which the whole creation groweth and travelth together in pains and possibilities of premature dissolution.

Q. 17. Has the human kingdom been subject to such foreign assault and violence?

A. Like all the orders of being beneath it, the kingdom of humanity was and is exposed to invasion from abroad.

Q. 18. Did such foreign invasion occur?

A. It did.

Q. 19. What foreign force has invaded the kingdom of humanity?

A. *Sin*.

Q. 20. Is sin *entirely* foreign to humanity?

A. The instigation to sin was foreign. The possibility was inherent.

Q. 21. Did not the possibility of sinning imply an imperfection in the primeval state of man, and reflect a shadow of doubt as to the perfection of the Creator?

A. Not at all. Without such possibility man would have been imperfect.

Q. 22. Was sin, then, a necessity in order to rational or human perfection?

A. The possibility of sin was a necessity.

Q. 23. Could such inward possibility have been actualized without the outward instigation?

A. No more than the static force-elements of nature could be developed without the presence of required conditions.

Q. 24. Was sin, then, statically present in the primeval man?

A. The possibility of sinning was really present.

Q. 25. Then human ability to sin was essential to human dignity and happiness?

A. Yes; man's ability to sin was essential to perfection in his primitive state; and his power to use that ability absolutely necessary to the attainment of his ultimate state of sinlessness in glory.

Q. 26. Is sin, then, the cause of death?

A. It is not the cause of human transition to a higher state, but of all the sorrows and miseries which now accompany the transition from the present section of human existence. It is not because this world is a bad and dangerous place, but because it was designed to be preparatory of a better state of existence that no good people get out of it alive.

Q. 27. Is sin the cause of death to the lower orders of being?

A. A great deal of dogmatic theology has advocated the affirmative side of the foregoing question, but the very rocks cry out in rebuke of such an unscientific assumption, while the geological records of numerous ages give unimpeachable testimony to the contrary.*

* The animal, while it lives, conserves to itself and appropriates continuously the forces of Nature with which it is in contact. Its life principal has an endowment making it thus capable. It appropriates the forces of light, heat, electricity—the nutriment of food, drink, air—the affinities of the elements—the laws of mechanics. All these appropriations go on and result in growth, strength, activity and the perfection of a living being. In all this time the life-forces have been building up; just like the growing tree that made fuel for the engine. But now the animal has reached its perfection—it has enjoyed buoyant life and has secured a succession of its species, and thence it gradually declines. In growth the life-forces controlled the simple chemical forces of Nature, and thus appropriated and built up. But now the chemical forces gradually gain upon the vital, and the animal goes down naturally, but orderly. There is harmony still in Nature—the animal yields up

Q. 28. But did not sin bring death to man?

A. Yes, in so far as it affected his moral nature, and disturbed the normal development of his whole being, but especially in its accomplishment of the moral separation between man and his Maker. Actualized sin was an incipient dissolution of the original compact written in the very constitution of rational being—moral separation—an abnormal condition of the highest side of man's nature, and, as a consequence, affecting the totality of his being.

Q. 29. Would man, then, have died, if the possibility of sin had not been thus actualized?

its forces—"conserve" them to the grand economy. Just as this animal had *appropriated* in its growing stage so it now, as naturally, *yields* after its maturity.

Physical death of all animals is a necessity, and a natural phase of the grand physical economy. And man, in obeying its laws of change and conservation of forces, as he passes them over after using them, is only playing his part in the grand drama. His superadded moral nature, indeed, brings in a new element, but this is only co-ordinate; and although it occasions some very notable circumstances that attend his physical experiences, especially that of death, yet it is no factor of the essential formula.

In our moral consciousness and religious sense, physical death is an event of much import; and the mistaken conceptions of the olden times, that have formulated the theory of a reciprocal constitution of our dual being, which ignores specific laws, have given death a penal character of moral elements only; and have thus made this inevitable phase of our corporeal being a most melancholy experience. The order of Nature is by no means chargeable with those melancholy reflections. And it will be infinitely to our moral advantage to have correct views of all the laws of our twofold being. Let all the consequences of sin or moral delinquency be precipitated, in our formularies of ethics, into the moral domain; and let *moral death*, which is an *unnatural* estate, appear in all its horribleness, so that sin may become more hideous. What a rich inheritance would thus be secured to theology! and what glory to the achievements of virtue.—Rev. J. Kost, LL. D., in "Repertory," 1879.

A. He would have made the transition to a higher state without death in the form of such terrible catastrophe in nature.

Q. 30. Then death does not necessarily belong to the constitution of Nature?

A. Death is a physical necessity in the lower orders of being, but man's constitutional dignity and attainable destiny involved only the necessity of transition.

Q. 31. Is sin, then, the perversion of something essential to humanity, or is it the presence therein of a hostile foreign force not essential thereto?

A. Sin is a perversion of the *life* force in humanity, rather than an invasion of anything like a death force from without, and yet such perversion could not have taken place without the presence and possibility of invasion by such foreign power as a condition necessary to such actualization.

Q. 32. Is sin then a force in our nature, or only the motion or effect of a force?

A. Sin is the perverted life force of humanity and therefore a force abnormally active in human nature.

Q. 33. Then sin is predicable of humanity in its present abnormal condition without any reference to deeds of actual sinning?

A. Precisely and emphatically so; and yet sin is no essential part of humanity.

Q. 34. Is the infant a sinner?

A. No human individual is a sinner until after he has individually and personally and purposely committed some overt act of transgression.

Q. 35. Is sin then a *static* force in infants?

A. It is just as really the perverted life force of humanity in a latent condition in every human individual as heat, sound and electricity—all the physical forces in fact—are statically present in matter.

Q. 36. Then sin belongs to humanity as at present constituted?

A. Sin is *in* humanity as at present *abnormally* constituted.

Q. 37. Does sin taint and affect every member of the human race?

A. Humanity is not a mere aggregation of particular things or number of human beings, but an organism which includes all the members and gives them character, or whatever is peculiar thereto. If sin has in any way tainted and affected the general organism of humanity, nothing but the shrewdness of unscientific sophistry can avoid the logical conclusion that every member of the organism is tainted and affected in the same general way.

Q. 38. Is humanity then totally depraved?

A. In a qualified sense, man is totally depraved.

Q. 39. How should the term "total depravity" be qualified?

A. So as to express merely its coextensiveness with human nature in its present abnormal condition.

Q. 40. Then man, by the actualization of his possibility to sin, did not cease to be human?

A. Man by sinning became neither a brute nor a devil as to the essence of his being. The substance of his nature has neither been destroyed nor transformed into something else. He is human still—though defaced and deformed, he retains the Divine image. For this reason his Maker loves him still.

Q. 41. If man is still human, and in a qualified sense still retains the Divine image, why does he die—what had sin to do with the bringing of death into the world?

A. As already seen, it had nothing to do with bringing death to the vegetable and animal kingdoms—death was an ordained physical necessity for them.

Q. 42. But how does sin stand related to the perplexing problem of death in the higher or rational order of being?

A. It is here and in this sense that *by sin came death*. This is what theologians call "spiritual death."

Q. 43. What has science to do with theology and the question of spiritual death?

A. Until recently it has had too little to do with the great problems involved therein, just as theologians have had too little to do in an earnest way with true science, and it will be better for theology when it becomes less dogmatic and more consistently scientific in the work which the Author of a twofold revelation has given to the scientific theologian and the Christian scientist to do.*

Q. 44. What, then, is spiritual death, scientifically considered?

A. It is the moral sundering from its Maker, or Fountain of its existence, of a being with a rational or spiritual entity in its constitution. A falling out of correspondence or communion with its substantial Source.

Q. 45. And sin is the cause of this sundering?

A. Sin is not the mere cause, but the very essence of spiritual death in the realm of spirit. Sin *is* static death in the abnormal state of the spirit, and death is sin in the process of development.

Q. 46. How far may the process of such development be carried before sin expends its force?

* The true ministry of Nature must at last be honored, and science take its place as the great expositor. With the inspiration of Nature to illumine what the inspiration of Revelation has left obscure, heresy in certain whole departments shall become impossible. With the demonstration of the naturalness of the supernatural, skepticism even may come to be regarded as unscientific.—Drummond, "Natural Law in the Spiritual World," pp. 32, 33.

A. For the same reason that gravital force will act upon matter as long as matter exists, and wherever matter is found, the force of sin will continue to act upon abnormal human nature as long as human nature continues in an abnormal state, and wherever human nature in such abnormality is found, unless——

Q. 47. Unless what?

A. Unless sin as a force be met by an antidote or counterforce corresponding with the nature and commensurate with the degree of the force to be eliminated.

Q. 48. What has science to do with spiritual antidotes?

A. This question will be discussed in the next chapter.

CHAPTER XIII.

DEATH'S ANTIDOTE.

QUESTION 1. What is an antidote?

ANSWER. An antidote is an applied counterforce—a remedy—that which neutralizes the evil or poisonous power of something else at work in organic existence—that which eliminates another force from any particular field of organic action, and relegates it to its fountain source.

Q. 2. Are counteractant forces limited to the organic world, or do they also belong to the domain of physics and in the realm of inorganic chemistry?

A. No pent-up Utica contracts the comprehensive domain of forces. When not static they are active or counteractive throughout the boundless universe of God. In the lower orders of being they are types of better things above, and prophecies of higher things to come. The science of chemistry reveals nothing more clearly than the fact that either matter or its properties, or the so-called new properties of its many possible combinations, or the forces resident therein, are continually neutralizing each other. For this reason the art of medication is largely the practical science of applied chemistry. Acids or sour corrosive substances are neutralized by alkalies. So also are narcotics neutralized—*i. e.*, their forces are subject to elimination or transference by the application thereto of a counterforce resident in belladonna or some other anti-narcotic agency of nature which has the power

to act or counteract as a superior energy. The same is true in the domain of physics, where forces deal with each other and with homogeneous matter, without reference to its many possible compounds, as is the case in chemistry. While all the forces are one in their common primordial essence, they are multiform in distinct missions and manifestations of being, and each one has the property of transference or is subject to neutralization when in the presence of a superior force or a force acting under more favorable conditions of retention. For example, as seen in Chapter IV., heat neutralizes cohesion; and again, in Chapter V., magnetism neutralizes gravity, and lifts up that which, according to the workings of gravital force, would tend downward. So, in the higher sphere of morals or spirit, that which tends downward under an abnormal force may be arrested and reversed in its course by the application of a moral or spiritual counterforce, which, neutralizing the abnormal force that pulls the moral entity downward, lifts its object up, and reinstates it upon its original plane and in the proper and normal sphere of its being.

Q. 3. Is it to be understood, therefore, that in the sphere of chemistry or in physics or elsewhere matter can neutralize matter or serve as a counteractant thereof?*

* One of the greatest mistakes that the world has ever made is its constant and fruitless effort in some form to propagate philanthropy at the point of the bayonet. And the Church, with too much of the world-spirit and world-tactics, as well as too much of the world's false philosophy, is constantly committing the egregious blunder of substituting material for force and calculating quantity for quality. There is great zeal for God, but not according to that knowledge which sees the most essential entities of Christianity in their true and immaterial character, and uses them in accordance with the purposes of their ordination. The Church has, indeed, "tasted of the heavenly gift, and of the powers of the world to come," but its ruling philosophy seems to be largely unconscious of the real and true

A. Not at all. Matter, having the negative property of inertia and being but a passive substance, has no power over itself. much less can one portion of matter have power over some other portion thereof, either to transfer or change any of its properties. It is, for example, the alkaline *force* resident in certain kinds of material which counteracts or neutralizes the force resident in acidiferous matter. When any one of these chemical forces is present in a living organism in such quantity or under such conditions as to threaten such organism with disorganization or death, and the other force is applied as a counteractant, the latter may be called an *antidote*.

Q. 4. Is sin then a disease that calls for a remedy in the form of an antidote in order that death, its more fully developed form, may be averted, and the patient ultimately restored to spiritual health?

A. Sin is that abnormal force in humanity which throws the spiritual side or quantity of human nature—and in a certain consequential sense the entire being of its human subject—into a diseased condition. The greatest Philosopher that ever blessed the world with a revelation of truth upon this subject declared the medical character of his mission among men by announcing the implied and tremendous fact which underlies his own self-evident proposition: “They that be whole need not a physician, but they that *are sick*.”

Q. 5. Is humanity then really sick unto death?

A. The whole head is sick, and the whole heart faint. From the sole of the foot even unto the head there is no soundness in it. And it will be well for the science of

counteractant force which Heaven has placed in its organism and at its command, and through which alone it can hope to roll back the popular tide of iniquity and spiritual wickedness in high places by neutralizing those immaterial “principalities and powers” which have a deeper and darker origin than mere “flesh and blood.”

biology, as applied to the human race in the full solution of the intricate problem of human life, when it once recognizes the organically diseased condition of abnormal humanity as a fact taught by Revelation and a truth confirmed by all the moans and groans of abnormal human history.

Q. 6. What then is the antidote, and how may it be administered or applied?

A. The above question may have its answer expressed in the following formula: An organism once brought under the indwelling power of incipient death can escape ultimate disorganization or a condition of endless abnormality, only as a higher and healthier order of life reaches it at some point in the earlier stage of its development, and by a vital contact and coalescence with its disordered life eliminates therefrom the poison which affects it, and thus rescues it from the dominion of death.

Q. 7. Has such a higher life-force been introduced into the diseased organism of humanity at any time in its history or at any point in the process of its abnormal development?

A. This question involves the vital point of all theology worthy of the name, and calls for Gilead's most substantial balm. As a soteriological question it crosses the straight path of legitimate science and can no longer be ignored as something outside of its proper province. Substantialism emphasizes the fact that such a higher life-force has been introduced into the organism of abnormal humanity, and calls for a proper interpretation of the testimony of history to justify the claim.

If science is of God, it has as much right as religion to appeal to history for the justification of its claims. The pages of Scriptural History, even though they should be regarded as nothing more than a historical record—and in such character they have at least as much claim upon

our credence as the chapters of accredited profane history—are good authority for the assertion that *such a higher order of force has entered the organism of abnormal humanity*. Furthermore, the correct reading and scientific study of all subsequent history—sacred and profane—as well as all human experience, so far as it has been flavored with the fruit of the entrance of that higher life-force into the race, have corroborated the statement of the Biblical record. Thus the record which claims inspiration and infallibility for itself; all sacred history subsequent thereto; and all legitimate experience, join their concurrent testimony as to the truth of the foregoing claim. Hence it follows most legitimately and conclusively that all systems of philosophy which fail to take this fundamental factor into their future reckonings must remain unscientific and finally perish from the earth to make room for something better.

Q. 8. But does not science transcend its own proper limits when it attempts to study the deep things of God?

A. It does not. If a correct knowledge of the forces and facts of Nature assists us in a more proper interpretation of the higher facts and forces of Christianity, it is both our proper privilege and imperative duty as Christian scientists, to avail ourselves of all the help thus placed within our reach; especially so since Christianity is the proper corrective, continuation and crowning complement of Nature, rather than a disjointed section of the universe out of all connection and correspondence with the world's present order of things.*

* "It is not, of course, to be inferred that the scientific method will ever abolish the radical distinctions of the spiritual world. True science proposes to itself no such general leveling of any department. . . . Nature is not a mere image or emblem of the spiritual. It is a working model of the spiritual. In the spiritual world the same wheels revolve—but without the iron. The same figures flit across the stage, the same processes of

Q. 9. Was not the Incarnation of the Son of God, according to the Scriptural account thereof, something entirely above all that goes before it in the order of Nature—something supernatural—and therefore entirely above the proper sphere and range of reason?

A. True science does not admit that there is anything in the universe supernatural, except in a relative sense. God himself is natural—in no sense above himself—in the realm of the infinite. The most orthodox confessions call Christ “the *natural* Son of God.” All the facts and forces of Revelation—the kingdom of God—are natural in the sphere of Christianity. Whenever science or religion begins to shirk from the line of its proper mission by pleading the statute of limitation on the false ground of alleged absolute supernaturalness in any one of the higher realms of being, it has either hampered itself by a false philosophy, or lacks courage to go in where God has made it possible and proper for his rational creatures to enter with unsandaled feet. To rule the Incarnation entirely out of the range of Christian science, would be to deny the continuity of law from the lower through the higher orders of being, and to impeach the testimony of all the prophets in the sanctuary of Nature.

Q. 10. What prophecies are there in Nature proclaiming the Incarnation an ordained necessity, and something entirely in harmony with the world’s twofold law of involution and consequent evolution?

A. All Nature is prophetic of higher things to come. The plant is supernatural to the mineral, though the mineral be not conscious of the fact that there is such vegetable order of existence entirely above it. There is unconscious prophecy in the fact that the life-force of the plant clothes or incarnates itself in the substance of

growth go on, the same functions are discharged, the same biological laws prevail—only with a different quality of *bios*.”—Drummond’s “Natural Law in the Spiritual World,” pp. 21-27.

the mineral kingdom. So, too, is the animal supernatural to the plant, and what an adumbration of higher things to come is the fact that the life-force of the former lays hold of all things subnascent or subnatural, availing itself of the force of chemism in matter to clothe itself upon with that which is beneath it. The same is true of the human kingdom in its supernaturalness as related to all below. The life-force of the rational lays hold of the lower orders and is destined to subdue all things unto the human. Man's life incarnates itself in the mineral, vegetable and animal substances. Are all these involutio-evolution processes to be regarded as having reached their final culmination in man's present order of being? No! The cold stones from beneath and the glittering stars from above cry out against the unreasonableness of such a supposition. Why, then, should science at this point get out of breath and throw up its helpless hands in token of unconditional surrender when confronted with the false plea of absolute supernaturalness in the higher orders of the natural? Man is supernatural to the ox, and yet the ox knoweth his owner; of course not as man knoweth himself; neither does true science claim to be able by searching to find out God as the Infinite is known to himself: but in the sense and to the extent that he has shown himself unto man in Revelation, of which the Incarnation is the central fact, and before whose sacred significance true science can never consent to shut the eyes of her admiration, or seal her lips of legitimate inquiry.

Q. 11. But is not the Incarnation, as a new factor in the world's organic history, something to be seized and understood only by faith?

A. Faith is indispensable; yet what is faith, objectively considered, but a new organ in humanity which would not be possible therein without the advent of the new order of life which the Incarnation brought into its

organism. True science in its proper and comprehensive sense includes faith—that substantial faculty or organ which recognizes the immaterial and otherwise invisible entities of being and factors of history as the most real and dynamic forces of the universe. It is not a faith which either contradicts or disregards the manifest teachings of either Nature or Revelation. Standing in proper relation to both it holds them in proper relation to each other. It is this reasonable and reasoning faith which enables the scientific student of Revelation and the Christian disciple of Nature to “understand that the worlds were framed by the word of God,” and also to understand further that the world as it culminates in man was redeemed by the same incarnate Word.

Q. 12. But is it not irreverent for Science to attempt an entrance where angels either fear or fail to enter?

A. Christian science is more likely to become devout than otherwise at the manger cradle of Immanuel. Besides, if Science, after it has availed itself of an attainable knowledge of all the knowable facts and forces which the God of Nature and Revelation has placed at its appropriation and command, does not attempt to pass the court of the Gentiles and enter with reverential attitude the holy place, it will prove itself a contemptible coward before the eyes of angels, God and men.*

* The Incarnation is, indeed, above anything which the human mind has been called upon to philosophize about, but Christian scientists do not for any such reason make the arbitrary separation between natural and supernatural for the convenient purpose of placing one order of being under the range of human knowledge and the other under the reign of *mystery*. Is the so-called supernatural more absolutely unintelligible to the natural than the human is to the animal, that man must stand with mock modesty at the very threshold of the powers of the condescending heavenly world while “all the trees of the field clap their hands” at the coming and in the presence of the incarnate majesty of their Maker? While Christian men bend worship-

Q. 13. But does not the foregoing view of the world's organic unity of design and development imply that the Incarnation was a constitutional necessity* in order to the full rounding out of the one grand and comprehensive purpose of Him who projected the universe from his own substantial self that it might roll its one increasing and unceasing tide of declarative glory back to his substantial throne?

A. It is so implied. To start forward with the bare idea that the Incarnation was designed primarily to serve as God's opportunity in man's extremity is to switch the whole central purpose of God from the eternally-ordained and well-ballasted central track of his providence upon an infralapsarian side track of casual history, in order that Jehovah might, by such strategic means, brought in by the promptings of a fortunate after-thought, checkmate the preceding proceedings of

* That must ever be a false and mutilated view of the nature and history of man, which rests not on a firm apprehension of his true relationship to God, as this comes out ultimately in the Constitution of the Messiah. That must ever be a false and defective view of the nature of God, as related to the world, which stops short of theanthropy, as the true and *necessary* central sun that serves to *irradiate and complete all other revelations* by which he is known.—Dr. Nevin, in *Mercersburg Review*, 1851, p. 56.

fully before the Incarnate Mystery, Christian science recognizes it as a mystery with many mysterious types and prophecies in Nature. Wherever the higher order of life-force condescends to clothe itself with the elements in the order next beneath, it is accompanied with a proclamation of the general law specifically affirmed in the angelic enunciation to the Virgin: "The power of the Highest shall overshadow thee." When the vegetable takes up the mineral it is in virtue of the fact that "the power of the higher overshadows" and inter-permeates the elements of the lower order of being.

the devil, and thus drive back the surging tidal waves of the world's abnormality, sorrow and death.*

Q. 14. What would have been the course of the world's history as regards the Incarnation, if humanity had not been brought under the power of death by the actualization of its possibility to sin?

*The only proper stand-point for both science and religion is the christologic principle as enshrined in the theanthropic person of Immanuel. From this common and commanding point of view Jehovah may look down, and man may look up with mutual admiration. No man hath seen God at any time, except as the latter has become visible through the revelation of himself in the only begotten Son, who is in the bosom of the Father; and it is equally true that God hath seen no man at any time, except as he has viewed him from the grand, central observatory of the Incarnation. God can look upon his works with complacency only as He sees them in their completeness. Man without Christ would be as incomplete as Nature without man. As man is the crown of Nature, Christ is the crown of man. All sound christological thinking must come finally to hold the Incarnation as essential to the actualization of that eternal and supreme thought in the mind of Jehovah, which finds its full expression in the fact and form of the Universe. Under any other view, creation can be regarded as only the first few spans of a bridge extending from a finite shore toward the unknown and unknowable center of some infinite ocean until it comes to the—the jumping-off place.

Jesus Christ is not only the beginning and ending, but also the center of God's creation; and a proper recognition of this cardinal, christocentric fact is the beginning of all true investigation into whatever is knowable of God, man, and Nature; and nothing is truly known or knowable of either, except as each is searched and seen in proper relation to each other. To this end was Emmanuel born, that he might bear witness to the truth. His testimony was given, not in the way of affirming the correctness of some abstract and theoretic statement, but by manifesting himself as the personal embodiment of **THE TRUTH**, and the key to the proper apprehension of all relative truths, whether in religion or science. This, then, we repeat, is the proper point of observation, especially for our unprecedented

A. The Messiah, as the "King Immortal," would have taken his position of honor at the head of the race by becoming bone of its bone and flesh of its flesh, and thus lead his human subjects on their way to glory without the necessity of an antidote for its disease and a battle with its enemy.

age of devotional and intellectual activity. It should be chosen for its commanding eminence, and occupied for its universal centrality. From this point the Christian philosopher, making use of all the helps afforded in Revelation and Nature, exercising the functions of both faith and reason, may sweep the entire religio-scientific field of known and knowable truth, and demonstrate to all the world that God's great handiwork is not a mere stupendous pile of jumbled irrelativities, but the well-designed expression of ONE eternal thought, in which and subordinate to which all other thoughts, as well as all expressions thereof, are for each, and each for all, and all for Him who is over all, God blessed for evermore.

The above advocacy of the *one* cardinal point in the religio-scientific compass implies, of course, that the Incarnation be accepted and held in its proper and permanent sense. The old heresies of Gnosticism, Ebionism, Eutychianism, and Nestorianism must be guarded against as ever seeking to repeat themselves in the onward march of the most earnest christological inquiry. To be of any assistance in explaining the meaning of Nature, in studying the dignity and destiny of man, in searching to find out God, and, in short, to serve as the anthropological key to the problem of the universe, the Incarnation must be apprehended as a fact of concrete and substantial force in the history of the world's life. The Son of God did not merely inshrine Himself in a human soul, and encamp for a few years in the body of a man, but assumed, for all eternity, the substance of humanity in its generic sense, so that he became the second Adam, the head of creation, "in whom are gathered together in *one* all things in Christ, both which are in Heaven and which are on earth." The foregoing also presumes the truth of a postulate not generally accepted by the most popular theological thinking of the world, viz.: *The Incarnation would have become a reality in the history of the world, even if man had not sinned.*

Q. 15. Then the actualization of the possibility of sin made it necessary that the Messiah should also become Redeemer and Sacrifice?

A. Just so;* and that the life-force which was brought into humanity through the Incarnation should neutralize the false force therein, eliminate the consequent elements of disease, and counteract the workings of its moral poison according to the working whereby the Fountain of life was "able to subdue all things unto Himself."

Q. 16. Then Christ possessed in his own person a life-force which was and is the antidote of death?

A. This is the central tenet of "New Theology," known for nearly a half century as *Mercersburg Theology*, yet it can never be consistently held and advocated except from the standpoint of *The Substantial Philosophy*,†

* This is not offered to the intelligent reader as something new. It has been affirmed by some of the profoundest thinkers in the past, and has more recently received additional emphasis from many of the most advanced theologians in Europe, and especially in Germany, among whom may be mentioned Dr. J. H. A. Ebrard, Dr. J. J. Van Oosterzee, Bishop Martensen, Dr. Liebner, and Dr. J. A. Dorner. Neither would we have the impression go abroad that we are entirely ignorant of the difficulties which confront this theory in the questionable light of some of our present prevailing exegesis. The Holy Scriptures are generally approached and interpreted from either the harmortological or sorteriological standpoint, rather than from the proper theanthropological point of view. This, we think, is a mistake. The entrance of sin into the world laid upon Immanuel only the additional necessity of humiliation, sorrow, and pain; or, in the language of Dr. Liebner: "Sin served only to bring in this modification, which, indeed, reaches far and deep, that now Christ appears *also* as a Redeemer and Sacrifice." Creation, not the perversion thereof, drew after it the complementive act and fact of the Incarnation.

† Substantialism, as applied to Christianity, aims to bring out a deeper meaning of the atonement than that which usually

as founded by Dr. Hall, and partially formulated in the volume of this book.

Q. 17. What then is the primary idea of the atonement?

A. The restoration of man to himself—to a normal condition of his being—to purity, freedom, *health*, and consequently to God, rather than the reverse order, as held in the old Anselmic theory of reconciling God to men, as though the mission of theology was principally to try to help God out of trouble and make him consistent with himself, instead of showing, in the light of Revelation and science, how God is helping man out of trouble.

Q. 18. Is there, then, anything in *The Substantial Philosophy* not in harmony with the Scriptural representation of the Atonement?

A. Indeed, there is not. On the contrary, it is in beautiful harmony therewith, but positively at variance with many of the most popular theories thereof.

Q. 19. Then the Incarnation brought a new life into the organism of humanity?

A. It brought in the life of the Word, which became flesh, and by such assumption of our nature constituted a source of new life and salvation to men. There is, therefore, a Divine-human life-fountain in the very or-

floats upon the surface of the undulatory theory of God's great gospel to man. As a philosophy it occupies the position from which it can consistently emphasize the *life-force* of the Historic Christ as something more dynamic in religion than even all the inexpressible agony of a dying Redeemer. It proposes to sweep away the miserable travesties that now obstruct the highway of a better theology, and open the road to a clearer and more scientific apprehension of God's word, so that faith and reason may rejoice together in the blessedness of the great truth that "if, when we were enemies, we were reconciled to God by the death of his Son, *much more*, being reconciled, we shall be *saved* by his *life*."

ganism of humanity, to which all individual human beings are in some way invited by the Spirit and the Bride.

Q. 20. What was the direct or immediate effect of the entrance of this new and higher life into the organism of humanity?

A. The assumption of humanity by the Son of God, and the consequent bringing into it of this higher life-force, was its restoration to its normal state—a state of moral purity, which again involved the possibility of normal development to the highest dignity and glory attainable upon the plane of the finite.

Q. 21. Was humanity as to its entirety saved by the Incarnation?

A. Everything essential to the constitution of humanity was actually saved in the person of the Redeemer.* The salvation of all human individuals, which was rendered possible in the wise and organic economy of the kingdom, remedial in its constitution, is not essential to the salvation of humanity. The tendency toward individualization is only a law of the development of the life-force (as shown in Chapter XI.) in humanity; therefore humanity does not necessarily include the sum total of all human individuals.

Q. 22. Did the entrance of this new order of life in any way affect all individuals of the race in their relation

* The old controversy as to the extent of the atonement—whether the atonement is general or limited—was little better than the chattering of magpies. Let it once be admitted that *humanity* was assumed by the Word, and saved as to all that it essentially involved, and there will be no room for such chip-basket divinity, and no reason to dispute about the question of the extent of the atonement. Atonement has been made for all that is essential to humanity, and if any individuals of the race are not healed of their moral malady, the cause can be found in the fact that the sufficiency of the remedy is not efficiently applied to some of the individual inmates in the general hospital of the diseased race.

to God and that high attainable destiny involved in the problem of human life?

A. It did. That which affects an organism affects all its parts—parts in possibility and parts in actuality.

Q. 23. Will all individuals of the race, in its abnormal state, become members of the new organism which was started in the Christ upon its normal course of development toward the attainment of its proper dignity and destiny.

A. Such an attainment was rendered possible, but it does not appear probable either in the light of Revelation or Science. It has been clearly shown in previous chapters of this book that physical forces never enter matter in such a way as to do violence to the lower orders and elements of being; that some kinds and combinations of matter have no ability to receive certain force-elements of Nature, and when that ability does not exist in matter the said certain forces do not operate upon said matter. Now if this same parity of reasoning be carried, according to the law of the continuity of law, into the realm of biology, and into that department of biology which treats of the forces and laws of Christianity, it will lead us on a parallel line of induction to the inevitable conclusion that while Christ is the Saviour of all men only unto them that receive him can he give power to become the sons of God in his reorganized family, even to them that believe on his name.

Q. 24. But is there not a fallacy in the above reasoning, since the respective realms of physics and biology are so very different?

A. Not at all. The difference rather strengthens every joint and member of the syllogism, and emphasizes the legitimacy of the conclusion reached. If Nature never allows her forces to do violence to helpless and unconscious matter, it is not reasonable to suppose that violence would be a law in the higher kingdom whose mis-

sion in the realm of humanity is to suppress lawlessness and grant its candidates for citizenship the greatest amount of liberty consistent with the nature of rational and responsible beings.

Q. 25. Why do some individuals savingly receive the Messiah with the life-force fontally found in His person, while others echo the old infidel cry: "Away with Him?"

A. For the same general reason that the sun while it affects all matter found in the solar system does not send its force into resistible opacity or into matter which has not the ability to receive the scintillations of its light.

Q. 26. But does not the proclamation of the presence and power of the Messiah's kingdom create ability in all human individuals to receive the saving benefits thereof?

A. The proclamation of God's remedial kingdom in the world is nothing more than the life-force thereof asserting itself among men. In such self-assertion it extends the substantial threads of its dynamic energy toward all; yet it can no more draw men who are destitute of receptivity, and who are determined to remain in such destitution, into the circles of its saving embrace than a charged magnet can lift up particles of glass or sawdust. Ability cannot be created where there is no reception of creative energy. If, as seen in a former chapter, the peculiar arrangement of the particles in some kinds of matter by virtue of cohesive force prevents the entrance thereinto of a luminous force, it should not be considered as a thing without prophecy or precedent, that the peculiar arrangement or derangement of elements and faculties in the constitution of certain rational individuals should render them entirely impervious to the life-force of the Messiah.

Q. 27. If, then, some individuals should remain forever in their diseased condition, are they individually responsible for their own sad future state?

A. Indeed they are, even though their cases should become chronic for all eternity.

Q. 28. How can that be made to appear in the light of justice?

A. If the preaching of the Gospel or the presentation of this life-force offers ability to receive it, it does not for that reason take away the ability *not* to receive it. Sick men, with the prescription in their hands and pills in their mouths, still have the power to throw physic to the dogs.

Q. 29. But the foregoing does not take into consideration God's great benevolence. Does not Christ's love for the world move him to save all?

A. Love is life in activity—the highest form of activity that can possibly be predicated of life, whether infinite or finite. Love works according to the law of the life of which it is phenomenal or expressive. Therefore it cannot do what life has no power to do.*

Q. 30. How does this life-force of the Messiah reach the individuals of an abnormal race to bring them into a normal state and saving relation to himself, thus antidoting in such individuals the poison of sin, and neutralizing the power of death?

A. Life-force, like the physical forces of Nature, travels according to its own law of conduction, and through its own peculiar media.

* Love is not an entity, but the expression of an entity. When the Scriptures represent that God is love, they do not teach that he is love in the sense of a Divine emotion, but that love is the highest form in which his essence goes out toward the objects of his benevolence. So, too, thought is not an entity, but an action or expression of a rational entity or *thinker*. To claim the salvation of all individuals on the ground of God's infinite compassion is to draw a false conclusion from false philosophy, in false sympathy, through a rickety syllogism of false logic.

Q. 31. What is the fundamental feature of Christianity's law of conduction or propagation?

A. Christianity propagates itself through media or intervening substance between which and itself there is an affinity or something in common, and something in the process of assimilation. Christianity after being started as a new creation* began to reach out toward abnormal

* Christianity is (1) a *new creation*, as real and distinct as that which in the beginning included the heavens and the earth. (2) It has an objective and *entitative existence*, holding in the organic union of the substance of the Son of God with the essential substance of humanity, in the sense that "the word (Logos) was made (assumed) flesh." (3) This new creation *heads in Christ*, "the last Adam," "the Lord from heaven," the "quickening Spirit," even as the old creation culminated in the first Adam, "a living soul," (1 Cor. 15). It is a kingdom in organic unity, as well as a unity in expansive and progressive evolution. Christ the true Witness, the Beginning of the (new) creation of God (Rev. iii. 14), is the primordial parent (Is. ix. 6), of the peculiar progeny born of the very substance of Him "of whom the whole family in heaven and earth is named" (Eph. iii. 15). (4) This kingdom of God is *at hand*, replete with substantial forces, for the solution of the most intricate and complicate problems of the universe, and for the salvation of all assimilable subjects in the sub-kingdom of humanity. (5) Having an objective existence, in an organic entity, it is not dependent upon subjective repentance, faith or experience, however essential these conditions and organs of receptivity on the part of the individual who becomes a citizen of the royal realm, and a consequent recipient of its saving virtue. (6) In a word, Christianity is *life*—not a mere attenuated, human life, but a distinct effluence of the life of God, which was not in the world in the same sense, and to the same extent, before the Incarnation. "In Him was life, and the life became the light of men." This life is not merely a divine "mode of motion," but the very substance of things hoped for by the deepest yearnings of the substantial human soul.

It follows further that Christianity, as to its inner organic entity, is not molded from without, or made dependent upon its form, as Materialism teaches concerning the dependence of the soul upon the body, and as some acousticians still teach,

humanity or individuals therein through that portion of the race already in the process of becoming normal—*i. e.*, that portion already in the convalescent stage.

Q. 32. But does not God as a spirit, and as the Personal, Supreme and Infinite Force of the Universe, move without law and without reference to any specifically ordained channel or media of communicating himself and his saving benefits to men?

A. God is always obedient to his own laws, and is therefore no more likely to direct that Christianity should be propagated without wisely ordained lines of travel than that he would have ordained that sound, heat or electricity should be conveyed independent of their peculiar media and modes of conduction.*

* God, like Nature, despises a vacuum, and prefers to send out his agents through inhabited space. As seen in Chapter X., sound, being a substance, cannot travel except through substance, and its rate of speed is governed and accelerated by the affinity it finds in its media of conduction. Heat travels best along that portion of an iron rod already permeated by heat-force; and electricity could not travel with such accuracy and in such an astounding rate of speed in the intelligible conveyance of messages except by the copper-wire route. Why, then, should so much of our modern Protestantism become crazy upon the baseless supposition and unphilanthropical theory that the Messiah and Christianity are to move forward in the accomplishment of *their* peculiar mission in the world without corresponding media of conduction and methods of operation?

affirming the dependence of "sound" upon the medium of its conduction. Like all other orders of life, in bending its energies toward externalization, Christianity is free to *take* and *change* its own form in the organic onflow of its mission, until it completes its terrestrial history in that final fullness and form which shall respond to the pattern within: and while thus free, it is also bound to take *only* such form as its inner model constitutionally involves. That final form will be the triumphant church, the body of Christ, the fullness (complement) of him that filleth all in all. (Eph. i. 23).

Q. 33. What is the organic wholeness of these Messianic forces, media of communication and propagation and proper methods of operation called?

A. Revelation and true science join heartily in denominating it the Church or Body of Christ.

Q. 34. What is comprehended in the true idea of a *body*, and what is expressed by the scientifico-scriptural term thus employed?

A. The church as Christ's "body"* and "fullness" is a

*That is no mere flourish of inspired rhetoric which represents the Church as "the body of Christ." A "body" is not a mere aggregation of material thrown together in convenient and comely shape, but an *organism* of invisible forces and plastic powers which ever seeks to complement itself in material form. As the human body takes up elements of the lower kingdoms—mineral, vegetable, animal—permeates them by its own powers, assimilates the assimilable, and throws off the excrementitious matter, so is it the mission of the Church, as the embodiment of the higher kingdom of heaven, to receive the salvable elements of the sub-kingdom of humanity, quicken them by the heavenly life of which it is made the bearer, and, when heedless indifference or hellish resistance does not thwart the heavenly purpose, assimilate them into the substance, and make them very members incorporate in that mystical body and kingdom which "ruleth over all." Again, just as it is possible for a human system to take into the stomach too much foreign matter for thorough digestion and consequent health, so is it also possible for the Church to become gorged with indigestible flesh and thus disturb the functions of the religious stomach, develop unmistakable symptoms of ecclesiastical dyspepsia, and bring a morbid condition of piety into the most pretentious portions of Christendom. According to the view of the writer, this is now the peculiarly alarming condition of the Church throughout the civilized world; and if our opinion is founded upon fact, it is certainly the part of wisdom to institute an earnest inquiry both as to the cause and the cure of the chronic malady.

The common mistake is made in locating the disease in one or several of the mere symptoms thereof. Pelagius was finally condemned, but semi-Pelagianism is the very devil in false

concrete entitative organism vitalized and energized with the highest form of life-force in the universe of God, and through which the powers of the heavenly world are constantly reaching down and into the realm of abnormal humanity, communicating the remedial force fontally present in Immanuel to such as have the ability to receive it.*

* "The Protestant doctrine does not identify Christianity and the visible church, but neither does it separate them. The relation between the two has been explained by introducing the term ideal church and actual church. We may explain here that in our use of the term *ideal*, we do not mean the church in thought, or as a mere mental conception, as antithetic to *real* but in a *substantial* sense in antithesis to the *actual*, just as we speak of the *idea* of the beautiful, the true and the good as objective substantial entities."—Rev. T. G. Apple, D. D., LL. D., Professor of Theology, Lancaster, Pa.

theology, once let loose and still at large deceiving the nations. Pelagianism grounds itself in a superficial view of the moral condition and real necessities of humanity as the subject of salvation from sin. The popular theology of this age, however emphatic the language of the confessions may be in the opposite directions, is considerably dipped with Pelagian error. It does not regard the human family as very seriously affected with anything like the epidemic essence of moral death. The term "regeneration" is frequently, if not commonly, used to emphasize the importance of conversion, while the latter means nothing more than a conviction that something wrong has been done, accompanied with an honest intention to quit making such mistakes. This is quackery in its most unsoteriological perfection. No wonder that so little account is made of the positive and substantial entities of the Christian religion where there is no clear discovery of a necessity for such a healing balm in Gilead. An empirical diagnosis leads to empirical therapeutics.

As long as such theological poverty prevails in molding the sentiment and in shaping much of the questionable workings of Christendom, it matters but little what theory of doctrine, church government, or religious customs may be in the ascendancy. Calvinism is the finest system of metaphysical abstractions ever wrought out in the laboratory of human brains: and

Q. 35. Through what channels or agencies in the church is this remedial force conducted to the individual members of the diseased human race?

A. Through the Word and the sacraments—by proclamation and propagation.

Q. 36. Is there anything in the human body prophetic of these peculiar functions of the church?

A. Indeed there is. This is the very thing primarily emphasized in the analogous reasonings of both Revelation and Science. Life, resident in the corpuscles of the

yet, blind to the beauty of the concrete, and deaf to the music of heaven's choral symphonies in the organic conception of the truth, as a mere theory of the Divine Being's mode of motion in the "plan" of redemption, it does not contain "irresistible grace" enough to insure the final perseverance of one poor saint. Arminianism emphasizes the other side of the same abstraction. It may be regarded as a theory of the mode of motion on the part of fallen humanity in its fruitless struggles to transcend the limits of its own helplessness. Transubstantiation, consubstantiation and the negative sacramentarian theories of unsubstantiation would do well to remain silent for about the space of a half hour, that the basic and primary question of *immaterial SUBSTANTIATION* in being may have a respectful hearing in the court of Christendom. Until that point is reached, it would be unwise to make any expensive preparation for an early dawning of the millennium. Evangelical Alliances, Pan-Assemblies, Holiness Convocations, Church Congresses and Salvation Armies may serve to reveal the existence of a felt want, and even act as agents in leveling down the mountains and filling up the valleys, but they can never make the comers thereunto perfect. Better things are required. Not the least of these things is a better philosophy. It may be said that true religion has nothing to do with philosophy. Possibly not; yet it occurs to us, just at this writing, that false philosophy has had enough to do with religion to impede the proper progress of Christianity in the world. And now, in this approximate dawn of her twentieth century, Zion unconsciously sighs and seeks for something to roll away the false philosopher's stone from the door of the sepulcher of Truth, that the invisible forces and consequent glory of her salvation may appear.

blood, travels out upon its mission through the arteries in the body to lay hold of substances within the compass of its grasp, assimilating them so far as they are assimilable, and repelling those substances that do not yield to the plastic power of the life-force which thus permeates the body and perpetuates it by such constant process of assimilation. So with the church which is the body of Christ. The life-force of the great Redeemer and Physician of diseased man is not to be regarded as Heaven's mere mode of motion operating in an abstract way, but like all other forces, whether in chemistry, physics or biology, moves out upon its mission, not only according to its own law, but also through its own peculiar channels of conduction. The main channels are the Word* and the sacraments which may be regarded as the nerve and arterial lines in the body of Christ, through which the life-force, as authority from the Head and vitality from the Heart of a redeemed humanity, approaches, confronts, calls upon and enables men to arise from their death-state of trespasses and sins.

Q. 37. When this life-force of Christ thus enters a human individual of abnormal humanity, and meets

* The Scriptural and truly scientific idea of the *Word* involves something deeper than the mere literal conception thereof. The Personal Word, who is the source and immaterial substance of the written and spoken Word, cautioned his disciples against the danger of limiting its meaning to signs expressed by characters or to sounds articulated by human breath. "The words that I speak unto you, they are spirit and they are *life*." This is the great Teacher's warning against the materialistic or wave-theory of his glorious Gospel. This theory largely prevails in the modern theological world. Indeed, no other theory can be consistently held or possibly maintained without the adoption of the fundamental principle of the Substantial Philosophy. The true syllogism must run as follows: All life is force; all force is substance; Christ's Word is life: therefore it is substantial force in his body, the church. The proper preaching of the Word, and

with such reception as to coalesce with the essential elements of his moral and rational being, what is the result called?

A. The Scriptures of God and true science unite in terming it *regeneration*.

Q. 38. Then regeneration is affected by the force from above?

A. It is. And yet the force from above could not regenerate a stone, a plant or an ox.

Q. 39. Why not?

A. Because these orders of being have not the ability to receive so high an order of life in the sense that man can receive it.

Q. 40. Why have they not such ability?

A. As seen in Chapter I., man's peculiar and intimate relation to God, by which he retains within him the God-consciousness, consisted in his having the Divine image. The Divine image in man is an element of God's own substantial being which was never communicated to any of the lower orders of existence. And although sin entered and marred that image, it was not destroyed.

the proper administering of the Sacraments are complementary means through which the life-force of Christ goes out in its correlative forms of *truth* and *grace*. This truth and grace are lodged in the church, the embodiment of Christ's kingdom upon the earth, and are thus objectively at hand by virtue of the Word having been made flesh to dwell thus *among* us (John i. 14) by his perennial presence. The popular and reigning theory in the general assemblies and literature of our earnest Protestantism, as to the essential constitution of the church, is as far from the truth as the wave-theory of sound. The theory, if allowed to run logically out to its own conclusions, would empty the veritable body of Christ of its objective realities, substantial force and historic character, and resolve it into a mere society of Christians huddled together for mutual advantage and protection, and held together like a heap of sand. This theory cannot long maintain itself before the rising and ruling philosophy of the world.

For this reason man is not unconditionally lost. He is capable of being made over—regenerated.

Q. 41. Does not abnormal human life develop under the influence of the gospel into normal humanity, or may not humanity be educated up into Christianity?

A. No more than the most precious stone can rise by the power of the lapidary into a plant; or the plant by the assistance of the botanist leap the impassable chasm that separates it from the animal realm of existence.

Q. 42. Then regeneration is something more than spontaneous generation?

A. It is something different. Substantialism disputes the baseless theory advanced by modern evolutionists that higher orders of being are spontaneously generated from the protoplasm of the lower; and in applying its broad and catholic principles to Christianity it consistently continues to maintain that any such spontaneous generation is equally impossible in the still higher realm of biological being.* “Except a man be born *from ABOVE* he cannot see the kingdom of God.”—John iii. 3, New Ver.

Q. 43. Has faith nothing to do with regeneration?

A. Faith, in its two-fold stage of development, is both the organ through which the possibility of the new birth is actualized and a fruit of such birth as an accomplished fact. There is really no Christian faith in a man until after he is Christianized. When the individual is made a Christian, faith becomes an entitative substance of his being. It is objective in its positive existence, and a creation—not out of nothing, but from the elements already

* Much of our theoretical, orthodox Christianity is nothing more than humanitarianism at best. Notwithstanding the claim to the contrary, many of our pulpits and much of our so-called Christian literature send out and circulate the poisonous doctrine that man can either perfect himself in his present sphere, or, by his own force, transcend his present bounds.

at hand; yet not from these in the sense of evolution, as though the original elements had power to transcend their limited sphere and spring into a higher order of existence. Faith is an entity "born from above," and yet as something conceived in the very womb of human personality. It is not something manufactured to order in heaven and sent in its completeness from the skies; neither can it have birth in the animal or in the angelic constitution. Humanity, as constituted in the image of God, is the only soil receptive of such heavenly seed. This mere receptivity is too generally mistaken for faith itself. Such theology is exceedingly superficial, unscriptural, and unphilosophical. It might just as well call the Virgin Mary's receptivity or conceptivity the veritable Son of God. There is no Christian faith in the human heart until after it has been "overshadowed by the power of the Highest," and quickened by the life of the Highest. Faith is then developed according to a vital process of spiritual gestation and growth. Barring the possibility of miscarriage, it passes the stages of its progress, and rises gradually into its higher form of existence, in fulfillment of all the prophecies in the lower orders of being, and in a growing conformity to its own heavenly type. That type is Christ. Such conformity to type is all that the Church on earth can ever have, or know, or give as a satisfactory solution of the great scriptural echoes of predestination. Away with mere abstract divinity! The world has had too much metaphysical theology. God "hath chosen us *in HIM*:" and "Ye are complete in Him." That which completes itself in him starts in him. He is the beginning and the end of all principles and processes with which he has anything organically to do—"the author and finisher of our faith." That which starts in him partakes of his nature—of his substance. That which starts organically in him and partakes of his being has life, even as he has life in him-

self. Life, though not a mere force, is nevertheless always a force. When this life becomes faith, *faith is a force*—the mightiest derivative force in the universe. It is distinct from Christ, and yet as inseparable as it is distinct. The just live by faith, because faith-life is the Christ-life of all whose “life is hid with Christ in God.”

That faith is concretely functional we readily allow, but that it is a *mere* function, or faculty of something more real than itself, we cannot admit. Even Herbert Spencer is scientifically orthodox enough to say that “we have next to no power of tracing up the genesis of a function, considered purely as such.” Separately considered, there is no such function in existence, and consequently there need be no effort made to trace after its origin. Faith has no being, even as a function, except in its relation to the organ which functionally acts, or rather the organ through which *life* acts in the discharge of *its* functions. The organ is nothing except in the organism of which it is an organic part, just as the organism is destitute of vitality outside of the kingdom, and the kingdom is nothing without the real presence of the king.

The “king invisible” never asserts his power in either of the several distinct kingdoms of his universal empire, from the mineral up to the mediatorial, without being peculiarly present both in the existence of its elements and in the operation of its laws. If this is pantheism, the Bible is a pantheistic book, and Christianity a pan-Christianistic religion. But it is not pantheism. There is no confounding of the creator with the creature. Even the penitent thief, upon the rack of torture, had sense enough to recognize and confess this general philosophic principle as applied to Christianity. In fact, that recognition was an act of his faith. The impression made by the regicidal tragedy of the Cross enabled him to exercise his incipient faith in the form of prayer—“When thou

comest *into thy kingdom.*” This is no exception to the general law of the empire. The Rock of Ages never crystalized an amethyst without being present in the lapidary of his own work; the Rose of Sharon never caused a flower to bloom until he first came in the kingdom to which the flowers belong; and the Redeemer never saved a single son of exiled Adam except as he approached the individual in, with, and through his remedial kingdom.

Such salvation is possible for each individual, because God has already so approached and redeemed the race in its generic sense. The ages bore testimony to the stately steppings of his gradual approach, until it was truthfully heralded forth that “the kingdom of God is at hand.” Thus at hand, it involved peculiar forces and functions of its own. While under one view this kingdom which “came down from God out of heaven” was foreign to that of humanity, it nevertheless, conditioned itself to the peculiar constitution and wants of the latter. Scarcely had it appeared above the sin-bedarkened horizon of the race until the challenge of its authority and the saving benefits of its provisions were uttered from the throne within: “Repent, believe: *for* the kingdom of heaven is *at hand.*” This announcement virtually implied that it was the approach of this kingdom which raised the possibility into the power of faith, by laying hold of the only point of contact in man. This point of contact is the *divine image*—defaced, but not destroyed. This involves the *God-consciousness* as a surviving element in the fallen race, and always essential to the constitution of humanity. At this point, in the very center of the individual’s personality, may be engrafted “the powers of the world to come,” enabling “the blessed and only Potentate” to say in truth to the individual believer: “The kingdom of God *is within you.*” Thus engrafted, the work of Christian growth begins, and the

process of individual evolution continues in accordance with the law of spiritual embryology. Thus, "Christ dwells in the heart by faith." The life which the Christian lives is "by the faith of the Son of God." Christ, his kingdom and faith are inseparable, and yet distinct, in the Christian. He spoke both of his kingdom and of faith as a grain of mustard seed. We see no escape from such conclusions except by an infidel rejection of God's Word and an unscientific denial of the resolvability, transmissibility, and conservability of force.

Thus faith, whether force, faculty, organ, organism in embryo, or all together, is "the gift of God." As already seen, it is a gift inseparable, yet distinct, from the giver. It is given in a sense somewhat analogous to that in which the sun gives light and vision. The sun not only calls the plant into individual being in the vegetable kingdom, but also calls forth within it the faculty through which it receives the light. The first thing that light finds in the vegetable seed is capacity. So with the possibility of the organ of vision in the animal or in man. The eye is not merely *met* by the light, it is *elicited* before there is any real organ of vision. The truth of this assertion is amply demonstrated in the caves of the earth, where perpetual darkness reigns. In animals long deprived of light there is a tendency to beget a progeny without eyes—or if eyes, without vision. So in the higher and spiritual order of being. Revelation from above is heavenly force coming down. Finding capacity in man, its first creative announcement is like that of Ananias to Saul: "Receive thy sight." Thus faith cometh by hearing, and yet it is not faith until it is conceived in the moral protoplasm of the human soul. These two factors must be held in proper relation to each other, in order to a proper conception of the genesis of faith as a substantial and entitative force in the Christian. The kingdom from above,

replete with a heavenly purpose, power, and glory, reaches down into the one immediately beneath it in the gradation of being, "touches with its mystery of life the souls of men" "dead in trespasses and in sin," quickens them into a higher order of animated existence, bears them across the otherwise bridgeless gulf between the mere human and that which is divine-human, and endows them with its own higher possibilities and powers.

What saith the Scriptures? What is the most reasonable rendering of the passages in which the term faith occurs? Limited space admits of inquiry concerning but a few texts. Luke xvii. 6: "Faith as a grain of mustard seed." The reference is not primarily to the smallness of the seed, but rather to the fact that it is the embryonic embodiment of life—that that life is a substantial force, the product of a kingdom behind it, and the possibility of an individual organism before it. Christ was too much of a philosopher to compare faith to a grain of sand. Gal. v. 6: "Faith which worketh by love." In this text faith cannot mean the *action* of the intellect of the individual; neither can it mean the *mere* action of the "new creature" formed within him. Action is not predicable of mere action. Back of all and in all there is something more than action. Faith worketh; therefore faith is inseparably distinct from the work—it is an entitative actor. 2 Pet. i. 5: "Add to your faith virtue, knowledge, temperance," etc. Here is a process of addition. Not by outward accretion, or accession of parts, but by development. The seven graces are evolved from the root principle of faith—a substantial entity. 1. John v. 4: "For whatsoever is begotten of God overcometh the world, and this is the victory that hath overcome the world, even our faith." Here is something procreated, generated, even "our faith." It is an entity because it is begotten. Who will dare to

step forward and say that God begets *nonentities*? It is a force because it "overcometh" some other force. Does not such inspired language justify us in the assertion that faith is the mightiest force in the world, since it *hath* overcome (new ver.) the world? Is there any room left for the meager diet of abstractions so generally served at the crowded table of unphilosophic dogmatics? Out upon this wretched heresy in theology! It corresponds with the untenable theory of molecular motion in physics! No wonder that the faith which is so unscientifically ignorant of its original moorings and entitative existence is often found creeping into its own circular syllogisms without any comforting contents! This is at least one way in which men crawl into the convolutions of their own false logic to indulge in delusive dreams of heaven.

From what has been shown in some of the foregoing paragraphs, it follows in the way of most logical deduction that faith as a force-entity in the Christian operates in a two-fold activity. It clings to the pure powers that begat it from above, and conflicts with the perverse powers that oppose it from beneath. The scriptural terms "overcometh" and "victory" imply opposition. These terms would have no meaning in the absence of such "principalities and powers." The "victory" of faith-force implies defeat of *counter-force*. What is this counter-force? Is it something constitutional and normal in the human race, or is it a foreign, adventitious element which the Scriptures denominate *sin*? We affirm the latter. A failure to recognize this truth seems to us the weak point in Prof. Drummond's great book on "Natural Law in the Spiritual World." At least he has failed to emphasize the fundamental fact of the world's substantial forces, normal and abnormal; and for this reason the treatise, which is otherwise a valuable contribution to science, is not worthy to be compared

with the "Problem of Human Life." If the great philosopher of Edinburgh has apprehended sin as a force, he has at least failed to apprehend force as a substance. To deny the existence of sin as of such character in the organism of humanity, is to resolve the whole process of human redemption into a sham-battle. Perhaps his eyes were blinded by Supralapsarian theology, held as a mere system of metaphysical abstractions.

Q. 44. How does regeneration stand related to the forgiveness of sins?

A. Forgiveness follows as a result of the introduction into man's nature of that which brings absolution through regeneration, and it will be a day of mutual confirmation for Revelation and Science when they can express the same truth in the same language: "He that hath the Son hath life, and there is, *therefore, no condemnation* to them that are in Christ Jesus." *Life, truth, righteousness* and *holiness* are inseparable in the constitution of Christ's person; so regeneration, conversion, justification and sanctification are the correlative terms expressive of his complementary work in, with, and for the individual. Christ's truth, righteousness and holiness ground themselves in his life; so does conversion, justification and sanctification follow in consequence of regeneration. It may also be added that Christ's life regenerates, his truth converts, his righteousness justifies (procures pardon), and his holiness sanctifies. Let theology be studied upon this line of investigation and a doctrinal day, brighter than the sun of Austerlitz, will soon begin to dawn upon the church. The old theology concerning the forensic theories of pardon, as well as much modern mechanical bosh, proceeds upon the supposition that the central element of the atonement was law rather than *life*—that God needed reconciliation more than man needed restoration, and that God was more concerned about the vindication of his wounded honor

than he was about the healing of the wound that sin had made in the more vital parts of human being. The church must soon change the emphasis from some of her theological tenets or make preparation for a ridiculous jubilee over the implied fact that Jehovah succeeded in extricating himself from the danger of inconsistency. Let the trumpet be sounded and a change be ordered all along the line. Let the question "How can God be just?" be relegated back to the court of heaven, and proper prominence be given to the more soteriological question: "How can man be made every whit whole?" Thus will be brought into proper view the foundation upon which the welcome doctrine of Divine forgiveness may stand in its legitimate place. But still it may be said to the church's honor that her faith has always been better than her philosophy—her creed better than her ruling theology. The articles of the Apostle's Creed are arranged in accordance with the natural order of things: The church, life-union in the church, and the forgiveness of sins in virtue of what is communicated with such life. Thus the Substantial Philosophy when properly applied to Christianity is beautifully in harmony with the creed of Christendom, though gloriously at variance with much of its philosophy and many of its theories.

Q. 45. In regeneration, what is born again?

A. The life-force from above, when all the conditions of its introduction and instatement in the human individual are at hand, begins its work in the vital center of his being. The *person* is born again, and yet in such sense that the individual or person continues identically the same. Personality has its high rank of being in the union of *reason* and *will*. These are therefore seized upon in the very incipency of the new birth by the life-force which produces it. From this personal

center* of man's individual being the force works out by process through the entire periphery of his nature, until he is "raised up at the last day."

Q. 46. Is regeneration then an instantaneous act?

A. Science must hold that regeneration is an instantaneous beginning of the workings of the higher form of life-force in the human soul, although there be a historic preparation going before and a gradual process following after.

Q. 47. Then what is sanctification?

A. Scientifically considered, sanctification is the process of getting well. A process running through the entire period of medication and spiritual convalescence.

Q. 48. When will this process end?

A. In its proper and most comprehensive sense it will end when sin has been fully antidoted, and when death is consequently swallowed up in full and final victory.

Q. 49. When will that take place?

A. This question will be answered in the next chapter, on the resurrection of the dead.

* The *person* is not only the center of man whose radii and periphery are all the activities (entities) of body and soul, but also the center of Nature. . . . What Nature contains in fragments is united in the person of man. . . . Our personality is complete only when we are conscious of God and our relation to him, and when we suffer God to speak to it and through it.—³ Dr. Fred. A. Rouch, in his "Psychology," p. 178.

CHAPTER XIV.

THE RESURRECTION OF THE DEAD.

QUESTION 1. Does the question of the resurrection of the dead come in any sense within the proper province of science?

ANSWER. It does. As seen in Chapter XI., biological science treats of being in the domain of *life*. If now, by the exercise of some force, or some perverse force-element antagonistic to life, as seen in Chapter XII., living beings are overtaken with an alleged catastrophe, seemingly destructive of all there is of life and for life, science is in duty bound to continue its work to the full extent of its ability to institute and complete a thorough investigation of the case.

Q. 2. What, then, is the first duty of science in its investigations of the conflict in which death has seemingly triumphed over life?

A. To inquire carefully as to just what is necessarily involved in the idea which the term "death" is made to express.

Q. 3. What has already been shown in the "Problem of Human Life," and in this book—a formulation of truths based thereupon—as to the sense in which alone death is predicable of any form of being?

A. It has been shown, as never before, from the unique standpoint of the Substantial Philosophy, that there is no death, except in the sense of change from

one form or condition of existence to some other form or state of being.*

Q. 4. What has the Substantial Philosophy, as formulated in the foregoing chapters of this book, re-established upon a new and more rational basis?

A. The indestructibility of all matter, and the conservability of all the substantial force-elements of the universe.

Q. 5. Can no kind of being ever be annihilated?

A. Nothing whatever, of a substantial and entitative character, whether material or immaterial, can ever go out of, or be forced out of existence—it can only be changed.

Q. 6. Are these changes constantly going on in Nature?

A. Indeed they are, in every domain thereof. Chemical changes are common and constant in the material world. In the vegetable and animal kingdoms, disorganization and reorganization complement each other. In the domain of physics the various forms of Nature's forces are undergoing an endless transformation, and yet never change as to the primordial substances of their being; and if the analogies of Nature are not the monstrous utterances of a false prophet, the same general

* With the physical forces of Nature demonstrated to be substantial entities, as already done in this series of articles, thereby equally demonstrating the substantive nature of the vital and mental powers and forces of all living and conscious beings, this philosophy at once spans the chasm between time and eternity, and embraces within its logical grasp the substantial *hereafter* as well as the invisible substantial *here* of humanity, and furnishes a reasonable proof of a conscious and personal immortality for the human race when this purely physical and temporary existence shall have passed away. The mind and life as substantial forces are necessarily indestructible, on the basis that no substantial thing can ever be annihilated though changed in form however often.—Dr. Hall, in *Scientific Arena*.

truth will apply to the higher problem of human life, justifying the conclusions that what we call the death-catastrophe in man is only a further change of his state, and that in such a changed condition he remains the same as to the essential substance of his being.

Q. 7. But granting for truth all that is claimed in the foregoing argument, what bearing has it upon the resurrection of the dead?

A. In so far that the dead, notwithstanding the alleged catastrophe, are neither annihilated nor changed into something radically different from what they were before the change, but that they are in a state of existence which leaves the question of the resurrection within the range of possibilities. Christendom is at present in possession of no theory of the resurrection in harmony with recent discoveries of science. Christians are satisfied that God, as his own interpreter, will, in his own time, make the mystery plain; and that the resurrection of the dead will eventually be comprehended by reason, even as it is now accepted by faith. But are we in the meantime to shut our eyes and suck our thumbs like babies who lull themselves to sleep on imaginary milk? True, we should not be wise above what is written in the infallible Word of God. Neither should we be content to remain ignorant below what is written in the volume of Nature, which, when not perverted by the element of sin, is equally infallible in its own proper sphere of instruction. And, further, we assert that there is no presumption in an ardent desire and legitimate effort to be wise above those conclusions drawn from the unscientific and contradictory apprehensions of that twofold revelation of harmonious truth which is everywhere given under the autograph seal of the great Jehovah himself, and which should never be considered as correctly understood until each part is seen to corroborate the other, and both are glorified together.

Q. 8. But does not the foregoing prove too much, viz.: that the dead animals are also in a state of vital or mental conservation in which it is possible for them to survive the shock of death and hear the beckoning blasts of the resurrection trumpet?*

* But since the mind and life as substantial forces are necessarily indestructible, on the basis that no substantial thing can ever be annihilated though changed in form however often, the difficulty arises, does not this great principle of Substantialism prove too much by including the conscious immortality of all lower animals, since their vital and mental powers and forces are as really substantial entities as are those of human beings? We admit the plausible force of this difficulty, and it was among the earliest that attracted our attention when trying to solve the "Problem of Human Life" here and hereafter.—See the "Problem of Human Life," pp. 468-471. And although the problem cannot be settled as we would solve a problem in mathematics or mechanics, it admits, as we believe and will endeavor to show, of a sufficient weight of evidence to form a well-grounded hope for the personal immortality of the one class; while the vital and mental powers of the other, or lower class, are only conserved as crude force returned to the primordial fountain whence all vitality and mentality originally came.

If electricity, magnetism, sound, heat, light, and gravity are really substantial or entitative forms of force, and not mere modes of motion of material particles, then these various forms of force, though immaterial, are necessarily as indestructible as is gross matter itself; and instead of ceasing to exist when their manifestations are no longer observed, they are either converted into some other form or forms of force, or, as the Substantial Philosophy so rationally teaches, they subside into the universal force-element or fountain of crude force from whence they originally came, and from which they are re-manifested as needed in the economy of Nature and through the various means and processes appointed to those ends in the wise counsels of the creative will.

So, also, as we have just hinted, must it be with all the lower orders of the animal kingdom. Their vital and mental powers, being also as truly and really substantial as their bodies, are equally indestructible; but as these powers or forces, judging by

A. A proper discrimination between the *personal* and *impersonal* beings in creation will show that the above objection is not well grounded. It is man's personality that raises him above the general law of subsidence or returnability to the primordial fountain of all force. Though the spirit of man in death returns to God who gave it, it goes there as its own personal and identical self. It can go in no other form or character, since it is

reason, have served the extent of the uses and purposes of their manifestation here, they, too, must subside, at the dissolution of such animals, into that compartment of the force-fountain of Nature suited to this department of the force-element from which the vital and mental powers of all living creatures must originally have come. This special compartment of the force-element of Nature, where vitality and mentality are conserved, so to speak, is especially correlated with the personal God of the universe as to his vital and mental powers, just as the physical force-element, before referred to, is correlated with God's physical laws and powers by which the corporeal operations of the universe are carried on through the variously manifested forms of force as they emanate from this physical fountain.

But according to the reasonable view which Substantialism takes, and which is supported by other rational considerations, the vital and mental powers of man, as the culminating and crowning work of the Almighty, and like unto the personality of God himself in every conceivable way, only on a finite plane, must have been designed and originally destined for a personal and conscious existence in a future life analogous to that which God himself must possess and enjoy as surely as he exists at all. The vital and mental faculties and endowments of man—this culminating achievement of infinite wisdom and power—with their innate self-consciousness and self-contemplation, and with their limitless capability for eternal advancement, would seem to prove an infinite absurdity in their very creation if they, too, were destined for the utter loss of personal consciousness and identity as soon as the body dies, and, like the no longer valuable or available powers of the beast, to be consigned to the unconscious and impersonal vital and mental force-fountain from whence they came.—Dr. Hall, in the *Scientific Arena*, Vol. I., p. 49.

indelibly impressed with the image of the Infinite Person.*

Q. 9. What then have we a right to expect from science touching the resurrection of the personal dead?

A. We have a right to expect science to show whether they are in a conserved condition in which they may be reached, and from which they may be raised, provided there be a resurrection power to reach and raise them.

Q. 10. Has science responded to this rational expectation on our part?

A. The Substantial Philosophy with its recently discovered facts, and its rational view of the substantiality

* The very strongest, however, of all scientific and philosophical arguments by which to prove the personal and conscious existence of man in another life is—first, the scientific and philosophical demonstration that God himself must and does exist as the personal, intelligent creator and organizer of this universe, as proved by the design, artistic beauty, and order everywhere manifested in Nature, from the whirling clockwork of the celestial spheres to the painted marvels of a humming-bird's crest, even down to the artistic and intelligent taste displayed in the exquisite lines and colors of the microscopic shells of ocean found in the rayless depths of her darkest caverns.

We speak of God's *personality*, since it is impossible to conceive of any intelligence of the highest order only as we make the mental comparison with our own conscious powers and rational personality. We can imagine such personal being to be higher than ourselves—even to be an infinitely intelligent and powerful being—but we can never conceive of such surpassing intelligence, power, and artistic skill to be less than ourselves, or less than a personality. The material body of man achieves nothing, even in the present gross state of being, only as the physical instrument through which the immaterial entity acts and which dwells temporarily within and manipulates such body. We are but lifeless, inert matter as soon as that immaterial entity has departed at death. Hence the immaterial entity within us is the real man which is to endure.

As sure, then, as a personal God exists independently of ma-

and consequent conservability of all forces, has demonstrated from all the known analogies and prophecies of Nature that the personal dead are not dead in a sense that would render a state of conscious existence impossible, or their resurrection therefrom improbable. Either this conclusion is true or the prophets of Nature are miserable liars, every one of them.

Q. 11. Well, what do the lower prophetic forces of Nature say?

A. They show the continuity of Law, from lower to higher, through all the graduated realms of being, and place the burden of disproving the truth of their prophecy

terial form and conditions, so surely may every thoughtful and rational human personality rest in confidence, with hope scientifically and philosophically grounded in the nature and fitness of things, that he, too, has a personality not dependent on this corporeal frame except for a temporary schooling through which the inner man is passing and preparing, like the butterfly during its chrysalis state, for the higher development when it shall be released from crude dross to mount on gilded wings.

This very fact of a rational personality within us says in unmistakable language to every man: If God lives and can think and plan and work without a material organization, then I can live also, and think and plan and work without a material body as an instrumentality. For why should an infinite personal God have made this immaterial, personal being within the present gross structure of flesh and bones with aspirations and capabilities for infinite duration and enjoyment, except to live substantially as God himself lives, unless he originally intended to mock his crowning work with conceptions of possibilities never to be realized, and with longing aspirations for enjoyment which were never to be gratified? We totally fail to conceive the possibility of an infinite personality working out such a scheme as this universe filled with countless millions of intelligent personalities like unto himself, except in degree, and with the certainty that these crowning triumphs of infinite skill, so suitable for his own intellectual associates throughout eternity, are doomed to annihilation after this brief and often miserable existence on earth.—Dr. Hall, *Arena*, Vol. I., p. 50.

upon those who, in the face of all analogy and law, affirm that death ends all that there is of man and for man.

Q. 12. Do these prophecies of Nature foreshadow the resurrection of the personal dead?

A. If that is not their prophecy, they have no obvious mission in the universe of God. Normal solids after being transformed into gases or fluids are *brought back* again to normal matter. Electric force is changed into thermal electricity and heat, and then *changed back* to lightning, which climbs the stairway of the atmosphere and rides in the chariots of the clouds. So in the marvelous metamorphoses of the insect. Who will say that even the *same portion* of the vital force in the insect does not pass from one form to another, and if so, why not *back again*, and up until the *arelia* becomes the gay and festive butterfly, whose heaven is sunshine and whose glory it is to weigh itself upon the flower.

Q. 13. But is not the resurrection of the dead exclusively a doctrine of Revelation and a matter of faith?

A. It is indeed a doctrine of Revelation and a matter for faith to embrace, but it is not exclusively from Revelation or for faith. Nature also contains a revelation, and science and reason have a work to do in grasping the mystery. It is the duty of Christian science to receive all revelations and utilize *all* the light that shines into the compass of her grasp. Until recently science was not prepared for anything that the higher Revelation had to say upon the subject.

Q. 14. What do the Scriptures of revealed truth say concerning the death catastrophe in the history of man?

A. The texts are plain and numerous: "All the days of my appointed time will I wait *till my change* come."—Job xiv. 14. "We shall all *be changed*."—1 Cor. xv. 51. "Who shall *change* our vile bodies?"—Phil. iii. 21. Other passages might be quoted recognizing the presence

of the element of sin in humanity, and giving the change a sombrous shade. In all of them, however, there is a showing of the original purpose of God that man should pass by transition from the present to another realm of human existence.

Q. 15. What is the state of man immediately after the dissolution or change?

A. The Scriptures call it Sheol or Hades, and science accepts the term as fairly expressive of the general condition of the personal dead.

Q. 16. Would Hades have been a state in the history of humanity if the possibility of sin had not been actualized, thus changing the constitutionally required transition of man into the consequent sad and sombrous form of death?

A. It would not. Death rode in upon the pale horse and Hades followed with him.—Rev. vi. 8.

Q. 17. What does Science know about Hades?

A. As yet, Science knows only in part. Even the Scriptures are a sealed book, except so far as its meaning has been unlocked by him who holds the keys of Death and Hades. Science alone with all the possibilities of its progress, can never open the apocalyptic book of seven seals, and bring to light the hidden contents of the intermediate state. This power is vested in him who liveth and was dead. The Lion of the tribe of Judah prevails to open the book; and true science joins the four-and-twenty Elders as they bow before the Lamb to sing the "new song": "Thou art worthy to take the book, and to open the seals thereof: *for thou wast slain.*"—Rev. v. 9. Christ's person is the key to the enigma of the universe, and his death the solution of all the problems within the veil. The entrance of sin into the world, and the entailment of its mortuary consequences upon

the world, made it necessary for Christ to pass, in a real historical way, under the dominion of death in order to unseal that great book of futurity whose most interesting contents are to be found immediately over the border of this present life.

Q. 18. Did Christ really enter Hades?

A. He did; and none deny it except such as are "fools and slow of heart to believe all that the prophets had spoken concerning him," and all that was of necessity included in his remedial person and work, from his conception by the Virgin to his return through the everlasting doors to glory. This view is taken from the truly Scriptural and scientific standpoint of *organic redemption*. It centers in, and flows forward with, the entire history of the Christ, on a line parallel with the forces at work in the history of abnormal humanity, until both powers meet in the realm of death, where death is swallowed up victoriously. Otherwise there would have been no "path of life" leading to "fullness of joy": neither could our God have "gone up with a shout." The Bible is full of this Christocentric theology. The logic of any opposite theory holds its premises and conclusions within the mechanical compass of dry abstractions. However plausible it may appear, its syllogisms are full of fallacy, and its pious platitudes full of emptiness. Divine consistency is not the key to the atonement. Neither does God save the world for the sake of the mere agony of his suffering Son. His death involves more than the tragedy of the Cross. Golgotha was the gate-way to the Satanic citadel beyond. The last scene in the dark drama was executed behind the sombrous curtain. Christ's heel was bruised on Calvary, but the serpent's head was not effectually crushed until the promised "seed" had passed "from Edom, with dyed garments from Bozrah," to invade the serpent's headquarters. Thus did he wrest "the keys of death and hell" from him who had the power of death

(Heb. ii. 14.). Thus, too, was the Gospel preached to them that are dead, making it possible for all the undoomed "spirits in prison" to "pass the crystal ports of light, and dwell in endless bliss."

This is not "another Gospel," but the faith delivered already to Old Testament saints. The twilight prophecy of *such* a coming Conqueror tinged the horizon of the patriarchal age. Abraham foresaw the day of Messianic triumph, and was glad. David embraced the primitive promise, and expressed his hope of deliverance from the power of death (Ps. xvi.). Peter was able, under the baptism of Pentacost, to draw more meaning from David's language than what was clear and distinct in the inspired faith of the Psalmist at the time of its poetic utterance. Neither did St. Peter embrace this great truth at once in all its plenary significance. He continued to advance beyond himself, or, rather, was carried forward by the objective power of the concrete truth, until his higher inspiration and his consequent deeper penetration enabled him to see David's Lord and Son invade the mystic realm of mortality and preach deliverance to the captives (1 Peter iii. 19).

Thus did the concrete and objective Gospel start with the development of the race, and move forward in the central channel of human history. The panorama of its successive and inseparable scenes passes continually before the restless audience of fallen humanity, communicating to each obedient individual the substance of a higher life and consequent faith, through which its saving benefits may be apprehended, its proportions surveyed, its beauties admired, and the personal Fountain of its excellencies adored. Such an exhibition leaves neither room nor relish for the unsavory hash of disjointed abstractions. Both science and faith require "that which every joint supplieth" in an organic way. It seeks a comprehensive view of all the sections in the past, present, and future of

one grand, progressive movement of Messianic life-force, until, before its raptured vision, "hell shall ope its dolorous portals to the peering day," and the ransomed "spirits in prison" march forth to swell the old triumphal shout of prophecy: "Lift up your heads, ye gates: and be ye lifted up, ye everlasting doors, and the King of Glory shall come in."

What a solemn, sacred enigma confronts us in the "three days" of transition from the cross to the Redeemer's resurrection! Christ was really dead—his soul was separated from his body. This state of separation was his intermediate state. The "corn of wheat" had fallen into the ground that "the law of the spirit of life in Christ Jesus" might germinate the promised "seed" into a glorified humanity, "free from the law of sin and death." This involved the conflict with principalities and powers. What a significant and far-reaching victory! A dead Christ had more commanding influence over the elements of his abode than had a living Jonah when he "cried out of the belly of hell." Jonah prayed; Jesus preached. His preaching was not so much a proclamation of a power beyond himself as a demonstration of the power he had in himself—"the Lord, strong and mighty in battle." The sermon in the sanctuary of Hades, on that last significant Sabbath in the calendar of Judaism, was nothing less than the power of his personal presence in the intermediate state. Its eloquence was "in the demonstration of the Spirit," and told powerfully in breaking the bands of captivity for the pious dead. Neither were its effects confined to the abode of spirits: "The graves were opened, and many of the *bodies* of the saints which slept arose, and came out of the graves after his resurrection" (Matt. xxvii. 3). This was a result of the descent into Hades. It reveals the law, and points to the fact of a general resurrection.

Q. 19. Then Hades is not a state of torment?

A. It is not necessarily such. Corresponding with the rise and progress of Substantialism there has been an advance in the way of sound theological and Christological thought. Hades has been too commonly identified with perdition, purgatory or the grave. The question of the peculiar *condition* or *state* of human beings consequent upon the separation of soul and body was too generally either confounded with that of the *place* or *locality* of the departed, or submerged into the very different question of *rewards* and *punishments*, according to the moral characters, respectively, of such departed. But a new interest has been awakened in this subject, and a new direction taken by the inquiries thus stimulated. Bright theologians throughout the world are alive to the important movement. New England theology no longer elevates the external organ of its sensitive olfactories at the mere mention of the word which formerly seemed to savor more of sulphur than divinity.

Indeed the way is now thronged with pious pilgrims and scientific adventurers, who wish to explore the valley which intermediates between death and the resurrection of the body. Believing that the soul is an organized entity, substantial in the essence of its being, and independent of this tabernacle, we join the eager throng, and look with pleasure upon the land of Beulah, where, amidst the flowers and fruits of Paradise, our sainted friends have pitched their hadean tents, and now wait in hope for that *greater* "glory which shall be revealed in us" all, when, "in the resurrection at the last day," "Christ shall *change* these vile bodies, and make them like unto His glorified body, according to the working whereby He is able to subdue all things unto Himself."

Q. 20. Was Christ's resurrection the mere effect or fruit of what went before in his personal conflict with antagonistic forces, whereby he in his person and passion neutralized the force of sin and death in humanity, or

was it also the evidence that he in his resurrection was the fruitful source of resurrection force for others?

A. Christ, as the generic man, and in his organic relation to the whole of the race, was, in the same generic and organic sense, the fountain and "forerunner" of all redeemed humanity.

· Q. 21. Did Christ in his resurrection return to the same order or condition of human life which he had passed out of when he committed his spirit into the hands of his Father?

A. He did not. The resurrection of Christ was no reinstatement into his former realm of existence. It was a transition to something beyond—an entrance into a higher realm of being, according to what was originally made possible in the constitution of human nature, and which, notwithstanding the actualization of sin, was continued possible, yet not without just such an antidote as that which was brought to its rescue and deliverance in the person and work of the Second Adam, who was also "the Lord from Heaven" and "quickeningspirit." Under this view of Christ's mission "into the lower parts of the earth," his resurrection appears as the *fruit* rather than the achievement of his victory. When Jesus cried with a loud voice it indicated "the greatness of his strength." In that strength he entered the realm, extracted the sting, and exhausted the power of death. Having thus "abolished death," he reached that turning-point in his eventful history when "death had *no more* dominion over him." Having captured captivity, he led it captive. Having spoiled principalities and powers, he made a show of them openly" (Col. 2, xv). Having been confined as a willing captive in the city of the dead, he arose in the midnight hour of human history, and, with more than Samsonian might, plucked up the pillars and carried away the gates of the hadæan metropolis. No wonder that "our God has gone up with a shout!"

No wonder that the apostles preached Jesus and the resurrection with such enthusiastic emphasis! "It is Christ that died; yea, rather, is *risen* again."

Q. 22. Was his resurrection the culminating point of all possible progress—the end of all transition in the history of the Redeemer?

A. The resurrection of Christ was indeed a cardinal period in his history, but it was not the final period to all that his full transition from the earthly to the heavenly state involved.

Q. 23. Did he leave his resurrection body behind him, and take on a new body during the forty days of his continued sojourn upon the earth or at the time of his ascension into heaven?*

A. He did not. His resurrection body doubtless underwent further change, according to the laws of the higher realm upon which he had entered, and to whose requirements and environments it was gradually adjusting itself according to all that is known of the law of growth and development; but it was the same body still, even as the risen Christ remained the same identical blessed Jesus who had come forth from the state of the dead, and who with triumph passed within the veil to appear in the presence of God for us.

Q. 24. But what has all this to do with the resurrection of human individuals?

A. Very much indeed. If humanity were made up, in a mechanical way, of a mere aggregation of separate and distinct beings, it would be otherwise. But humanity in the concrete is an organism, and as seen in Chap.

* We are exceedingly sorry not to find that vigorous thinker, Christian scholar, earnest preacher and pious man—Bishop Randolph Foster, with us, in this, the very heart of all New Testament theology. In his excellent book, "Beyond the Grave," p. 161, he takes the opposite view.

XII., that which affects the head affects the whole, and that which affects the whole affects all the parts.

Q. 25. Will all human individuals be raised from the dead in virtue of the resurrection of Christ?

A. They will; because Christ's risen humanity stands organically related to all the members of the human race.

Q. 26. Does it not then follow that all will have part in the healing benefits of his life and the glorious fruits of his resurrection?

A. It does not so follow, because while some have been made to partake of his life as an antidote for sin, others who will have rejected the antidote, or who did not have the disposition to receive it, will still be found poisoned and diseased with that moral malady; and, therefore, while between themselves and Christ there is a humanity in common, there will be some elements which they will be found not to possess in common with the great personal magnet of the resurrection morn—elements *essential* to a resurrection unto moral health, consequent happiness and eternal glory. Christ as the risen, ascended and glorified head of humanity will, by some action of resurrection-force going out from his person, and for some purpose, draw *all* men unto himself. His relation to those who shall have partaken of his life as an antidote for sin and death, and in whom it shall have operated as a healing force, will be one of positive attraction. To such as will not have been benefited by this counteractant life-force of Immanuel, and who are found in Hades as continued and consequently continuous sinners, will be resurrected to a continued state of self-condemnation under the continued force of death. As seen in Chapter V., the higher affinities found between life-forces and the attraction consequent thereupon involve the possibility of repulsion. This possibility of repulsion will reach its ultimate

actualization in the peculiar character of the resurrection and rejection of the wicked. The Son of Man, by virtue of the common affinity between himself and all members of the race, will gather "all nations" before his Judgment Seat, and by the force of repulsion will cause the wicked to "depart from" him.

Q. 27. Will there, then, be no hope for those who are thus repelled by and from the Fountain of all life, humanity, holiness and happiness?

A. Neither Science nor Revelation gives any ground for a reasonable hope; and if some unknown remedy should yet be provided and offered, it would not, therefore, necessarily follow that such individuals would embrace its remedial benefits after having incorrigibly neglected the first great offer of salvation.

Q. 28. Will there, then, be two resurrections of the dead?

A. Revelation so teaches, even as Science foreshadows the same in the different movements produced upon different substances in different minerals by magnetic attraction and repulsion.

Q. 29. Who shall have part in the first resurrection?

A. Blessed and *holy* is he that hath part in the first resurrection. Such as those in whom sin has been antidoted in this present state of human life and who are consequently found in Hades in a morally convalescent state.

Q. 30. And they will be raised to a higher state of blessedness by virtue of their normal relation to him who is the first begotten from the dead?

A. Just so. The Apostle Paul had no other theory of the first resurrection, except that which held the risen Christ to be the magnet of redeemed humanity. How otherwise could his inspired vision have seen the dead

in Christ rise first to meet their descending Lord in the air? What but the substantial life-force of the resurrected Head could penetrate the pale portals of Hades and preach final deliverance to the captive members of his mystical body, the Church?

Q. 31. Does the resurrection of the dead include the resurrection of the *body*?

A. There will indeed be a resurrection of the body, but not of all the material elements which at some time in life or at the time of final dissolution may have been incorporated and held together by the ebbing life-force of the individual. The first step toward a scientific solution of this question is to secure a clear and distinct perception as to what constitutes the *body*. It was the old orthodox idea that the resurrection body is the outward frame composed of various material substances, and that it would be raised from the grave by some sort of synthetic process in miraculous chemistry. This section of the old theology, like our outward tenements of clay, is now fast passing away beyond the power of resurrection. It was born under the reign of a materialistic planet, and has managed to live through the past materialistic ages, but can no longer command the respect of thinking men, since the light of a more *substantial* luminary has made its appearance in the scientific heavens. It has been weighed in God's great balance and found wanting. If theologians had not been blind to the existence of an unseen universe, the idea would never have been born. Besides, it based itself upon the abstract power of Omnipotence. We do not deny the unlimited power of God, and yet we pity any "body of divinity" that has no organic conception of a concrete truth. We admit that Omnipotence might make a successful search after all the mummies in Egypt and gather up all the original ingredients of men whose material bodies have been analyzed in the chemistry of fire, but if this is what the creed of

Christendom implies as essential to the resurrection of the body, our faith needs a tonic of the most powerful sort. For our part, we expect neither carnal notoriety, church discipline, nor glorious martyrdom, for announcing right here that we do not believe in a resurrection of flesh and blood; and we charge nothing whatever for the very valuable information hereby furnished to all materialistic philosophers and theologians, that the field of eschatological science can never fertilize itself with bone-dust.

It is evident, therefore, that by this time and in this age of proper progress, both rational faith and Christian science demand a more satisfactory conception as to what constitutes the essential body of a human individual. It is, then, in order to inquire: "With what body do they come?" The answer is: "Thou sowest not that body that shall be;" and yet, "God giveth to each seed a body of its own." What is this "seed?" It is not merely the soul, for the soul, as but one side of the man's being, does not build for itself a body, neither does it develop itself into a bodily form, any more than it can be the product of molecular motion or nervous efflorescence, as materialism teaches. The body, like the soul, grounds itself in personality. The germinal substance of man's entire being is a life-principle originating in God, and, carrying with it the impress of its Great Original, involves the power—the *necessity*—of endless continuance.

The key to this interesting question, so far as philosophy can contribute anything toward its solution, is found in that tenet of Substantialism which teaches that there is a pre-existent, immaterial and substantial form or type for each and every individual in the organic world. In a modified sense, each human individual may use the language of the second Adam: "A body hast thou prepared me." The heathen need not rage at these declarations, for the Psalmist taught such philosophy

three thousand years ago. "Thine eyes did see my substance, yet being unperfect; and in thy book all my members were written, which in continuance were fashioned, when as yet there was none of them." Yes, "fashioned;" first in the all-comprehensive purpose of God, afterward by the plastic power ordained by God in man. This plastic power is not a material germ or starting-point in the process of individual evolution, neither is it a mere mental germ breathed into embryonic nostrils at some instant previous to or during the period of gestation, but a life principle involving both mental and material possibilities, and a pattern holding its existence as an organized entity, and, as such, under God, the author of its being, whose will is the law of its well-being, proceeds to complete itself in the way of a twofold development: viz., the inward, looking to the supersensible side of human nature, or soul, and the outward, as the putting on of this tabernacle.

"A dualism," says Dr. Rauch, "that admits of two principles for *one* being, offers many difficulties, and the greatest is to unite those principles in a third." A river may originate in two fountains, but individual life cannot. And because life cannot be scraped together it cannot be separated into parts.

We repeat, therefore, that whatever there is of a blessed or first resurrection for humanity hinges not on some colossal stride of God's abstract omnipotence, but roots itself organically in the last Adam. It is in Christ, not merely as a fruit of his own personal victory over death, and his consequent ascension into the higher sphere of glorified humanity, but also and rather as a fountain of substantial sinless life for each individual in organic union with him who is the "quickening spirit." Thus "*in* Christ shall all be made alive," because "the quickening spirit" begets a substantial spiritual body in the very womb of the psychical or inward type

which we, in this answer, have tried to define. "*There is a spiritual body.*" It is not merely the immaterial body, which, according to Substantialism, is the inward pattern of the outward and material, but the inward body quickened and made spiritual in virtue of a personal life-union with the Second Adam, which the science of theology calls regeneration. In this new relation or translation to Christ, the life-principle or body of the individual does not lose its identity, but begins to unfold *normally*, according to a different law of development, even "the law of the spirit of life in Christ Jesus, which makes it free from the law of sin and death." At the very moment of such regeneration "this mortal" begins to "put on immortality," and, therefore, when the earthly house of this tabernacle is dissolved the new Adamite is clothed upon with his habitation which is from heaven.

The only question remaining to be touched upon in this answer is *when* shall the last psychological change take place in the history of each Second-Adamite. Down to this time, the weight of theological sentiment, as formulated in the confessions and taught in divinity schools, has favored its postponement to some unknown future period, when the dethronement of death and the aggregate rising of the dead is to constitute the grand and final act in time's great theater. There is now, however, a gradual breaking away from all such interpretation of Scripture. Many believe that the doctrine never had any fellowship with the truth. As soon as an individual becomes a member of the Second Adam there is a beginning of the process by which "this mortal shall put on immortality." The more loyal and obedient hearts in the Redeemer's family are beginning to rebel at the senseless thought that any part of man's real being must go down into the grave and sleep away unnumbered years in the cheerless chambers of sepulchral solitude.

Q. 32. Then it is the *person* who is raised from the dead?

A. The person is raised from the state of the dead; and all that belongs *essentially* to the constitution of the personal individual will be subject to the life-force or resurrection power of Him who is *the* Resurrection. Just as Christ, as the organic head-center of the whole human race, draws the individuals of the race from the state of the dead, so does personality, or the personal head-center of the human individual, draw after it and unto itself all that ever belonged essentially to it, and all that is necessary to complete or recomplete itself in the resurrection from the state of the dead.

Q. 33. Is it, then, to be understood that the Substantial Philosophy, as applied to the Christian doctrine of the resurrection of the dead, does not admit the correctness of the theory that there will be a resurrection of the identical material particles formerly placed in the grave?

A. The Substantial Philosophy cannot admit the correctness of anything so much in conflict with the legitimate deductions of true science, and the obvious teachings of Revelation.*

Q. 34. But it has been claimed, in view of the fact

*Bishop Foster, of the M. E. Church, in his course of lectures delivered before the Chautauqua Assembly in 1878, and afterward published in his "Beyond the Grave," p. 162, says: "The word resurrection is strained when it is insisted that it is equivalent to the statement that the exact body is to be restored. It may even be doubted whether it is an assertion concerning any part of the body. Its utmost meaning is, that *the MAN who is cut down by death shall live and flourish again*" (italics and capitals ours). Also on p. 161: "There is no particle of it [the body] that it [the soul] particularly cares for. If it should lose atom by atom, as in fact it does daily, it would not go into mourning. Its mold in the grave will have no special charm for the soul. Let us cease to be the sport of dreams and slaves of prejudice.

that Christ arose from the grave in the same body that Joseph of Aramathea wrapped in linen and laid in the tomb, that it therefore follows, since Christ's resurrection is the pattern of ours, that the literal and material bodies of dead men will also arise as to every identical particle of dust to which the material of their bodies returned through the full and final process of dissolution in the grave. Is such reasoning correct, and can such a conclusion find justification in the real premises of the case?

A. Christ's resurrection is not a pattern of ours in any such sense, as though the great teacher had written a copy for his pupils to imitate. It is the pattern in the sense that he is the type, source or root-principle of all that follows organically in the way of effect or conformity to type. To make Christ a mere outward pattern, in a mechanical sense, of any fact, or act, or achievement in the history of the individual Christian, or in the history of his kingdom from grace to glory, betrays the wretchedness of abstract thinking, and the leanness of our most popular theological literature. Away with such mince-pie divinity! Christ indulged in no rhetorical flourish when he said: "*I am* the resurrection." His is therefore the pattern of the saint's resurrection, not in the sense of something to be copied after, but as the principle of resurrection fruit. Paul so understood the subject treated in Cor. xv. Otherwise, the whole chapter would be a miserable mess of jargon. The core of his masterly argument is in substance: "If you do not admit the flowing of the stream, you deny the existence of the fountain; but the fountain is a fact—Christ *is* the resurrection, and he is risen from the dead, and, therefore, the stream must flow as a necessary and legitimate result, viz: All who are substantially and organically in him are already risen with him, and the process must complete itself in the resurrection of their bodies."

But it does not follow that the material of their bodies will arise as Christ arose in his material body. That sort of reasoning would lead us to conclude that St. Peter's resurrection will show the nail-prints which the Apostle received in his crucifixion, and a continuance thereof would lead us into absurdity, world without end. Paul said that he was crucified with Christ, and by the cross of Christ. Are we therefore to conclude that his material body hung upon the material cross on which the Redeemer died? Even Catholicism in the doctrine of the mass, does not teach anything more objectionable than some of the materialistic inferences of such Protestant theology. It is in this way that violence is done to the Bible, science and common sense. And it will never be otherwise, indeed, until a general and hearty recognition of the invisible and organic entities of being becomes the guiding star of both faith and reason. It must ultimately come to this. Science must endure as seeing the invisible, or perish utterly from the earth.

We believe in a full salvation, and in a full resurrection; but our faith has neither room nor relish for the many monstrous deductions of materialistic philosophy now pestering the Church as severely as the frogs did the inhabitants of Egypt. If this is rationalism, we are proud to plead guilty of the charge. The practice that once filled the Church on earth with relics is bad enough; the theology that tries to carry them into the Church triumphant is worse. It may appeal to the resurrection of the Second Adam, but will find no justification in that principle and formative period of a process in which all saints have a consequential part. Christ was without sin, and as there is no merit in physical decay there was no reason why God's holy One should see corruption. As pure water leaves no sediment, so the immaculate Redeemer left no "remains" in his death. The saint leaves a sediment behind, because every principle and particle

of his essential personal being is filtered through the Rock of Ages. Publish it and keep it before the people, that in the light of the more Substantial Philosophy of the dawning future it will be seen and acknowledged that the sedimental deposits of the grave are no more necessary to constitute the saint's complete identical being in the glorified state of the just made perfect than the settlements of impure water are essential to the water as such after God has taken it up and clothed it upon in the clouds of Heaven, to reflect the beauty of the sunbeams, and give back the rays of his supernal glory.

Q. 35. Then it is the resurrection of the *dead* rather than merely that of the body which is promised in Revelation, and with which science has to deal, so far as it has a commission for such work?

A. The above question involves its own correct answer. Any proper and thorough exegetical examination of the great majority of the Scripture passages bearing upon the subject of the resurrection will show that they support and justify no other view. Even in that great inspired treatise, 1 Cor. xv., where the great apostolic substantialist discusses this feature of the subject, he introduces the deeper and more general topic by his interrogatory proposition: "How say some among you that there is *no resurrection of the dead?*" And as he proceeds to discuss its bearings and effects upon the resurrection of the body—a mere branch of the general subject—he gives the entire materialistic theory away by the inspired declaration: "Thou *sowest not that body that shall be.*"

Q. 36. But does not the Creed of Christendom express faith "*in the resurrection of the body,*" rather than in the resurrection of the dead?

A. Christendom is not at variance with the truth in the confession of its faith in the XI. Article of the Creed. It must be remembered that the old Gnostic heresy and tendency to *spiritualize* everything pertaining

to Christ's person and his work in the Christian was still in the Church in those periods of her history when the Creed was passing through the gradual process of formulation, and that in order to hold fast to the great truth of the resurrection of the dead, with all that it involves and implies, including what the Gnostic heresy denied, viz., the resurrection of the body, the Church wisely *emphasized* that side of the truth; and so it continues in truth and by toleration even unto this day. The time will probably come, however, when Christendom, assailed as she now is by the opposite tendency toward materialism, will be obliged to place the emphasis back to where the Scriptures and true science will justify its location and continuation through all the future periods of her militant history; and in the light of the Substantial Philosophy all the subordinate confessions of faith will echo back the consistent sentiment of one unanimous Amen.*

*The "Heidelberg Confession" was never intended as a strait-jacket for any man's reserved rights and opinions. We know of nothing in its teachings in conflict with our expressed view of the first resurrection as seen in the light of the Substantial Philosophy. If, however, it should become manifest in the future that that venerable and amiable little book, or for that matter any other confession in Christendom, is evidently at variance with the obvious teachings of true science, the symbol must be made to undergo any such change and modification as may be necessary to bring it into harmony with the truth. We consider the foregoing assertion as neither very original nor radical, but a proposition which must be regarded as fundamentally correct as long as progress is the watch-word of science, and perfection the pole-star of human history. And we remark further that science is not under bonds to appear before the bar of the Bible, when the latter is considered as a mere volume of valuable archives to be ransacked at random by the vandalism of materialistic induction. Both the teachings of science and the Bible as now constituted, and as it now incorporates not only divine, but also human elements—which, it is reasonably presumed, may, notwithstanding its recent revision, possess at least some slight possibility of further defects—must finally

Q. 37. Then Substantialism as applied to Christianity is not at variance with the Gospel of Christ and the blessed hopes which its promises kindle in the hearts of Christian men?

A. God forbid; yea, Substantialism establishes the hope of immortality; it tends to show how the law of the spirit of *life* in Christ Jesus makes human individuals free from the law of sin and death; it justifies the reasonable expectations of the human soul; it encourages the noblest yearnings of the home-sick heart; it catches every promise of Revelation, and then from a truly scientific standpoint it shows that the dignity and destiny of God's children require that they should rise from the intermediate state of the dead and shout their triumph through the skies.

appear for judgment at the bar of *God's Word*, which is "forever settled in the heavens." This substantial Word of God is the *Truth*, whose goings forth are from of old, from everlasting, and from whose decisions in all matters of conflicting theories there can be no appeal.

CHAPTER XV.

OUR FUTURE STATE AND PLACE.

QUESTION 1. What has been shown in the former chapters of this book?

ANSWER. By way of beneficial recapitulation it may be stated in brief that, according to the teachings of the Substantial Philosophy, and in a light never previously shed upon the organic chain of subjects treated herein, that the Personal and Infinite God is the fountain and source of all normal things; that God is a substantial being, and that, therefore, the universe as derived from him is constituted of substantial entities; that these entities naturally classify themselves into material and immaterial substances; that as matter was not made from nothing it can never go to nothing; that all immaterial substances, whether vital or non-vital, are also force-elements in nature and no more destructible than matter; that these force-elements or immaterial substances are either such as belong to the inorganic order of being, as in chemistry or physics, or to the organic domain thereof; that the highest finite form of immaterial substance holds its being in the mental and moral constitution of man; that man is the center of creation, and in man's personality creation comes to have meaning, and awakens to a consciousness of itself; that such personality involves also of internal necessity a consciousness of God, the primordial source and perpetual center of all personalities; that this God-consciousness in man is the Divine

image apprehending the original; that this image is not a mere shadow, but a vital drop of God's undiminishable substance in the being that bears his image; that in virtue of this peculiar indwelling of God in man the latter possessed the power of progress and transition to a higher realm than the present order of human life; that this possibility of rational and moral advancement involved also of necessity the possibility of failure in the way of actual sin and death; that such possibility to sin became actualized in the very beginning of human history; that in such actualization humanity passed into an abnormal state with a consequent tendency toward the state of the dead; that for the purpose of counteracting this abnormal tendency the second head of humanity—Immanuel—God with us—became also Sacrifice and Redeemer by plunging voluntarily into the surging and seething death-stream, and swam along down with the swelling current until by the counteracting force of his own high and holy life he checked the raging, roaring tide at the very threshold of eternal damnation; that such neutralization was fully and finally accomplished in the intermediate state or hades; that as soon as the tide was thus checked death had no more dominion over him, and that all power was his in heaven and earth; that in virtue of such victory over death he arose from the dead; that in such victory manifested in his resurrection, the demonstration of the Spirit and power was given to his sermon in hades, whereby he had preached deliverance to the captive dead; that even some of the graves were opened in testimony of the glorious achievement; that some of the bodies of the saints walked into Jerusalem to swell the triumphal march of David's risen Lord and Son; that Christ draws with him to a higher plane of life all individuals between whom and Himself there is a healthy affinity in the substantial elements of holy and normal life; in short, it has been shown and seen that

the Substantial Philosophy after solving satisfactorily all the fundamental problems of finite being and human life could also pass with the rod and staff of Science and Revelation through the valley of the shadow of death, proving, as no other system of philosophy ever could, that, notwithstanding the throes and threats of corporeal dissolution, death does not end all that there is of man and for man.

Q. 2. What now still lies before us in the full problem and comprehensive volume of human life?

A. Our future *state* and *place* after the resurrection from the dead.

Q. 3. In considering our future state, what is it that first of all enforces its claims upon our attention?

A. *Immortality*, which “oversweeps all pains, all tears, all time, all fears—and peals like the eternal thunders of the deep into my ears this truth: Thou livest forever.”

Q. 4. Then man is immortal?

A. Either man is immortal or the whole creation has no higher mission than to mock God’s noblest creature and man’s noblest yearnings.*

* Now, if man’s spiritual being or inner man, at death, simply steps out of this physical structure, retaining, as we hold, its personal and spiritual identity and character, it is but a continuation of the same conscious and spiritual life that we possess here, raised to greater perfection or lowered to greater degradation according to real, intrinsic character in this life, since the real man is then brought nakedly to face the real environment of his selfhood without the obscurations of physical surroundings. To say that man is not naturally immortal by virtue of his creation in God’s image, and by virtue of his having received a spark from God’s self-existent being which constitutes his conscious, spiritual entity, is to say that Adam was not immortal before the fall and that he would not have continued to be immortal had he never sinned. To be a Christian, redeemed here by Christ, is to be restored to the same immortality that Adam

Q. 5. What does immortality involve?

A. First of all, it implies everlasting duration; but it involves more than duration—more than everlastingness. If matter is indestructible it is everlasting, but it is not for that reason immortal. Rolling suns may continue in their eternal circlings, but still they are nothing more than mammoth meteors in the sky.

possessed before falling under the condemnation of sin, so far as our spiritual entity is concerned. If that redeemed life continues after the body dies, we do not see why it is not a continuance of man's primeval immortality. That immortality is promised as a gift of God to the righteous is an intimation that the condition of the unrighteous after death by virtue of their real character and degradation, will be so nearly a state of perpetual death as to be virtually the opposite of the higher immortality, though in a modified and limited sense they two will be immortal, since because possessing absolute deathlessness and spiritual consciousness they will never absolutely die. Perfect immortality in its sublimer sense, as the *gift of God*, will only be theirs who are in character Godlike, and in this higher sense life and immortality were first brought to light or revealed to man by the gospel.

Our argument, therefore, for the immortality of man, meaning thereby his perpetual and indestructible existence as a spiritual and conscious entity, is based on the incontrovertible fact that his personal and spiritual entity came originally as a drop from out God's spiritual and vital being. Man as a personal and spiritual entity was not made out of nothing any more than his body was made out of nothing. His spirit, soul, mind, and life as a whole was a drop of God's intelligent, self-conscious being, and as such shaped into God's image, became the human ego around which forms are reproduced from generation to generation as corresponding physical organisms. The fact that this inner man is *substantial*, demonstrates its *indestructibility*, and the fact that this indestructible entity was originally a part of God, consisting of His vital, mental, and spiritual consciousness, demonstrates man's immortality by science and the nature of things, whether this inner entity be incased in a corporeal body, as at present, or not.—Dr. Hall in *Microcosm*, Vol. II., p. 56.

Q. 6. What more does the true idea of immortality involve?

A. It involves everlasting *life*, and yet even everlasting life is not necessarily immortality. The tree of life in the midst of the Paradise of God, if it be a literal tree, is not immortal in the high sense in which immortality may belong to man. If the four beasts before the throne should continue there forever as literal beasts they would not be immortal.

Q. 7. What still more is comprised in the expressive word?

A. It includes the element of consciousness, or the ability to be conscious of self-existence, and even this definition is not entirely exhaustive of the full and deep meaning of the term. The wicked are conscious of their own miserable existence, and yet it would be a travesty of truth to speak of immortality where conscious wretchedness does nothing more than darken the dungeon walls of deep damnation. Duration, life and consciousness combined can only reach the proper realm of immortality by virtue of that *higher* life which came forth into humanity in the Incarnation, and which triumphed over death in him who brought immortality to light in the Gospel of his resurrection, and who alone hath immortality to give unto such as "seek for immortality," and such as are made recipients of it in regeneration, when that which is otherwise begins to *put on immortality*.

Q. 8. Was the human race immortal as it stood primævally in Adam?

A. It was potentially immortal, and possessed the possibility of becoming such in actuality.

Q. 9. Does immortality belong exclusively to the soul, or may it also be predicated of the bodies of the saints?

A. Scientifically speaking it belongs exclusively to neither in the fullest sense of the term. Immortality

proper can be predicated only of personality in the highest form of life.

Q. 10. Will men have material bodies where saints immortal reign?

A. There is no reason whatever to suppose that they will be so radically changed in the essential and dual constitution of their nature that in the future state they will appear to themselves as having been torn to pieces and fashioned after another pattern. The tendency of all known finite life is to exteriorize itself in material. There is no evidence that God ever blew the breath of life into a vacuum. Indeed, material has no higher mission in the economy of Nature than to furnish the opportunity for life to manifest itself. Here, the body without life is a corpse, and life, however substantial an entity, without the body, is without its complement; and there is no authority either in science or Revelation to justify the supposition that in the future normal state of man's being God will put asunder what he in the present state had joined together. The fact that the immaterial side of man's being may exist independent of the material side, or corporeal body, is no evidence that such is either his normal state or that he will continue thus forever unclothed. The separation of the material from the immaterial substances which here constitute the man in the entirety of his being is an abnormal state of human existence—it is the state of the dead, and a continuation of this state through eternity would be poor evidence that death had been entirely swallowed up in victory. Indeed, the mere intimation of such a possibility is not very complimentary to him who has proclaimed himself the God of battles, and the complete vanquisher of death in those who have received the benefits of the remedy found fontally in the Victor's person. Substantialism is as much opposed to vapory spiritualisticism as it is to bold materialism. Neither

does it teach, as did some of the old pagan philosophers, that matter is evil, *per se*, and that continually, and a consequent enemy of the Spirit. It has rather emphasized the fact so generally ignored in current theories that matter is helpless and unable to perform that which under God can be accomplished only by the immaterial and substantial force-elements operative in being. If this inward life-force of ours—whether we call it soul, spiritual body or inner man—seeks to clothe itself upon in this present section of human existence, there is no authority, whatever, either in Nature or Revelation, to justify the baseless supposition that it will be obliged to go naked through all eternity. The analogies from Nature all around, and the promises of God from above, encourage the reasonable demand of the spirit within, as if in abhorrence of everlasting nakedness—“Not for that we would be unclothed, but *clothed upon*, that mortality might be swallowed up of life!”

Q. 11. If, then, we are to continue to exist in the future state as beings reorganized after the present type of our dual organisms, and if—as it logically follows—our bodies in the future shall be as immortal as our spirits, does it not also follow that our present bodies are just as immortal as the spirits which now inhabit them, since they, as well as their spiritual tenants, are to continue identically the same?

A. The foregoing question contains much pertinency. According to the Substantial Philosophy, as shown in Chapter XI., there is an inward, immaterial side, counterpart or type of the outward body which incorporates material. The two are in exact correspondence with each other, according to the general biological law of conformity to type.* This separation in death, if, in-

* Here then we meet the question squarely and risk the consequences. If the soul is an organized entity it must have

deed, there be any real separation at all, is neither natural nor an essential part in the proper history of human life, but the result of the workings of an abnormal force. In any such separation, the inward type can suffer no corruption, but continues intact, and inseparably united with the equally immaterial spirit. It follows, therefore—since this abnormal force will have been neutralized according to the workings of the spirit of life in Christ—that in the resurrection the inward immaterial type, as well as the spirit, will take again its outward material form. Thus it will be demonstrated that what God had originally designed should be joined together in everlasting wedlock cannot be put and kept eternally asunder. Substantialism, therefore, emphasizes the immortality of

organs, and this organized entity with its organs must be in the form of the physical body it inhabits, because an *organism* however intangible, must necessarily have some form, and there seems to be no earthly or heavenly reason why our *inner man* should assume any other form than that of the *outer man*. In the next place, this inner man when it leaves the outer man at death must reasonably be expected to retain its general form as it passes into the spirit-realm, and still continue an organized entity with the same organs it possessed here, namely, eyes, ears, brain, fingers, etc. This unavoidably implies the employment of these organs upon surrounding objects in real acts, such as thinking, seeing, hearing, handling, etc. If the *ego* or the conscious *I* in the spirit-world uses its eyes and ears, it must have an incorporeal or psychical environment consisting of real objects to see and real sounds to hear: for how can the organized ego use its eyes if there are no real psychical objects or incorporeal forms upon which the psychical sight can be exercised? The whole drift of the Scripture is to teach that man in the next life, even now before any general day of resurrection, is *man* in the real sense of the word, with his faculties and powers complete. . . . We most confidently expect when we shuffle off this mortal coil, that we will be greeted with real sights and real sounds from the soul's new environment vastly surpassing in beauty and grandeur and loveliness, anything ever addressed to mortal eyes or ears in this life.—Dr. Hall, *Microcosm*, Vol. II., p. 35.

the person, rather than the immortality of either the soul or the body. They are only different sides of *one* personal being. The union of all the forces and functions of spirit, soul, and body, inner man and outward man, enter of necessity into the proper and complete constitution of the immortal person.*

Q. 12. Then the saints will be clothed upon with material bodies in the future state?

A. Science and Revelation unite their testimony in the justification of such a belief.

Q. 13. Does material in heaven differ from matter as we now have some knowledge of it on earth?

A. It may be more attenuated and must be more refined than in its terrestrial state. There are bodies celestial and bodies terrestrial. Celestial bodies incorporate material in its highest attainable form, even as the blooming flower incorporates material more refined than that which enters into the crude leaf at the base of the same plant. This order of things displays the wise and beautiful designs of Providence. He does not allow the flower to spring into that beauty of which its own delicacy is a constitutional part until after the rising plant has lifted the bud above the earth and the devouring insects that harbor around the base. God has shown this same benevolent wisdom upon a higher plane in ordaining the order of succession through which his rational creatures may pass as they climb the progressive stairway of human existence. Anything like a reverse order would

* In no organism, beside the human body, is matter so nearly allied to spirit, and so transparent with the transfused glories of a higher world. In man's body the image of God is represented in a material form! Still more. In the incarnation of Christ, Deity is personally united with matter. This is the house in which God dwells! The Saviour, being "in fashion as a man," united the infinite Spirit with finite matter.—Dr. Harbaugh in "The Heavenly Home," p. 197.

fill our most confiding faith with tormenting doubts and fears. A refined and celestial body on earth, amidst the snows and storms of "the former things" would be as much out of place as a blooming rose on Greenland's frosty face, or tropic fruits beneath the icy pole. So, too, if it were possible for a body of literal "flesh and blood" to inherit the celestial kingdom of God, its presence there would shock the eternal fitness of things and send a note of discord through all the choral symphonies of heaven.

Q. 14. Will the bodies of the saints become so attenuated and refined as to be absolutely intangible?*

A. Neither refined matter nor immaterial substance necessarily involves intangibility.

* Much vaguity, so to speak, exists in the minds of most persons as to the meaning of the words *tangible* and *intangible*. The common definition, as given in our dictionaries, confines the meaning of these terms to the *tactile sense*, or the sense of touch, commonly called *feeling*. This, however, is not sufficiently broad. The five senses constitute a chain of gradations of tangibility, or, more properly, modifications of the sense of touch. In its lowest phase we feel the material body by its actual contact with our tactile nerves. A still higher phase of this lowest sense of the animal economy is experienced in feeling the touch of immaterial substance, such as heat, radiating against the cuticle. But the highest phase of this sense is experienced in the contact of the *mind* upon the nervous system of the body, causing physical pain or pleasure, according to the mental impressions made.

Next above the sense of touch comes the sense of *taste*, which any one, with a little reflection, can easily resolve into a modified form of touch, requiring, as we know, the actual contact of the flavorful substance with our gustatory membrane and nervous system to produce the sensation. *Smell* is still a higher form or modification of touch, requiring the same actual contact of odorous substance with the nasal membrane and the olfactory nerve to cause that peculiar sensation, no difference whether the odorous particles be material or immaterial substance.—Dr. Hall, in *Microcosm*, Vol. IV., p. 188.

Q. 15. Are not Substantialism and Swedenborgianism at this point essentially the same?

A. The Substantial Philosophy accepts the truth wherever found, whether preached by the angels in heaven, Swedenborg in Europe, or the devils in hell.*

Q. 16. Will our transition from this to the future state produce any change in the *relation* now existing between the material and the immaterial substances in the constitution of our individual persons?

A. It will indeed. The former order of things in this particular will pass away, or be reversed. Notwithstanding the superiority of mind over matter, the immaterial here is largely conditioned by the material. Hereafter the spirit will be emancipated—not *from*, but from *under* matter, which state of subordination is at least largely abnormal and the result of sin. When the spirit is thus emancipated, the body, no less than itself, will be a beneficiary of the change, and the entire disen-

* Few people have understood Swedenborg. The writer takes off his hat, partially out of reverence for the great celestial rambler, but principally to permit that necessary expansion of the cerebrum actually required for the comprehension of such "mystical lore." Swedenborg seems to have been a "personal paradox," and his writings an insolvable riddle. That they contain some great pioneer truths for the ages to come has not been denied by men who have the courage to examine all things and hold fast that which is good. John Wesley, Emerson and Carlyle were only a few of the many who looked upon him as "one of the mastodons of literature," and his mind "majestic, though in ruins." How rich the veins of his original thought, and yet how apocryphal are all his writings. If the Baron's New Jerusalem Church is the one that "cometh down from God out of heaven," St. John's description of the descending bride contains more flattery than truth. Swedenborgianism, with its dreams and prophecies, its revelations and speculations, its strained analogies and abominable absurdities, is a—a dead lion; and he proves himself a man of Samsonian powers who takes the mellific nectar of truth from such a hive. The Substantial

thralled person will arise to a state in which it will be unconditioned, except by its own finite limitations and the impassable and bridgeless chasm between itself and the sphere of the infinite.

Q. 17. But will not the finite saints be permitted to enter into the very presence of the infinite God?

A. The pure in heart shall stand in the immediate presence of God's person, admire the beauties of his face and all the glories of the place, but such approach even into the presence chamber of the King immortal does not imply that the saints will ever transcend the realm of the finite any more than the humming bird passes into the realm of the human by being admitted into the palatial residence of the prince?

Q. 18. And the saints shall dwell together?

A. It is an axiom in mathematics that all things near a common center are necessarily near to each other. This truth may be applied to the question of the approximate nearness of the saints to each other in the society of the redeemed,

Philosophy is something superior to this heterologous budget of riotous assertions and beautiful theories. Instead of being what Swedenborg taught, Substantialism is just what he needed to guide the sublime flights of his erratic soul and ethereal piety; and, further, it is precisely what some of its self-important and superficial critics need to distinguish between the verities of God and the vagaries of men. Indeed, many of the objections raised against the new departure savor largely of the most supreme childishness. We are about tired hearing the cry of "spooks in the garret." For our part, if there were no other alternative, we would sooner harbor a few small spooks in our intellectual attic than to have the upper story destitute of all positive contents, and damned with that "respectable" sort of cowardice which prevents all earnest search after something more substantial than spooks, more entitative than shadow, more noble than mere matter, and more enduring than the flashings and flickerings of molecular motion.

“Where the saints of all ages in harmony meet,
 Their Saviour and brethren transported to greet;
 Where the anthems of rapture unceasingly roll,
 And the smile of the Lord is the feast of the soul.”

Q. 19. And shall they know each other?

A. Why not? If they know each other here where they know only in part, shall they not know each other better when that which is perfect is come? Shall the saints in heaven who are near and dear to each other and in some respects alike, have less of the power of recognition than the rich man in Hades when he discerned Lazarus far away across the impassable gulf?

Q. 20. And are the old relations of earth to any extent renewed in heaven?

A. The relations which were constituted here for a subordinate purpose will end with the serving of such purpose; but those relations which ground themselves in the essential substance of humanity and in the character of human society as it involves proper permanency, will run forward through the endless ages of the future.

Q. 21. But will there not be peculiar friendships in heaven?

A. There will be no such peculiar loves as those which have a peculiar mission here, and which are put off with the peculiarities of the tabernacles that enshrined them. Reunited husband and wife will not continue to love *as* husband and wife, for in this respect they shall be as the angels who were never called to propagate angelic species through matrimonial felicities; and yet life is too substantial and the institutions of God too sacred to permit even the rolling years of eternity to wipe out the holiest landmarks of time or obliterate the hallowed memories interwoven with all the woof of the history of humanity's progress through this world and its rise to the more excellent glory in the world

above. The fond associations which are sealed and sanctified here by the holiest ordinations of God can never wear away. Sailing upon the vital current which took its rise in God's own substantial being, fond memory will still continue to dive beneath the surface and bring up delight from other days gone by. If love is the highest form of activity in God, it is reasonable to suppose that it is the most permanent emotion springing from the life of man. Surely human love in its best terrestrial estate is not a flower of such a transient character as to waste all its fragrance on the desert air of this bleak world. When transplanted with its substantial life-root, it will continue to bloom with some proper peculiarities in Heaven. Why not? He who came not to destroy the law loved John with peculiar tenderness here. May not the saints then hope to love their former intimate friends with tender fondness after they shall have exchanged the lower loves of life on earth for the higher life of love in Heaven? . . . But here the author's eyes grow blind with a flowing solution of sacred sympathy for loved ones gone before, as if some dear one out upon the eternal ocean deep had stirred the calmness of his sainted breast, and dashed the gentle spray upon our shore. Bishop Foster is at our right hand and speaks *to* us from p. 193 of his "Beyond the Grave." Let him come to the front and speak *for* us until these tears are wiped away. He speaks; hear him: "We cannot doubt that those whom we love most here, love most purely and tenderly, will be likely to be dearest to us there. They will still be our treasures. All that they ever were to us will be remembered; the hold they had on our being will still be felt in more exalted forms. The noble passion purified from all alloy, will rise into far grander and more ravishing intensity. The relations will be sunk, but the bond will be tightened. They will be greatly more to us than they ever were on earth, and more to us, we may

venture to believe, than they could have been, had they not been bone of our bone and heart of our heart."

Q. 22. Will the saints be confined to any particular locality?

A. They will not be limited in their movements or circumscribed by anything except their constitution as finite beings. They will have sufficient room to gratify their thirst for knowledge of God's creative power, and ample means to range the fields of heaven and gaze upon the wonders of redeeming love. It has been shown in this book that force can travel by proper means of conduction to any inviting element able to receive it; and as life is the highest form of force, it is reasonable to suppose that when it is raised to its highest state in the glorified personalities of rational beings, and when clothed in material like that in Christ's ascension body, no pent-up Utica can contract its powers. The saints will therefore be unconditioned in their ample range and in their facilities of movement, except as they are conditioned by themselves and by the wise and infinite Father above them. What more can they desire? Venturesome recklessness belongs to that other class of beings who, in consequence thereof, were hurled headlong through the ethereal skies to darkness and perdition. Sound will not travel through a vacuum, neither is it presumable that saints will want to ramble around through space to see how far they dare venture away from that more central

"Place where spirits blend

And friend holds fellowship with friend."

Man as a social being must have society. This law of his nature will run parallel with his being. Social magnetism will ever draw the saints together and keep them clustered around the Lamb, the great Magnet of redeemed humanity. He will be the center of all centers and the circumference of the entire glorified periphery.

Within this periphery there will be many little social centers and gathered groups without the exclusiveness of caste. Little coteries of old friends will doubtless "gather at the river that flows by the throne of God." The sealed fountains of past endearments will be opened afresh, and the pure waters of delight leap forth amidst many a domestic circle once broken by the cruel thunderbolt of death, but again reunited forever. Will not their hearts burn within them as Jesus makes himself known to such disciples in breaking unto them the bread of heaven as never served on earth. We will love our friends in heaven for Jesus' sake and love Jesus more for their sake. Our hearts will not grow weary, but oh, how they will yearn for the old folks and for the young folks at home. It would be blasphemy even to intimate that he who came in love to fulfill the law would himself destroy the law of love. The saints will forever continue to be filled with the sacred memories of the past, the solid joys of the present and sweet anticipations of the future.

Q. 23. Then heaven will have both duration and locality?

A. Why not? Man was brought into existence to be a denizen of time and space, and he will continue under that twofold category until his being is radically changed to something else. The supposition of such a change would involve a superlative absurdity. It is nonsense to say that duration will not extend to eternity, and that the lines of time's longitude will not continue into the map—the ever-unfinished map of heaven. Time may lose its metric character, and be no longer divisible into sections by rolling suns; and space may continue to defy all finite attempts to comprehend its boundaries and boundlessness; yet if there is time for "a half hour of silence in heaven," there will be time enough for an endless day of hallelujahs loud and long, and space enough for the New Jerusalem with all its measured furlongs.

How can it be otherwise, indeed? *God's* heaven may not be localized, but the heaven of man must have a place and be a place. As already seen, there will be refined material in heaven. All material, however attenuated, must have extension. Such material extension must have limitation. However boundless space may be, the creatures of space, being finite, must have boundaries. Man is a substantial being, both as to his spirit and his body. He must, therefore, have place as to his finite spirit and room as to his material body. Neither Science nor Revelation have given us any evidence that attenuated, refined or glorified matter shall do away with its constitutional and qualified impenetrability. To the same extent which glorified persons incorporate material will they require that their substantial heaven include material environments. If the bodies of the saints are tangible, the substantive elements of their abode must, in the same sense, be equally so. All the furniture in our Father's house will be tangible to the tactile touch of our celestial fingers, and all the golden goblets of his banquet chamber tangible to the lips no longer parched with feverish thirst. Substantialism, while it discounts the gross materialism of this world, is not disposed to run into dreamy idealism concerning the next. God never designed that man, after having a substantial existence here, should be a phantom to float upon the shoreless bosom of some ethereal sea, or a shadow to flit away beneath the vault of some ethereal sky.

Q. 24. What are the environments or surroundings of the saints in the heavenly place?

A. Our eyes have not yet seen, our ears have not yet heard, neither have our hearts yet been able to experience the things which a kind Father hath laid up for those who by becoming children of Christ have also by the same birth become joint-heirs with the elder brother to that "inheritance incorruptible and undefiled, and that

fadeth not away, reserved in heaven for them." It is reasonable, however, to suppose that the environments will be such in their substantial character as to surpass our most extravagant dreams of their reality. The reasonableness of this supposition is supported by science and justified by Revelation. What meaning can there be in the last few chapters of the Bible if heaven be less substantial and less real than earth? Surely the New Jerusalem with its dozen gates ajar, the crystal river with its living, limpid stream, and Mount Zion, on whose celestial summit stands the Lamb surrounded with the happy hosts of the redeemed—surely these are not false images of nothing real before which a kind father would have his confiding children bow down and worship in the blind adoration of illusory hopes. Why should there not be pearly gates and golden streets through which to enter and upon which to walk when the ransomed of the Lord shall return and come to Zion with songs of everlasting joy upon their heads? Why should there not be palms of victory borne, and crowns of glory worn by the exultant army of the skies as they parade before the enthroned majesty of the Commander-in-Chief, and cause heaven's high arches to ring with hallelujahs to his everlasting praise?

Q. 25. What then is our duty to God and to ourselves?

A. It is our chief duty as well as our high privilege to study God's Word and works in the light which they shed upon each other and which they comminglingly shed upon the great central problems of human life, here and hereafter. This can now be done to greater advantage than ever before since the investigation may be made from the standpoint of the Substantial Philosophy founded by A. Wilford Hall, and partially formulated by the author of this book. Blessed are they that heed the suggestions of this volume, for the time is at hand for

men to see the invisible things of God in every domain of finite being. Guided by the foregoing helps and hints, the devout student of Nature and Revelation may quicken his steps in the direction of a more perfect knowledge of him whom to know aright is life eternal, and whom to love supremely is the highest duty of man. Thus walking in the path of duty, and thus possessed of this eternal life, even now,

“Before we reach the heavenly fields,
Or walk the golden streets,”

we shall be able to partially overcome all false forces at war with the proper dignity and well-being of our nature, pass through our transition period in triumph to the skies, enter upon the higher realm of human existence, join the gathering, swelling throng of former friends to range, in mutual happiness, the flowery fields of heaven, and pluck ripe clusters from the vines of God.

[THE END.]





