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Truths and untruths of evolution

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Vedder Lectures, 1883

TRUTHS AND UNTRUTHS

OF EVOLUTION

BY

JOHN B. DRURY, D.D.

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PREFACE.

THE lectures constituting the present volume were delivered in April, 1883, before the students of the Theological Seminary and Rutgers College, at New Brunswick. When chosen to lecture on the Vedder Foundation I thought I could not better accomplish the object designed, than to present so far as could be done in the course of five lectures, the line of argument which had brought satisfaction to my own mind when confronted with the chief of the problems presented by modern science. In the discussion I have sought to be just and fair to science as well as to religion. As the reader will see, instead of combating Evolution as altogether inadmissible, I concede a possibility of its truthfulness, and aim to show that the believer in God and a Revelation, has nothing to fear from it as a foe to religion, when its postulates are freed from assumptions, and its truths are separated from its untruths. It was the expressed wish of the founder of the lectureship that the courses de-

livered should be published and thus reach a wider audience than that immediately addressed. The present volume is sent forth in compliance with that wish, seconded by the opinion of those who heard the lectures, that they would prove useful in clearing up some of the difficulties with which many honest and thoughtful minds are troubled in view of claims that are made in the name of science.

The lectures are printed as delivered, except that an occasional note has been appended. They are sent forth with the earnest prayer that they may be helpful in a period so full of questionings and doubtings as the present.

J. B. D.

GHENT, N. Y. *November*, 1883.

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TRUTHS AND UNTRUTHS OF EVOLUTION.

LECTURE FIRST.

INTRODUCTORY: EVOLUTION, THE HYPOTHESIS.

The scope of the lectureship, in accordance with whose terms I appear before you, is defined, by the instrument establishing it, as "a course of lectures on the present aspects of modern infidelity, including its cause and cure."

In coming to the consideration of this general theme, I am profoundly impressed by the fact that in our day the chief and most formidable assault on our Christian faith comes from the side of the natural sciences.

Speaking in the name of these sciences, which seek to usurp to themselves the very name of science, unbelief challenges the very fundamentals of religion, and is insidiously giving an infidel tone to modern thought and literature. A chief danger to religion lies in this direction. Do not understand me by this

to affirm that the students of nature are predominantly unbelievers, and that natural science itself is necessarily materialistic, atheistic or infidel. On the contrary, it can be established that the chief contributors to a true science of nature have ever been devout Christians, and a legitimate science is to-day, as always, the friend rather than the foe of true religion. What I would emphasize is the fact that, to-day, natural science is relied upon to furnish to every school of antagonists to religion, such weapons as they have,—is, in other words, both the arsenal and citadel of modern infidelity. It has become such through the growing influence of the scientific hypothesis known as evolution, and the frequent assumption, that it has made untenable faith in God and the Bible.

Always and everywhere the root of unbelief is the natural opposition of the heart to God and His law. The vast majority of unbelievers are merely inattentive or indifferent to the claims of religion,—they neither seek for nor give, a reason for their unbelief. But this course does not suffice for all, nor permanently for any. Men cannot escape thought, and if questioned by none else, the soul must give a reason to itself for its doubts and unbelief. A thoughtful man cannot be content

without some plausible reason for not accepting the strong and seemingly invincible claims of Christianity. The situation, to-day, is substantially this,—that nearly all who reject our revealed faith and the religion of Christ are depending for a logical defence in so doing on the scientific theory of evolution. The real battle, therefore, in our day between the Christian faith and infidelity is waged in this field of thought, and the issue is over the existence of a personal Deity. Unbelief, speaking in the name of evolution, boldly asks:—Is God any longer to be considered as a necessary factor in the history of the universe?

The questions contended over within the pale of Theism,—such as prophecy and miracles, the credibility and authority of the Bible, the person and work of Christ,—are, in this new phase of the struggle, relegated to a subordinate position. The assailants tacitly, if not avowedly, concede that on these issues, granting the postulate of an intelligent personal creator and governor of the world, the battle has gone against them.

If there has been a creator and ruler, such in His being and works as we have been accustomed to infer from the evidences of wisdom and beneficence so conspicuous in nature, everything essential to the Christian system

is made both possible and probable. Revelation and redemption, providence and miracles and prayer, fit so readily and perfectly into the system that they altogether cease to be anomalous or incredible. It is coming to be discerned that to concede the possibility of a revelation removes the chief ground for rejecting its contents, that if there be such a thing as the supernatural, the position of Christianity after centuries of futile assault is left well-nigh impregnable. Hence the cause of infidelity practically depends on its success in denying God and the supernatural.

Until recently this seemed so impracticable that few skeptics were willing to join issue at this point. Now, as has been said, it is the chosen ground of battle, and it is boldly claimed that the world and its inhabitants have come into being, and are what they are, through a process of unintelligent mechanical evolution, which not only makes unnecessary, but actually excludes, the intervention of any supra-mundane power, and does away with creation and a creator, save it be as an impersonal, initial force.

The issue thus presented by the infidel cannot be evaded, and the believer of all others need have no wish to evade it. It necessitates a careful examination of the position behind

which the enemy has entrenched himself, and presents to us the question whether the use which is sought to be made of this latest generalization of science be legitimate. Perchance there may be a wide difference between evo lution, and evolution as the excuse for unbelief. At all events it will be timely to inquire into the state of the question, and seek to learn how much of truth and how much of error there may be in this hypothesis of science, which bears so directly upon our most fundamental religious beliefs.

Called therefore as I am to discuss "one of the present aspects of modern infidelity," and viewing the situation to be such as I have sketched, it has seemed to me I could not do better than examine with carefulness and candor the present state of the case. If I shall do nothing more than map out the issues, and exhibit what is fact, and what theory and assumption, in the postulate so boldly appropriated by the unbeliever, I shall feel my labor has not been lost. For many a problem, when its terms are freed from ambiguity and confusion—when it is once simply and correctly stated—is near to a solution.

I propose to examine, therefore, as honestly, dispassionately, and carefully, as is possible, the evolutionist's hypotheses, and their appli-

cations, accept truth wherever it is found, and eliminate, as far as it is discoverable, that which is false. My general topic can properly be formulated as, "The Truths and Untruths of Evolution."

I am addressing, I assume, those who are with me believers in God and the religion of the Bible.

My aim will be not so much to convince the unbeliever, to confound or convert the infidel, as to confirm faith and dispel doubt.

If I may suggest anything to help the honest doubter, or relieve the fears of those to whom it seems that the very citadel of our faith is in danger, I shall be content. As for the confirmed skeptic, if the intuitions of the soul, and the witness of the conscience to God, do not convince, I am persuaded no amount of reasoning will avail to do it.

What I submit for your consideration is the fruit of much careful investigation and thought, and though laying no claim to originality or novelty, beyond what always appertains to independent thinking, it will I trust prove suggestive and useful as an aid in studying the present position and probable future of the evolution hypothesis.

It is sometimes charged that faith in God and Christianity must necessarily incapacitate

and unfit one for the fair and unbiased treatment of such a subject. Perhaps it does for an *unbiased* study of a postulate that excludes God and the supernatural, but not of any question that is essentially one of science, as evolution properly and legitimately is. But aside from this it may well be doubted if it is possible, or desirable, for an earnest and thoughtful man to come to the examination of any question entirely unbiased. However, in the case before us it will be conceded, I doubt not, that the believer is no more unfitted by his faith, than the skeptic by his want of faith, to deal fairly in the matter.

The scientific spirit ought to be especially truth-loving, and dispassionate, yet one can read but a little way in the so-called science of the day, without discerning not merely an indifference to the bearings of its conclusions on the conception of God, and the postulates of religion, but an absolute anxiety to escape even the supposition of God, and a persistent effort to magnify the so-called antagonisms of science and religion. This manifests, we submit, a bias *against*, much less favorable because harder to overcome, to the dispassionate investigation of truth, than a bias *for*, God and religion: since the latter rests on kinds of evidence as substantial and satisfying as the

evidence for scientific truth. In other words, I believe one is better equipped for finding the truth, who believes, on the testimony of his own soul and consciousness, and the phenomena of mind and spirit, that there is a God, than one who ignores every kind of truth, save that discoverable by scientific induction.

At all events, it shall be my endeavor to preserve throughout the discussion, at least as fair and honest a spirit, as those who appeal to science to excuse their infidelity.

Necessarily, in so brief a course as this, there is time only for hints and suggestions. I shall need confine myself to the barest outlines of thoughts and arguments, hence I shall in many cases, be able to no more than indicate the course of treatment fullest of promise in the interest of truth, and leave it for each to follow it out for himself.

EVOLUTION—THE HYPOTHESIS.

Evolution is the general name for that method of accounting for existing diversity, which supposes present complexity to be the result of successive and gradual modifications of simpler forms. It makes the development of the individual from the germ, by successive but closely connected differentiations, to be

the image and type of the genesis of all existing beings.

One of its clearest and ablest expounders, Huxley, defines the term, when employed in biology, "As a general name for the history of the steps by which any living being has acquired the morphological and the physiological characters which distinguish it."[1]

He has applied this definition both to the genesis of the individual, and to the sum of living beings, but when given in connection with the latter the definition receives an addition, from which, I believe, proceed most of the untruths discernible in its applications. Evolution in this definition becomes much more than the *history* of nature's transformations. He says, "Evolution is the process by which the physical world and all things in it, whether living or not living, have originated through the continuous operation of purely physical causes out of a primitive relatively formless matter."

[1] Article "Evolution," *Encyclopædia Britannica.* Our quotations of the views of leading evolutionists are taken as far as possible from the ninth edition of the *Encyclopædia Britannica,* rather than from their published works, both as more convenient and as embodying the later and more matured opinions of the advocates of evolution.

To the same purport is the definition of other evolutionists.

Herbert Spencer's is substantially this:—"Evolution is a change from the homogeneous to the heterogeneous, from the indefinite or undetermined, to the defined or determined, from the incoherent to the coherent; and the causes of these changes are involved in the ultimate laws of matter, force or motion. The rationale of which is a distinctly mechanical process."

James Sully, author of the article on "Evolution in Philosophy" in the last edition of the *Encyclopædia Britannica*, thus defines it:—"Evolution includes all theories respecting the origin and order of the world which regard the higher and more complex forms of existence as following and depending on the lower and simple forms, which represent the course of the world as a gradual transition from the indeterminate to the determinate, from the uniform to the varied, and which assume the cause of this process to be immanent in the world itself that is thus transformed."

In all these definitions we note that they make evolution not merely the *history* of a process, but equally *the complete account of its causality.*

By the legerdemain of a definition, other than second causes are barred out. As Huxley expressly says when speaking of man's place in nature, "He is now known to be the last term in a long but uninterrupted series of developments effected without intervention of any but what are termed secondary causes."

It is this limiting of causality to purely mechanical forces, this exclusion of other causes than those immanent in things themselves, that has served so generally to identify evolution with materialism. It is emphasizing this feature that enables the infidel to claim that the hypothesis of a personal creator is no longer necessary. The universe, under this conception, becomes not merely a mechanism but a self-evolved and self-evolving one, possessing within itself the causes of all its transformations.

It is true that Hüxley and Spencer and Sully, would probably disclaim the intention to absolutely exclude any other than mechanical causality, and would possibly append to their expressions, if pressed, the saving clause, "*i. e.*, any other cause that science knows about." Indeed Spencer expressly says that "while all phenomena can be formulated in terms of matter, motion and force," these are, in the last analysis, "but symbols of the unknown real-

ity;" and escapes with many others the logical sequence of bald materialism, by admitting, back of and beyond second causes, an unknown and unknowable potentiality. So long however as the causality is made an integral part of evolution, and that a causality inherent in things themselves, the definition of Hæckel is to be preferred, both for its frankness and its clearness, when he says: —"The general theory of evolution assumes that in nature there is a great, unital, continuous, and everlasting process of development; and that all natural phenomena without exception, from the motion of the celestial bodies and the fall of the rolling stone, up to the growth of the plant and the consciousness of man, are subject to the same great law of causation; that they are ultimately to be reduced to atomic mechanics."

Now, just so far as exponents of evolution assume to exclude the operation of causes other than those inherent in matter, they transcend the limits of a true science. *It* has to do merely with the *how*, and not the *whence*, of things.

Dr. Carpenter, in his address before the British Association in 1872, justly says:— "When science sets up its own conception of the order of nature as a sufficient

account of its cause, it is invading a province of thought to which it has no claim." "To set up the laws of nature as self-acting, and as excluding or rendering unnecessary the power which alone can give them effect, appears to me as arrogant as it is unphilosophical."

So also W. Stanley Jevons, in his full and exhaustive treatise on "The Principles of Science," in controverting the idea that "the course of nature is being determined by invariable principles of mechanics, which have acted since the world began and will act for infinite ages to come," says, "Such notions I would describe as superficial and erroneous, being derived, as I think, from false views of the nature of scientific inference, and the degree of certainty of the knowledge which we acquire by inductive investigation" (p. 430). Further on, in another connection, but speaking of the same class of scientists, he says, "there is an erroneous and hurtful tendency to represent our knowledge as assuming an approximately complete character" (p. 449).

These authorities will suffice, I take it, to bear me out in the declaration, that it is unscientific and pure assumption, to assert that there have been no causes at work in producing present diversity except those capable of scientific analysis.

There is no ground, except as it is hidden away in the terms of a faulty definition, for the postulate that the process of evolution has known no other causality than that inherent in nature itself and discoverable by science.

We are willing to accept what science can demonstrate, and feel ourselves the richer for its many contributions to our stores of knowledge, but we cannot accede to the claim that there is nothing real or credible beyond the narrow limits in which its observations are made. There is much truth outside of what can be measured and weighed by the appliances of a purely natural science, and it is not by any means axiomatic, as some scientists seem to imply, that what science cannot formulate is either non-existent or unknowable. The fact is that science itself is ever, and on all sides, meeting with phenomena inexplicable by its formulated or discoverable causes. As Jevons well puts it, "The more we have explained the more there is to explain."

Sir W. R. Grove, whose name is inseparably associated with "the correlation of forces," concedes his inability to pass beyond the *phenomena* of light, heat, electricity, magnetism, motion and chemical affinity. He says, "We

are totally unacquainted with the ultimate generating power of each and all of them, and probably shall ever remain so; we can only ascertain the normæ (the rules) of their action:" from all which it is clear that, from the standpoint of a true science, anything in the definition of evolution that limits its causes, and excludes all others than those immanent in the world itself, is unscientific, and nothing but an *arrogant assumption.*

This may be accounted one of the untruths of evolution, as it is the parent of many others.

Excluding this gratuitous limiting of its causation, it seems most probable that evolution, considered as *descriptive* of *the process* by which the world has come to its present condition, is likely to become established. Already with the majority of scientists is it accepted as a working hypothesis, and each year is adding to the number of those who *in this sense* are evolutionists.

In other words, that the universe and living beings have come to their present condition through a process of gradual modification of previous conditions,—*i. e.*, through a development, an evolution,—is coming to be regarded as harmonizing more facts and offering fewer difficulties than the until-recently-accepted hypothesis of special creations. It is in this as-

pect, in presenting the present as born of the past, that evolution has in it an important and valuable truth.

A half-century ago men were beginning, through the progress of geological investigations, to gather the idea that the earth had not come into being as it is now, but that it had been progressively fitted to be the support of life and the home of man. But while thus abandoning the idea that God by a single fiat had fashioned the dwelling-place, nine-tenths and more of all the students of its living inhabitants were studying them in the light of the accepted hypothesis, that every true species of the vegetable and animal kingdoms, now existing, had originated in the simultaneous creation of a first pair.

This was so generally held, not, as the skeptical scientist is fond of asserting, because of the accepted theological or biblical theory of the origin of things, but because the idea of permanence was embodied in every accepted definition of what constitutes a species.

De Candolle, the botanist, defined a species of plants by saying, "We unite under the designation of a species all those individuals that mutually bear to each other so close a resem-

blance as to allow of our supposing that they may have proceeded originally from a single being or a single pair;" and Cuvier, an equal authority as a zoölogist, defined a species as "a succession of individuals which reproduces and perpetuates itself." So long as these definitions were accepted as correct, there was no escape from the inference that each species must reach back to an original pair, and that they had proceeded directly from the hand of the Creator.

The immutability of species was then an insuperable, as it is even now a serious, difficulty, in the way of the acceptance of any hypothesis of evolution.

The strength of this objection has been weakened, but not altogether destroyed, by the Darwinian theory of natural selection, to the promulgation of which, and to the investigations which it has stimulated, are principally due the influence and wide acceptance of evolution. Whatever may be the ultimate fate of Darwin's particular theories, it is beyond question that he inaugurated a revolution in scientific methods, and lived to see evolution become the prevalent working hypothesis of science.

And yet the acceptance of the later theory, so far as it has been accepted, is due much

less to the positive arguments in its favor, than to those negative ones which have tended to its advantage through casting a doubt on, or positively disproving, the earlier hypothesis.

It has not yet been satisfactorily shown how species have originated, nor that a true species is other than immutable, and yet it has been made certain that if species were created it was not in the way and manner formerly supposed. And this has been so generally accepted that evolution is regarded as a tentative and probable hypothesis—at least as a method of creation—by many who fully discern the weakness of its positive arguments.

The original hypothesis of special creations covered not only the fact of a creation, but a particular mode of creation. It supposed a special fiat for each species, that each primitive pair came into being in maturity and all simultaneously.

The advance of geological science demonstrated long since that the old conception of a simultaneous creation of all types was erroneous; new species have been appearing upon the scene all along the course of earth's geological history. The present *geographical* distribution of living forms shows that many species of plants and animals are limited in their geographical range, and that continents

and seas and islands, as well as the different zones, each have their flora and fauna, so that different centres as well as different epochs of creation must be supposed.

Beyond this, the vast and rapid growth in the number of species—each, under the old definition of species, a special creation,—has served to raise the question, whether it be not more rational to attribute at least *some* of these variations to modifications by descent. For example, the total number of animal species described up to 1831 was 70,000, in the fifty years since the number has grown to 320,000, while it is estimated that not a day passes without adding to the list. Not less than 12,000 species of insects alone it is stated are awaiting description in the museums of natural history. In the vegetable kingdom the number of species is even more numerous. And when we add to the recent forms those of the geological series, the estimate of fully 2,000,000 different species as the total does not seem excessive.[2]

When we remember that among these multitudinous species many are separated by minute characteristics, and all from the highest to the lowest so gradually shade off one into another that it is difficult to draw dividing

[2] See Lubbock's "Fifty Years of Science," p. 15.

lines, we can readily understand how many scientists came to question whether independence of origin was necessary to the idea of a species, and whether the old conception of the mode of creation did not need modification.

It was such facts and considerations as these that led Darwin and Wallace independently to formulate the theory of "survival of the fittest," and convinced many that it is necessary to modify the creation hypothesis, so as to reduce the number of special creations, and give greater potency to secondary causes in producing existing diversity.

The modern progress of biology, in calling attention to the community of embryological substance and form, the identity in plan of structure which brings into relationship most diverse individuals, and the presence in many species, of rudimentary organs of which there can be given no satisfactory explanation on the theory of independent creation, has contributed still further to give probability to the theory of modification by descent.

The same science, by demonstrating that differentiation begins way back in the nucleus of protoplasm, beyond the detection of the microscope or chemical analysis, gives the highest probability to the theory that God when He creates does so by touching the

hidden sources of being, and leaves the visible form to shape itself by the interaction of inherent properties and general laws.

All this renders it probable that things and beings are what they are by some process of gradual modification. To it properly attaches the name of evolution, provided it be supposed to begin subsequent to the creative act.

Evolution, regarded as descriptive of a process in nature, has much, we thus see, to commend it, but it ought to be distinctly remembered and emphasized that it is as yet a mere theory, and must not be regarded as having more than a hypothetical value. In whatever form it be held,—whether that behind which infidels and agnostics hide and defend their unwillingness to believe, or that which many Christians hold in conjunction with their faith in God and the Bible,—it must not be lost sight of, that it is yet unproven, and may not properly be used for any other purpose, or in any other way, than is legitimate for an *hypothesis*. Because a theory harmonizes with very many facts, with more than a previous or rival theory, does not make it any less a theory, or convert it into an established principle. The key that fits *all* the wards of the lock is the only true key, and only the theory that fits all the

facts may be accounted the absolutely true one. Few scientific theories to-day can endure this test, and least of all this of evolution. However, for purposes of investigation and as a help to scientific progress, a theory—an hypothesis—may be most useful, even if unestablished, and possibly or even probably erroneous. Science has made and is making her progress with just such hypotheses, scarcely any but what are contradicted at certain points and so strongly as to awaken the suspicion that a new and broader generalization will some day succeed them.

The nebular hypothesis has yet to fit into itself the anomalous movements of the moons of Uranus. The atomic theory so useful in developing our knowledge of chemistry has had to be modified again and again, and in the opinion of many chemists is almost certain at no distant day to give way to a theory more consonant with all the facts. The undulatory theory of light seems almost mathematically demonstrable, yet the difficulties presented in the supposition of a transmitting ether are such as to strongly suggest that the ultimate explanation of the old time "imponderables" and the present "correlated forces" has not yet been reached.

We cannot dispense with either of these hy-

potheses, they fit into more of the facts than any other, and yet each is, after years of investigation, unestablished, and will possibly some day be superseded by some more comprehensive and truer generalization. If it be so with these older and better tested theories, how much more need of a cautious and tentative use of that which has only yesterday become probable.

No one who is at all imbued with a proper reverence for true science can do other than protest against that advocacy of evolution which claims for it triumphant establishment, and reasons from it as from a very axiom of science. It has indeed a possible truthfulness, but its difficulties are yet many and great.

If I were to formulate a definition of evolution, such as the present condition of our knowledge warrants, it would be this:—

Evolution is that hypothesis which supposes the process by which present diversity in nature has been reached to have been one of progression; the more complex and better endowed, proceeding in accordance with laws imperfectly known, out of simpler and lower forms.

It seems probable there has been some such evolution as this, and this is as far as a scientific definition is able to go.

The philosophical forms of the evolution theory, *i. e.*, the forms it assumes when co-ordinated with other knowledge, and applied to the world-old problems of the "whence" and the "whither" of the universe, are principally three:—*Materialistic*, *Agnostic*, *and Theistic.*

The first is characterized by the recognition of nothing but efficient or mechanical causes, rejecting all forces other than those inherent in nature itself. Hence is eliminated from the universe the First Cause—a personal, intelligent, self-existent Creator, and equally final cause, the supposed evidence of design. Such evolution is simply blind, unintelligent progression, controlled by merely natural forces, from fire-mist to man.

It seeks vainly to give any plausible account of origins, and makes man—doomed to die, and a mere automaton—the highest product and the only goal, of this mechanical process. It abounds in startling assumptions, and, its advocates themselves being witnesses, it is wanting in essential evidence at well-nigh every vital point. This perceived weakness of the argument for a purely materialistic evolution would seem the real occasion for the formulation of the second form of the hypothesis, *the agnostic*, which differs from the materialistic only in granting the possibility

of a cause, back of and higher than mechanical force, but claiming that its existence and its nature are alike unknowable. This "unknowable" is so plainly nothing but a *deus ex machina*, a mere device to escape a formal denial of a first cause, that it is of little weight. As in all else, agnostic evolution agrees with materialistic, we shall in our further discussions treat them as one. The difficulties of materialistic and agnostic evolution, and the failure of their advocates to meet them, will be considered in our succeeding lectures, treating of the applications of the hypothesis; for which reason we shall not now pause to consider them further than to make a remark or two on a fundamental characteristic,—their denial of what are known as final causes.

These must be eliminated from nature or else they abide, as they have ever been regarded, the conclusive proofs of the existence of a God—the Cause of causes, and the solid basis of a knowledge of His attributes.

Hence, many and beautiful and complicated as are the contrivances and adaptations to be noted everywhere in nature, admirable as are the adjustments by which beneficent ends are secured, we are bidden to see in them all, nothing foreseen or intended by a superior power, but only the necessary outcome of the fortui-

tous interaction of unintelligent and unchangeable forces, called laws. "It is plain," as says Janet in his unanswered and I believe unanswerable argument in defence of final causes and the old teleological method, "that this is nothing but the theory of chance under a learned disguise."

He says substantially: "If by evolution anything more is intended to be expressed than the gradation of organic beings, rising step by step, or at intervals, from the less perfect to the more perfect forms,—a process that necessitates the idea of intelligent control, it is only another name for the Epicurean's fortuitous concourse of atoms, and expresses the successive gropings of nature, until favoring circumstances bring such a cast of the dice as evokes an organization that can survive. And when evolution, in admitting nothing but efficient causes, brings itself to this position, it is exposed to the objections that in all past time have been urged against the idea that the world can be the product of chance." [3]

There is in phenomena, a manifest working unto an end, and no system that denies this

[3] See Janet's "Les Causes Finales," original edition, p. 416. And "Final Causes," the translation of the second edition, p. 282.

will ever commend itself as true to nature. This has been well elaborated by the Duke of Argyle, as well as the French savant, neither of whose arguments have been successfully met.

The fact that the difficulties in the way of materialistic or agnostic evolution are so many and crucial, requiring of its advocates a boldness of assumption and a baldness of dogmatic assertion, that are anything but scientific, gives to the remaining form of the hypothesis—*the theistic*—a natural precedence.

Even many who are inclined to the other forms of the theory, are constrained, by the invincible character of the objections to a purely natural origin of matter and life, to assume a Creator, and so far are to be accounted theists, even though, as is the case with some, the Creator is scarcely more than an initial force. Aside from such, it is proper to divide theistic evolutionists into two schools, both of whom hold to a Creator who is not a mere logical abstraction, but a Self-existent, All-powerful, All-wise Personage—a true God.

The one supposes creation a single act, which wrought, the Creator is remanded back into the heavens as no longer needed, since the result of creation is so perfect a mechanism as not to require, at any subsequent point,

adjustment, superintendence, or control. We do not dispute the grandeur of this conception, and fully recognize the homage it bestows on the wisdom as well as the might of the Creator. It is, we allow, worthy of an infinite mechanician to construct a machine that will perpetuate itself and never need the intervention of its maker. The chief difficulty is, that it fails to adequately explain the facts.

The other supposes not only that God created, but that He also governs and controls His handywork. It holds fast to a Providence, as well as a first cause, believes that God is "the *Father* Almighty" as well as "the *Maker* of heaven and earth." This is the only form of the evolution hypothesis, it seems to me, that adequately meets the facts, that has a probability of establishment, and that the Christian can accept. This sees in the history of the universe a process of evolution, but it is one originated and controlled by Divine intelligence and power. It supposes the existence and operation of fixed and unchangeable laws, efficient agents in carrying out the plan of the Great Architect, but they are what they are, and have efficiency, by the ordinance and appointment of the Creator, and He is ever and always co-ordinating and controlling their interaction unto the accomplishing of purposed

results. It is, in other words, as Joseph Cook has recently well said, an evolution not *by* law, but *according* to law.

The advances and discoveries of science have, it may be, overthrown the conceptions of a simultaneous creation of living forms in their maturity; they may have, and we believe they have, made probable that the earth's history—the process by which present existences have received their being and form—has been an evolution; that the development of the individual is a type of that of the sum of human beings; and, in addition, that this evolution has been largely or mainly wrought out by forces or laws inherent in things themselves. Nevertheless, at the beginning must be supposed a Creator, omnipotent and all-wise; for only thus can be explained the origin and the wondrous adaptations of the universe. Equally, to account for the progressive modifications of earth and its inhabitants, the maintenance of that beneficent equilibrium through which earth has teemed with life and the progress has been upward rather than downward, there is need not only of a Creator, and a creation way back in the beginning, but of a presiding Providence, and creations all along the ages. Certain is it, that again and again something has touched the springs of exist-

ence and given a new trend to being. It is perhaps impossible to decide, and we do not know that it matters, whether God has done it directly, or through an agency implanted by Him. In either case, it bespeaks Him a living potential Being, presiding over, as well as originating, the universe; and this, we take it, is the essential fact to be established in the present discussion. So long as one holds on to faith in God,—the Father Almighty presiding over and administering the government of the world,—he is on safe ground.

Let evolution be seen to be only an instrument or method of God, and it ceases to be antagonistical to faith and religion. As with every hypothesis, so with this, the truth is to be ascertained by the success with which it unifies and harmonizes the facts it is propounded to explain. The truths and untruths of evolution, will be exhibited by its success or failure in solving the problems that present themselves in earth and man, civilization and religion. Into these fields we purpose to press the inquiry.

LECTURE SECOND.

EVOLUTION AND THE EARTH.

In my last lecture I examined the definitions and philosophical forms of the evolution hypothesis, pointed out what I conceived to suggest an untruth in the common definitions, and among the philosophical forms, indicated as the only one likely to be established, the theistic, which makes it the expression of the creative wisdom and providential control of that God whom we reverence and worship. The views expressed are now to be tested by application to the facts with which the hypothesis has to do.

It is plainly vital to any form of the theory which eliminates God, and a controlling intelligence from the universe, that its account of origins and its series of causations be complete. It must take in, not only the phenomena of the material world, but of humanity, civilization, morals and religion. It must exhibit and prove a necessary and unintelligent progress

from primordial atoms, up to the highest manifestations of human intelligence and morality, —connect by an unbroken gradation of ascent the diatom and infusoria with a Shakespeare and a Newton,—protoplasm with the phenomena of conscience and the ethics of Christianity. A break anywhere in the long chain, the failure anywhere along the line to show a necessary connection, the having at any point to suppose or invoke a determining power outside of nature, at once makes possible, probable, and perfectly reasonable, the existence of a controlling mind independent of nature, and gives the highest probability to the theory that the entire process from beginning to end is under its direction and efficient control.

In this lecture I desire to inquire how satisfactorily the existence and present condition of the *earth* can be accounted for on the theory of materialistic or agnostic evolution. The inquiry is briefly this:—Is it possible to suppose our planet, in its past and present conditions, the product of causes or forces inherent in matter itself, or must we, to account for earth and its contents, predicate something outside of and superior to nature,—a Supreme Intelligence, a Self-determining Will?

It has always been the weakness of evolution hypotheses, from the days of Democritus

and Lucretius down to Lamarck and St. Hilaire, that they failed to give even a plausible explanation of crucial facts. We proceed to inquire whether at the present day the situation has materially changed.

The theory of Kant and Laplace as to the method of world-building, known as the nebular hypothesis, is the starting point of every modern theory of evolution. This, though yet a mere supposition, serves to bring into unity and scientific correlation so many facts, both of astronomy and geology, that all scientists use it as a working hypothesis, and regard it as a most probable account of the origin of the solar system and of the earth's structure. The time has long passed when it was regarded as in conflict with revealed religion, and as superseding a Creator. The devout Christian scientist holds to it as firmly, and accepts it as an account of the way God built the world, as freely as the materialist who argues from it that the world need have, and has, no Creator.

The fact is, that this, as the theory of evolution itself, is and can be interpreted in accordance with either conception. Our concern with it is to ascertain, not so much its truthfulness, as whether, if it be true, it affords any countenance to the idea that the world is

self-evolved,—that there has been no interference from without.

The nebular hypothesis, as you know, is briefly this: that originally the entire space occupied by the solar system was filled by an evenly diffused nebulous mass of matter. This mass is supposed to possess a slow rotary motion. Under the reciprocal attraction of its parts condensation goes on, under which the rotation is accelerated, so that under well-known mechanical laws successive rings are formed, and then spheres: thus the planets and their satellites, each moving in the same plane and at proportionate distances, come into being, while the central mass as it contracts gives off light and heat and remains the controlling centre of the system.

While this method of world-formation was first proposed as pure hypothesis, and yet remains an hypothesis, it so well suits and explains the circular character of the planetary orbits, the plane in which they lie, the uniform directions of their revolutions, and the oblate spheroid shape of the earth, that though there are facts that are yet inexplicable by it, it is generally accepted as the most probable mode by which the solar system came to be what it is.

Granting all that is claimed for it, accepting it as true, does it make unnecessary an

intelligent Creator and Ruler? Does it afford the materialistic evolutionist all he needs for a starting point in the long course of unintelligent upward progression? We say nothing here about what must, on his supposition, be potentially present in the fire-mist, in the primitive nebulous mass;—the life, intelligence, and consciousness which are manifested in the higher and later stages of the process, which has here its beginning. We do not now press the difficulty of supposing that in this original matter there is "the promise and potency of every form and quality of life."

There are sufficiently formidable chasms to be bridged before we come to this. Whence the matter? Whence the force? Whence the relation of the two? Whence that exact adjustment of materials, motions, interactions, and combinations, from which has resulted earth, as habitable and the abode of order,—a cosmos rather than a chaos? At the very beginning of his chain of successive transformations the materialist has to predicate matter and force,—and both in definite and fixed amounts. For it is as well established, as the case admits, that matter and force are each indestructible, and hence are the same in amount to-day as when present in the nebulous mass. From nothing to

matter,—and if force be not a part of matter, from matter to force,—are leaps that are beyond even the imagination of the materialistic evolutionist. And, therefore, if he may not accept a creator and a creation, he is shut up to an eternity of both matter, and the source, whatever it be, of its motion.

This, if at all conceivable, is only so on the supposition of eternal cyclical changes. The primitive nebula must be regarded as only the *débris* of former worlds, and the outcome of the evolution now going on will be an ultimate return to primordial atoms.

The very postulate of *evolution*—it being a progression from the simple to the complex, implying alike a starting point and a goal—would seem to sufficiently negative this conception. But, beyond this, the evolutionist's own theory of the correlation of forces seems to demonstrate its impossibility. What Sir William Thomson has called "the dissipation of energy" is mathematically proven to be going on continually, so that the sun's heat, the source of energy so far as our system is concerned, is passing out into space, from which it does not return.[1] It can therefore

[1] For a full and clear statement and discussion of this "dissipation of energy," see Newcomb's "Astronomy," pp. 500-505. Also Jevon's "Principles of Science," pp. 441-8.

be predicted that the present constitution of the solar system will not endure forever,—that the time is coming when the sun will be a cold and burnt-out mass, and the mechanical energy of the universe will be exhausted. By the very law by which all force is convertible into heat,—since *that* ultimate form of energy is certainly being dissipated, and its *entire* reconversion into mechanical power is impossible,—it follows that the mechanism will run down and the machine stop, as certainly as a clock, when the weights no longer exert their influence.

This necessary *end* of the process—implying as it does its beginning—negatives, it would seem, the only possible form of the supposition, that mattter and force are eternal. In fact scarcely a single materialistic evolutionist is found who longer claims for them eternity. The thorough-going materialist leaves the problem unsolved, the agnostic places it in the domain of the unknowable, while others admit that here a Creator must be supposed, however well He may be dispensed with in the subsequent process. J. Clerk Maxwell, in article "Atom," *Encyclopædia Britannica*, says—"We have reached the utmost limit of our thinking faculties when we have admitted that, because matter cannot be eter-

nal and self-existent, it must have been created."

But the proof of a Creator at this starting point is not merely a negative one. The fact rests not merely on the dilemma, either eternity or Creation, but is susceptible we think of affirmative demonstration.

To constitute a first step in the supposed evolution, force or energy or motion is as necessary as matter, and the two must be in some form co-ordinated one with the other. Besides this, as the amount of matter is a fixed quantity, and according to an accepted axiom of science, it has not been and cannot be increased or diminished, something outside of itself must have established this amount at the time of its production.

A parity of reasoning leads to the conclusion that something above itself has measured out and generated the precise amount of *energy* which would suffice to execute the work to be accomplished.

Not only so,—matter exists, we have every reason to believe from chemical science, in elemental atoms, which combine only in certain fixed and definite proportions. These various elements must be supposed to have been present in the original nebulous mass, and that too in definite quantities and pro-

portions, so that not only the total of matter and energy must have been somehow fixed and determined, but equally the amount of each element, and the nature and proportion of their chemical affinities. For instance, there must have been just enough oxygen to combine according to its atomic weight with all the different elements into whose composition it enters, and leave nothing over. The same is true of hydrogen, carbon, nitrogen, and all the other elements. The amount of each is just sufficient and no more to make and keep the world the habitable abode it is.

Now here is co-ordination that bespeaks design and a designer. At the very beginning, when matter was in its simplest forms, when laws as the expression of forces or properties, were fewest, we see the same need of an intelligent mind and ruler, in order to their wise and beneficent collocation and co-ordination, as when the process of differentiation had grown more complex and varied. Indeed, the argument for a first cause, an intelligent Creator, is more unanswerable here than at any other point in the series, for these results, collocations, co-ordinations, cannot be attributed to any previous evolution, cannot be claimed as the product of exclusively efficient or necessary mechanical causes, but must be

acknowledged to have constituted a part of the nebulous mass at its origin. And this goes far to conclusively prove that both the matter and its contents, were brought into being and co-ordinated by a supreme and extra-mundane power.

Materialistic evolution, therefore, as to the very substance out of which all existing forms are to proceed, fails to give any rational account of its origin. It leaves unanswered the inference that the nebulous mass, its properties and motions, can only be accounted for as the creation of an all-wise and self-existent ruler; that there has been, in other words, a beginning in which God created the heavens and the earth. The only refuge from this conclusion is the remanding of everything, back of the nebulous matter, to the region of the unknowable, leaving the origin of all things an unsolvable mystery. Whoever accepts a Creator here, by so doing is compelled, it seems to us, to renounce all *a priori* argument against the existence of a power superior to nature, and his subsequent interference at other and later stages of the process. But granting matter and force—the materials for a mechanical evolution—there is another abyss that must be bridged, or the process cease to be self-sufficient, and that is the chasm which separates dead and living matter.

The introduction of life upon our earth is a problem that presents fully as much and grave difficulty as the origination of matter. And the failure to solve it, is even more fatal to evolution as a necessary, gradual, and continuous process. For it necessitates the interposition of a supernatural power, a Creator, not merely at the beginning, but midway in the upward progression. Huxley, in his article on "Biology," says: "If the hypothesis of evolution be true, living matter must have arisen from not-living; for by the hypothesis, the condition of the globe was at one time such that living matter could not have existed in it, life being completely incompatible with the gaseous state." How necessary such evolutionists feel it to be, to account for a purely natural or mechanical origin of life, is seen in Helmholtz's and Sir Wm. Thomson's suggestion that it may have been introduced from a meteorite. On which supposition Huxley justly observes:—"It makes no difference if we adopt Sir Wm. Thomson's hypothesis, and suppose that the germs of living things have been transported to our globe from some other, seeing that there is as much reason for supposing that all stellar and planetary components of the universe are or have been gaseous, as that the earth has passed through this stage."

Every materialistic evolutionist feels that here is a crucial test, and if their theory is to stand, life must have proceeded out of the not-living. Hence it has been zealously sought to prove the possibility of spontaneous generation, and again and again have we heard that this formidable chasm has been closed.

Twice within the past twenty-five years has it been confidently announced that spontaneous generation,—abiogenesis,—life from the non-living, has been experimentally demonstrated.

Pouchet, director of the Museum of Natural History at Rouen, in 1859, and Dr. Bastian in 1870, obtained bacteria and infusorial life from fluids claimed to be entirely freed from every possible living germ. Pasteur repeated, with greater care and scientific accuracy, the experiments of the former, and demonstrated that the inference drawn was erroneous, and that life was only present when the germs were introduced from the air, and that where sufficient care was taken to obviate this, or *sufficient* heat employed to destroy the germs, life invariably failed to appear. What Pasteur did for Pouchet, Tyndall has done for Dr. Bastian, and to-day there is scarcely an evolutionist who does not admit that at present there is no such thing as abiogenesis—that the

sayings, *omne vivum ex vivo* and *omne vivum ex ovo*, "all life from a living germ," express a universal and established fact. Tyndall and all others agree with Huxley in saying, "The properties of living matter distinguish it absolutely from all other kinds of things, and the present state of knowledge furnishes us with no link between the living and not-living"; and also, "The fact is that at the present moment there is not a shadow of trustworthy direct evidence that abiogenesis does take place, or has taken place within the period during which the existence of life on the globe is recorded."[2]

The only escape from the inference that life, like matter, was a gift of a living potential Creator, is that offered by Huxley in the addenda to the passage already quoted—"The fact," *viz.*, that there is no evidence that abiogenesis does take place or has taken place, "does not interfere with any conclusion that may be arrived at deductively from other considerations that, at some time or other, abiogenesis must have taken place." "The other considerations" reduce themselves, we see from the course of his reasoning, merely to this syllogism: mechanical evolution is established

[2] Article "Biology," *Encyclopædia Britannica*, Vol. III., pp. 588-596.

by irrefragable proofs; such evolution necessitates abiogenesis; therefore, though it is not known to occur now, and has never been known to occur, it must have taken place. Than which I know of no more glaring case of begging the question.

To most minds, the concessions that living matter cannot come out of the non-living, and that life only appeared when the globe came to be fitted to maintain it, proves, as far as is possible, its introduction by a power that is not of earth.

This is apparently conceded by the one who above all others deserves to be called the father of modern evolution,—the late Charles Darwin. For in his epochal book,—"The Origin of Species,"—in which he formulates his law of natural selection, he expressly assumes the creation of one or a few low forms of life, and only claims to show how from them all the others have proceeded. Whatever were Darwin's personal beliefs,—and we have reason to think he was not disinclined to entirely eliminate God and the supernatural from the universe,—his writings stamp him as a theistic evolutionist. He no where seeks to account for the *origin* of matter, or life, or intelligence, but only for their development in divergent forms when once existent.

Notwithstanding this admission, the Darwinian theory is really the stronghold of materialistic and agnostic evolution, since it is the nearest approach to anything like a plausible accounting for the existing forms of the vegetable and animal kingdoms, apart from Divine creation and superintendence.

Darwin formulated a law, which evidently has been widely operative in diversifying natural forms, and serves to explain beautifully and simply very much that characterizes existing species alike of plants and animals. Mechanical evolutionists hastened, as soon as promulgated, to use it as the master key that unlocks every mystery and explains every difficulty in their hypothesis, and while to-day abating much in their claims, they yet have to rest upon it as the only *formulated* cause of the wide diversity in nature.

Of such importance is this theory, in its relation to the wider theory of evolution, that, at the risk of wearying you by traversing all-too-familiar ground, I must dwell briefly upon it.

The postulates on which it rests are well-nigh axiomatic for their truthfulness. The first is the fact, that the increase of living forms on the earth is in a geometrical ratio,

so that in a very few generations the number becomes far in excess of the means for their support. The progeny of a single pair would suffice in a few centuries to overstock the whole earth. As the consequence of such a tendency in plants and animals, there is a struggle for existence, in which the weakest perish, and the strongest survive; by the weakest being meant those least fitted, and by the strongest those best fitted to maintain the struggle. Hence the law is appropriately called "survival of the fittest." Now the fitness does not inhere only or chiefly in strength, but rather in adaptation to environment, so that the advantageous peculiarities which enable any particular form to survive are many and varied. It may be physical strength, or some peculiarity of claw or teeth, which makes more certain the capture of its prey, or it may be some defensive adaptation by which a natural enemy is more certainly eluded.

The survivors in this struggle are those who possess the peculiarities best fitted to their surroundings. Thus far the theory is necessarily accepted—its truth is axiomatic. But to make up the law of natural selection, by which the origin of species is to be explained, another postulate is put forth and maintained by Darwin with a wealth and skill of illustra-

tion and argument, that cannot but call forth admiration. This is the tendency of plants and animals to vary despite the general law of heredity that like produces like. This is well seen in plants and animals under domestication; and by the careful cherishing of desirable variations many new and profitable varieties have been perpetuated. This has been done by human intelligence co-ordinating the laws of heredity and variability. Darwin claims that it is done in nature by the same laws, without superintending intelligence, that variations are continually occurring, slight, it may be, but yet sufficient to decide the issue in the severity of the struggle for existence, and where the variation is profitable it secures the survival of its possessor.

Thus ever wider and wider variations arise and are perpetuated, and constitute what we call Species. All this occurs, not as the theist claims by a process divinely superintended and governed, but of necessity.

From one or a few simple forms of life all the present forms have sprung, through the operation of this law, without intervention or control by God. It was put forth as having universal and unlimited potency.

No one doubts that there has been such a thing as natural selection, in the sense that

certain forms, because of inheriting valuable, advantageous peculiarities, have been thereby marked out, selected, fitted to survive; the whole question turns upon how extensively and potentially the law has operated.

Is there or is there not a limit to variability? Does the proposed law suffice for the explanation of all,—as well as of some,—of the past and present diversity of form and function? For more than twenty years the controversy on this point has been waged, and though the final verdict may not have been reached, there are certain conclusions that can be regarded as settled.

One is that the potency, whatever it may be, of Darwin's law, is more or less restricted. Alone and by itself it fails at many points to satisfactorily account for crucial facts.

As an explanation of necessary evolution it has to be supplemented again and again, and collocated with other and unknown forces and laws. This is conceded on all sides. Darwin, in the fifth edition of "The Origin of Species,"—issued ten years after the first—limits the operation of the law in these words—"I am convinced, . . . it has been the most important, but not the exclusive means of modification." He was compelled to invoke new factors to meet its deficiencies, as sexual se-

lection and pangenesis, and then leave much to be accounted for by unknown laws.[3]

Alfred R. Wallace, who propounded the principle contemporaneously with Darwin, has always held it as of only limited applicability, and has well pointed out its failure when applied to man.

St. George Mivart, of equal rank with Darwin, Wallace, Huxley and Tyndall as a scientist, though an evolutionist, remands natural selection to a subordinative role, and not only asserts, but is generally conceded to prove, that "it requires to be supplemented by the action of some other natural law or laws as yet undiscovered. 'Natural selection' is insufficient, both on account of the residuary phenomena it fails to explain, and on account of certain other phenomena which seem actually to conflict with that theory."[4]

Huxley, whose lucid exposition of the theory served more even than Darwin's labored book to give it popular currency and acceptance, concedes, in the last edition of the *Encyclopædia Britannica*, "How far 'natural selection' suffices for the production of species remains to be seen". . . "it must play a great

[3] See "Descent of Man," Vol. I., p. 146.

[4] "Genesis of Species," pp. 17, 33, 257. Compare also, "The Cat," Chap. XV.

part in the sorting out of varieties into those which are transitory and those which are permanent." . . . "The causes and conditions of variation have yet to be thoroughly explored; and the importance of natural selection will not be impaired, even if further inquiries should prove that variability is definite, and is determined, in certain directions, rather than in others, by conditions inherent in that which varies."[5]

One of the latest important works that has appeared is "The Theories of Darwin," by Rudolph Schmid, in which, in presenting "the present state of the Darwinian theories," the author says (p. 107)—"In summing up all we have said about theories of descent, of evolution, and of selection, we still find all the solutions of the scientific problems to be hypotheses, but hypotheses of very different value. The least valuable is the selection theory. It possesses the merit of having started the whole question of the origin of species; it may explain subordinary developments; natural selection may have co-operated as a regulator in the whole progress and the whole preservation of organic life. It seems certain however, according to Ed. Von Hart-

[5] Article "Evolution," *Encyc. Brit.*, Vol. VIII., p. 657.

man, that the impelling principle which called new species into existence lay or originated *in* the organisms and did not approach from without. This seems to be confirmed more and more decidedly with every new step of exact investigation as well as reflection."

These latest conclusions of science as to the insufficiency of Darwin's theory, or "natural selection," to explain the origin of species, these concurrent testimonies as to its having but subordinate efficiency in moulding the forms of life, make it unnecessary to devote more than a casual glance at the points wherein it breaks down. The grounds for denying it the potency at first claimed are chiefly these—

1st. The preponderating evidence is very strong in favor of a *limit* to the variability of species, and against the proposition on which the whole Darwinian theory is founded,—that there is no essential difference between varieties and species. The fact that varieties, however they may differ—and in structure they do differ more widely than many species—are universally fertile with each other; and that, in all the wide variation introduced by domestication, infertility has not been produced; joined to the fact that species when crossed universally manifest this, the peculiar-

ity of hybridism, combine to prove that there is an essential distinction between the two.

This distinction has not yet been broken down, and though the theory has made it exceeding probable that many real varieties are reckoned as species, and the boundaries of true species must be very largely extended, it has not demonstrated that there is no real difference between them. Facts prove, as Huxley concedes, that, coupled with wide morphological or structural changes, there exists great fixity of physiological or functional characteristics. Indeed, under domestication, a limit is ultimately reached beyond which variation cannot be carried; and it is demonstrable that it is equally so in nature, and that there the limit is much sooner reached. In view of this, the widening of specific limits seems all that can be justly claimed for the theory.

If specific modifications have been by descent, as it seems probable that they have been, it has been regulated, not by this but by unformulated laws, and may as well as otherwise have been due to creative power exerted directly on the germs.

2d. The testimony of the geological record opposes the theory in many points. The theory implies not only a general upward gradation in plants and animals, an advance

from the lower to the higher, as we indeed find, but the same advance in particular families or types, which confessedly we do not find; since particular families began apparently in their higher rather than their lower members. The theory demands progress by slow gradual modifications; the geological record seems to indicate leaps: many forms of life have appeared suddenly on the scene and unconnected with previous forms. According to the theory there ought to have been many transitional forms; the record affords scarcely any. Those which have been adduced as the assumed progenitors of the horse, and winged reptiles, while lending some additional weight perhaps to the theory of evolution, *viz.*, that present forms have been reached by successive modifications of previous ones, do not materially strengthen the theory of natural selection. While it still remains an almost insuperable difficulty in that theory, that, in the very strata which afford the most continuous records for the longest periods, there is an entire absence of such forms, as modification by such a law would call for. It is still a fact that the main types of the invertebratæ appear almost contemporaneously and without any traceable intermediate forms.

3d. The enormous lapse of time required for the development of existing species, is, further, an insuperable bar to its acceptance. Darwin says, "Natural selection acts solely by accumulating slight successive favorable variations; it can produce no great or sudden modification; it can act only by slow and short steps."[6] Mivart estimates that, by this method, "it would have taken 2,500 million years for the complete development of the whole animal kingdom to its present state." And if natural selection has been the only method, this is not at all excessive in view of the length of time it has taken to differentiate, say the greyhound from the wolf. Now earth, it is mathematically demonstrable, could not, according to the nebular hypothesis, have been the home of life for more than 100,000,000 years, some estimates say 10,000,000 years, and even the longer period would scarcely suffice for the production of the higher mammals.

4th. The theory utterly fails to account for the incipient stages of organs and organisms, which, however profitable in their perfect and mature form, previous to that must have been useless, or even injurious.

Mivart, in his "Genesis of Species," has

[6] "Origin of Species," p. 421.

fully set forth and illustrated this objection, and shown both the utter impossibility of the acquisition of many peculiarities by any such slow and gradual process, and following Nägeli, the mathematical improbability, that a modification, occurring in one or a few individuals surrounded by others, would be perpetuated rather than be lost.

These objections are recognized as fatal to Darwin's celebrated theory as a full and satisfactory account of the origin of specific differences.

The theory does serve however to explain with much plausibility a number of facts—*e. g.*, rudimentary organs as atrophied through disuse; the phenomena of mimicry,—*i. e.*, close resemblance of certain plants or animals to other and perhaps different plants or animals, as a safeguard from enemies, and hence an advantageous peculiarity certain to be perpetuated; while it fits in with some of the facts of the geographical and geological distribution of species; of the homology of form and function; and biological development.

We have dwelt thus upon the theory of natural selection, since it is the only one of which science has as yet been able to explain the operation.

The laws with which it has co-operated to effect present diversity are conceded to be unknown, and are merely inferred because there seems evidence that existing forms and species have in some way descended from pre-existent ones.

This the present geographical distribution, taken in connection with geological remains, makes most probable. For it is a conceded fact that the geological remains in many cases show the prevalence in geological ages of the same typical forms as are found in the same localities to-day. Thus in Australia is found a particular faüna, and among those peculiar to it, and indeed found nowhere else, are the kangaroos and other pouched beasts, and the same type of creatures is found in its geological remains. The same fact is true of the very peculiar animals of the sloth and armadillo type—found alone in South America.

Alfred R. Wallace has collated many corroborative illustrations of this feature of geographical distribution, and further shown that the diversity of animals and plants on islands is directly proportionate to the degree of ease with which they can have passed from one to the other. These considerations, with some of those already referred to, as being best explicable on the supposition of

genetic relationship, lend much strength to the hypothesis of an evolution of specific differences. We have seen that Darwin's theory does not by itself explain them, that there must be supposed other laws, yet unknown and unformulated, supplemental and co-operative, to account for the facts. The very fact that different laws have conspired unto the result; that the relation of plants to insects, of many a species to other species, is one of mutual dependence; that the outcome of the struggle for existence has fitted the earth to be a home for man; proves that there must have been a co-ordination and collocation of laws and efficient causes throughout the process, and this we cannot conceive of, apart from an all-wise and almighty co-ordinator and ruler.

Mechanical, necessary evolution fails as signally to explain the origin of species as it does to account for the introduction of life, and the beginning of the world. These all are inexplicable by any other evolution than that which has back of it a living, personal God, creating and governing all things for His own ends; and such evolution, subsequent to its beginnings, differs not from what in theology we call Providence.

In reviewing the ground we have traversed in this lecture, we see that materialistic and agnostic evolution, in seeking to account for the earth and life by causes or forces inherent in itself, is necessitated to bridge the chasms between the non-existent and the existent, between nothing and matter, and matter and force, between the not-living and the living, and between the widely separated forms of vegetable and animal life. We have seen that it fails in each and every instance. We could equally demand of it, to explain still higher steps in the necessary progression. Whence sensation, intelligence, consciousness? By what principle immanent in nature has man, with his reason and conscience, self-determining will and spiritual intuitions, been evolved? These difficulties are as inexplicable, by such evolution, as those into the consideration of which we have entered.

The only rational conclusion, the only consistent account of earth and its contents, is an evolution back of which is a creator and a providence in one person. For the origin of matter, of force, of life, of intelligence, of man.—a creator: for the progressive process by which, under laws and secondary causes ordained by the Creator and co-ordinated by Him, earth has become what it is,—a Providence.

True science, when it has traced out the history of the earth and its myriad inhabitants, when it has mastered the wondrous connections and intimate relationships of its phenomena, and when, discerning herein the presence of a plan, of thought, intention, purpose, it asks the questions, whence? and why? will find its only answer to be:—GOD.

LECTURE THIRD.

EVOLUTION AND MAN.

The advent of man with powers bespeaking a different order of being from any below him, demands even more than the incoming of life, sensation, and intelligence, the interposition of an omniscient and omnipresent Creator; and this is strictly accordant with a divinely co-ordinated and controlled evolution. Mechanical evolution, on the contrary, is constrained to make man, as everything below him, the necessary outcome of unconscious and unintelligent forces,—merely the highest and final product of a slow and constantly ascending natural selection.

The Agnostic as much as the Materialist must so regard him. For let it be admitted that man is the Creation of God, and has in his soul something that bespeaks his origin and is akin to his maker, and God ceases to be the altogether unknowable, and the fundamental postulate of Agnosticism is overthrown.

Agnostic and Materialist therefore agree in making man only an evolution from the brute, a survival from the same stock as the Anthropoid Apes.

The difficulties however of such a conception are greater than at any previous point in the process.

They are such as to cause many an evolutionist, as notably Alfred Russell Wallace, to pause, and concede that here mechanical evolution fails and that "a Superior Intelligence has guided the development of man in a definite direction and for a definite purpose."

However efficient natural selection has been in accounting for the "Origin of Species," many besides Wallace have been constrained to concede its inability to explain the "Descent of Man." Wallace's arguments on this point have never yet been satisfactorily met. He urges that natural selection does not account for the size of man's brain, so much in excess of the highest apes, and of his own need when but a slight remove from his brute ancestry. It cannot account for the loss of such useful peculiarities as a hairy covering for his back, and the prehensile character of the feet. Nor can it explain the latent and long unused capabilities of the human hand and voice, and the acquisition of man's character-

istic mental and spiritual faculties. These are difficulties, we may add, not only in the way of natural selection, but of any theory of unintelligent and mechanical evolution.

The hiatus between apes and man is so great as to be a serious stumbling-block in the way of any theory of gradual modification. If man and the ape have had at a remote period a common ancestor, where are the many intermediate and transitional forms that must have existed? It is conceded that man is the latest and possibly the final outcome of the long process. However far back his advent, compared with the other forms of life, it is recent, and from his first appearance the earth-record is measurably complete. Now this record speaks of no such half men and half apes, as, on such a theory, we have a right to expect. On the contrary the earliest human remains show that man was then no whit less endowed with cranial capacity than the man of to-day. Then as now the size of brain does not perhaps positively decide whether the condition was one of savagery or civilization, but it does positively negative that it was ape-like. To the same purport is the fact, that no man has ever been found so embruted or sunken in savagery as to be without capacity for spiritual quickening and development, a capacity no ape has

ever manifested, and this proves man's intelligence to be of a different kind from that of the brutes. In fact it must be granted that if brute instinct be of the same order as human intelligence, then, as Sir John Lubbock justly says, if "anthropoid apes approach nearer to man in bodily structure than do any other animals, it must be admitted that ants have a fair claim to rank next to man in the scale of intelligence."[1]

In view of this, we ask, are we more entitled to look for the missing link in the domain between man and the monkey, than between man and the ant? Is it bodily form, or intelligence, that is man's chief characteristic? In either case, however, the chasm is immense and cannot be closed.

The evidence is cumulative that serves to disprove the postulate of materialistic and agnostic evolution, that man has been evolved from the brute.

Just as to account for matter and force and life a divine interposition is needful, so is it even more essential, in order to account for man, possessed as he is of a soul with moral attributes, and a higher order of intelligence than that of the brutes.

There are two inferences necessarily drawn

[1] Lubbock's "Ants, Bees, and Wasps," p. 1.

from the hypothesis of mechanical evolution that deserve especial consideration, and all the more because it is claimed, that they are established by independent and positive evidence and hence are put forth as not merely consistent with man's descent from the brute, but positive arguments in favor of such an origin.

These inferences are:—*Man's vast antiquity;* and *his low primitive condition*, only slightly in advance of his supposed brutish ancestry.

We readily see, that the establishment of these postulates is essential to the maintenance of any theory of mechanical or necessary evolution; if they be overthrown or weakened by just so much is the entire hypothesis discredited. To the establishment of these propositions therefore have been given great industry of research and wide learning. It becomes us to examine them with great carefulness and candor.

In what remains of this lecture we will consider the question of *Man's Antiquity;* and reserve for our next, the equally important and closely connected question of his primitive condition,—the origin of his civilization.

In consistency with the claim that "man is descended from a hairy quadruped, furnished with a tail and pointed ears, probably arboreal in its habits and an inhabitant of the Old

World, and classed among the Quadrumana as surely as would the common and still more ancient progenitor of the Old and New World monkeys,"[2] he must be regarded as coming on the stage of earth not only in a condition of savagery lower than any now known, but at a time most remote from the distant period to which the dawn of history carries us back. On the hypothesis of slow gradual modifications, one hundred or even five hundred thousand years would not be an excessive estimate of his age on earth, if it be measured by the ratio of his progress in the four or five thousand years covered by the records of history.

But we will not concern ourselves with this inferential style of reasoning. Fond as the advocates of a great antiquity are of using it, it carries no weight unless mechanical evolution itself be accepted, and that too in a form which admits of no modifications or progression except by a process, as slow, gradual and steady, as that by natural selection. To argue antiquity from an assumed progression, at an assumed rate, from savagery to civilization, from the ape-like ancestor, to the cultured descendant, is a mere begging of the question.

The issue is capable of being tried in the

[2] Darwin's "Descent of Man," Vol. II., p. 372.

light of facts. It is a question of evidence. Do the facts as far as ascertained prove the great antiquity of man?

We will proceed to interrogate the evidences, but before doing so, it may not be amiss to state that latterly there has been in deference to facts, a great curtailing of man's age, from the hundreds of thousands, if not millions of years claimed for it, on the ground that he has become what he is by the slow process of natural selection. Even Hæckel has conceded that the claims at first advanced were probably excessive, and admits that a modest minimum of twenty thousand years may prove all that the facts will warrant. E. B. Tylor in his article on "Anthropology" in *Encyclopædia Britannica*, uses equally moderate language,—as, *e. g.*, "from twenty to one hundred thousand years may fairly be taken as a minimum," the evidence of prehistoric remains, requires "an antiquity of at least tens of thousands of years." The development of culture and language "necessitates that to the four or five thousand years to which the ancient civilizations of Egypt, Babylon, and China date back, a probably much greater length of time must be added." This is a marked abbreviation of the hundreds of thousands that were at one time claimed.

This bringing down the sojourn of man on earth to somewhere within from double to quadruple the time usually allowed his history is necessitated by any temperate weighing of the facts relied upon to prove his age. Though his advent may be remanded back to a geological period, it is to the period confessedly the topmost of the series. He belongs to Cenozoic time,—the Quarternary age,—the geologically Recent period. There have been frequent announcements that evidences of his existence in the Pliocene and even Miocene period of the Tertiary had been found, but more careful examination has ever disproved the claim. So that no recognized authority assigns to man an antiquity older than the Pleistocene of Lyell, and the Middle Quarternary or Recent period of other geologists. There are those who indeed expect the evidence of greater age will be found, but the fact remains that it has not yet been adduced.

The sciences to be interrogated as to man's antiquity are three: Geology, Prehistoric Archæology, and the Science of Culture. And the evidence adduced correspondingly falls under three heads:—1. Facts which concern the geological position of human remains. 2. Facts which respect man's association,

and contemporaneousness with certain extinct mammals. 3. Facts which respect his race characteristics, diversities of speech, and the origin and growth of civilization.

We will as briefly as possible examine the argument.

Within the last fifty years, and more particularly the last twenty-five, facts have been multiplying tending to connect man with a past geological epoch, and an extinct fauna. Very few fossilized crania, or bones of man have been found—and such as have been discovered are conceded to have afforded very slight evidence as to his antiquity.

Their age as inferable from their position, rests upon geological considerations, and as to these there is no such agreement as to require the supposition of any very great antiquity.

The evidence as to age on the hypothesis of a kinship to the brutes, equally breaks down in respect to the crania that are confessedly the most ancient, as notably the Engis and Neanderthal skulls. As to the first, Huxley says: "There is no mark of degradation about any part of its structure. It is in fact a fair average human skull, which might have belonged to a philosopher, or might have contained the thoughtless brain

of a savage." As to the latter, he says, while in some characteristics "the most pithecoid of human crania yet discovered, . . . its capacity may be estimated at about seventy-five inches, which is the average capacity for Polynesian or Hottentot skulls." And "in no sense can it be regarded as the remains of a human being intermediate between men and apes."

In the light of these oldest human remains he declares "if any form of the doctrine of progressive development is correct, we must extend by long epochs the most liberal estimate that has yet been made of the antiquity of man."[3]

The remains of man which are depended on to prove his antiquity and condition, are not his fossilized bones so much as the fruits of his skill and handiwork, which have survived the destruction of time. It is the position and relations of these indisputable relics of his art, that furnish the principal ground for claiming for him a high antiquity.

For instance, mingled with the drift, or valley gravels of certain rivers, as the Somme, the Seine, and the Garonne, in France, and the Thames, the Wey and the Ouse in England,

[3] Conclusion of Huxley's "Man's Place in Nature," also Quatrefages' "Natural History of Man," pp. 83–5.

are found worked flints,—the indubitable evidence of the existence of man at the period of their deposition.

Associated with these tools and weapons of flint, are found the bones of extinct mammals, such as the mammoth, the rhinoceros, the hippopotamus, the cave lion and bear, the hyena, etc., etc. Evidences of man's existence and handiwork, are also found in numerous caves in England, Belgium, the south of France, and elsewhere. In nearly all cases his weapons, and tools and pottery, if not his own bones are associated with the same or a similar extinct fauna, as is found in the flint-bearing gravels.

Likewise in the peat-bogs, particularly of Denmark, and in what is known as Kjökken Möddings, or kitchen refuse, or shell,heaps, which are numerous and extensive at many points adjacent the sea-coast of northern Europe, are found not only the relics of the shell-fish and animals on which men lived, but many of their weapons and tools, and in such order and arrangement as give us some idea of their condition and mode of life at successive periods.

Already at this epoch, however, man has come to have substantially the same environment as in the historical period, and has passed

out of the geological epoch. The same remark applies to the very interesting remains that have been recovered from the beds and shores of the Swiss Lakes, where prehistoric men had for generations as a protection against beasts of prey or hostile tribes of men, their houses built upon piles in the lakes and thus easily isolated from the land. This particular form of dwelling is no evidence of antiquity, as similar structures are found to-day, where among certain tribes considerations of convenience or security make them desirable, as extensively in the northern parts of South America, and not infrequently elsewhere.

In Europe and Asia such structures were in use during the historical period, and are mentioned by Herodotus in his account of the Ancient Pæonians; by Hippocrates, and by other ancient writers.[4]

The remains recovered from the sites of the Swiss Lake dwellings, assure us that they were in use from the stone age down to the bronze, yea into the iron, even to the time of the Roman conquests. The fauna was some of it different from to-day, but none of it geological,

[4] As to the use of this form of dwelling in historic and even present time, see Lubbock's "Prehistoric Man," pp. 174–77. Also Southall's "Recent Origin of Man," pp. 156–58, 178–79. "Epoch of the Mammoth," pp. 40, 58.

or such as to require the assumption of any great antiquity.

These several classes of remains furnish all the direct geological or prehistoric evidence there is for man's great antiquity. It remains for us to examine the arguments built upon them, and ascertain whether it is a necessary conclusion that these prehistoric men lived so many thousands of years antecedent to the dawn of history.

It is readily granted that man was present in Europe while yet large portions of it were feeling the influence of the last glacier period, that he lived in a climate and among a flora and fauna markedly different from the present, that he carried on the struggle for existence amid difficulties to which his descendants are strangers. We accept this to be the evidence of the river gravels and the caves; though the remains of human art and of the extinct mammals have suffered so much of dislocation and mixture by watery currents and other agencies, that the proof of contemporaneousness can be scarcely regarded as conclusive. Dismissing this doubt, however, the question of age turns upon how long a time has been necessary to effect the changes that have taken place.

When were the flint-bearing gravels of the rivers deposited? How long, since man was

at least an occasional occupant of the caves, and the contemporary of the mammoth, the reindeer, and cave bear? How much time must be allowed for the changes in configuration of land and in climate that have taken place? The answer to these questions will depend altogether on the views we take as to the kind and degree of the forces by which these changes have been wrought. The advocates for a very long period, with Sir Chas. Lyell at their head, are without exception uniformitarians, *i. e.*, they assume that geological changes have been wrought by the same forces, not only, as are operating to-day, but by these forces operating in the same way, and with substantially the same energy as at present.

It is by this convenient assumption, that, learning the ratio per year or century of any change now going on, the time requisite for the work accomplished can be readily reckoned.

Thus Sir Charles Lyell reasons in respect to parts of the shores of Norway. They are found to be rising at the rate of say two feet and a half in a century, therefore where they have been upheaved to an altitude of six hundred feet it must have required a period of twenty-four thousand years. So too the time it has taken to form the alluvial shores and the

delta of the Mississippi, or the Nile, may be calculated by ascertaining the amount of sediment that is each year carried down by their waters, and dividing by it the alluvial mass; thus assuming the delta of the Nile, for example, to have grown at the rate of three inches and a half in a century, it would have taken several hundred centuries to have accumulated the many feet that make up its present thickness. On the same principle, Huxley assigns ten thousand years, and others three to four times as many, as necessary to have produced the gorge below Niagara Falls. The mighty rush of water is cutting away the rock at the rate of from one to three feet per year: it is therefore a simple mathematical calculation to ascertain how long it has taken to wear away the six miles of ravine that lie below the present Falls.

It is by calculations such as these that the date of the river-gravel and cave men is sought to be ascertained.

As to the flint implements of the Somme Valley, their age is calculated by estimating how long it must have taken for the beds of gravel rising from the chalk fully one hundred feet in places, to have been formed, on the supposition that every change has been wrought by the agency of the present river,

flowing indeed at a higher level and with some greater volume, but in other respects no more potent to work changes than at present.

The calculation begins by estimating the age of a deposit of peat about thirty feet in thickness, which overlays, and is more recent than, the gravel. The age of this has been computed in this way. At about eighteen inches from the surface have been found several flat dishes of Roman pottery, from which it is inferred that the peat has only grown about eighteen inches in perhaps eighteen hundred years, at which ratio of deposition the age of the whole thirty feet cannot be less than three to four hundred centuries. This conclusion led even Sir Charles Lyell to hesitate to adopt the proposed rate as a true chronometric scale. But it is precisely on *this principle* that such calculations are made. If a valley has been worn down, it has been at an average erosion of so many feet a century; if the coast line has sunken, it has been at a given ratio of depression; if peat has formed, it has been at a fixed rate; and as all these features are present in the Somme Valley it must have required so many millenniums to have brought it to its present condition out of the original chalk. This is manifestly assuming that the forces of nature operate with a uniform ratio

of intensity. Without pausing at this point to controvert the postulate, we may further observe that the age of the cave men in many cases is ascertained in the same way. An instance is found in connection with the famous Kent cavern of England.

Beneath a deposit of stalagmite five feet thick were found flint implements and the ashes and coals of a fire. At once a time measure was sought, and it seemed ready at hand, for two hundred and twenty years ago a man had carved his name upon the stalagmite, since which time it had grown only one-eighth of an inch, hence to form the five feet must have required a period of one hundred and twenty thousand years, and a prominent lecturer from England claimed before an American audience only a few years ago, that on this evidence we must believe the man or men who built that fire in Kent cave did it more than a hundred thousand years ago.

Such results it would seem must necessarily cast suspicion on the methods by which they are reached. We have only instanced one or two of the many applications of this principle of uniformity as the basis for an estimate of time. The occasion does not admit or require that I should do more. All such estimates are utterly worthless, since nothing is capable

of more triumphant demonstration than the very converse of the assumed principle.

There is no such thing in nature as the assumed indefinitely continued uniform activity of its forces.

It may be on the contrary laid down as a law, that the forces of nature have no uniform ratio of activity.

Peat is forming to-day as it has in the past, at nearly every rate of growth, from one foot a century to one foot a year, and how long it has taken any particular deposit to form cannot be calculated on the assumption that every part has growth at the same rate.

This is equally true of stalagmite: it may grow as slowly as the case cited, one-eighth of an inch in two hundred and twenty years; it has been known to form as rapidly as one-eighth of an inch in six months; and because at one period the deposition is very slow, it by no means follows that at another and earlier it may not have been very rapid. The same is true of those wider and more extensive changes which respect the elevation, or depression of land, carrying with them as they necessarily do important changes of climate and corresponding variations of flora and fauna. These are not, any more than the other and minor modifications, made at a

uniform rate. A coast line may rise for a century at the rate of only a few inches or feet in all that time; it may also rise or sink suddenly, as has happened to the coasts of India and South America; or again, in the period of a single generation it may undergo most marked changes, such as Darwin notes as having occurred in Chili[5] or as are now taking place in Hudson's Bay, whose shores have risen several feet in the memory of man. And the fact that change has been going on for a century at one rate, is no criterion for judging what the rate will be in the century to come or what it has been in centuries past. The present popular school of Uniformitarian geology, founded by the lamented Lyell, was a natural and proper reaction from the Cataclysmal theories that had obscured the important dynamic effects wrought by long continued action of existing forces. But just as the day of accounting by sweeping catastrophes for every geological change is past, so we believe will it soon be with rigid Uniformitarianism. The one extreme is as far from the truth as the other.

Other agencies have operated in nature than those we see at work every day. And moreover, these ordinary agencies and forces

[5] See "Voyage of a Naturalist," p. 310.

have wrought on a wider scale and with a greater energy than we ordinarily observe. Thus have changes, we doubt not, been many times wrought more extensively and rapidly than is conceivable on the uniformitarian hypothesis.

Besides, *uniformity itself is cumulative*, and accumulations of slight changes tend necessarily and invariably to catastrophes.

It may take a long period for such accumulations to overthrow the equilibrium, but the time necessarily comes when there must be a readjustment. Then the changes are so rapid as to be cataclysmal, and a very brief space may suffice to work fundamental and revolutionizing effects.

It is such catastrophes as these, that are perchance centuries in preparing and other centuries in working out their effects—*catastrophes which are readjustments* made necessary by changed conditions, that are lost sight of by geologists of the Lyell school. The fact that uniform conditions exist and have been observed for long periods, affords no basis for predicting the length of their continuance, or fixing the date of their beginning. Who would be prepared in view of the uniformity in the contraction and expansion of water under the wide range of

degrees of heat marked by 40° to 200° for, the changes that take place when 32° is reached on the one side, and 212° on the other? Yet something similar to this is to be looked for throughout the whole domain of nature. Uniformity necessarily tends to its own overthrow. When catastrophes are spoken of and their agency invoked to explain natural phenomena, thought naturally reverts to such as earthquakes, volcanoes, tidal waves, and the like, which come seemingly by no law and most unexpectedly. The very fact that such unpredictable events *can* interpose and work wide-reaching effects, make more or less uncertain the estimates based on rigid uniformity. But these are not the kind of catastrophes that have been most potential and widely revolutionizing in their effects, but rather such as by their culmination have brought increasing cold and glacieration unto the changing the climate and life of extensive regions, and those which in turn destroyed the glaciers, and gave more favorable conditions to vegetable and animal life. In such wide reaching changes, though the causes leading up to the event may have acted slowly and uniformly, there must be conceived to have been an acceleration of rate as the crisis

approached, and with it a more intense and rapid action of all the forces.

The avalanche, for example, is prepared for by each increase of snow and ice,—and as certainly as the mass grows, so certainly will the law of gravity cause a portion some day to be launched on its destructive course, but no one can predict the time, or measure the rapidity or extent of the changes, by the rate of growth that produced the needful conditions.[6] Whatever were the cause or causes of the glacier period we may be sure the nearer it came to its culmination, the more intensely they operated. And whatever causes produced the increase of heat which melted them, we may be certain that each season brought a more and more rapid wasting of the accumulated ice, and a corresponding amelioration of climate, until an equilibrium was reached.

The position of the earlier remains of human

[6] I cite the Avalanche as an illustration of this sort of cataclysmal change, since however circumscribed may be its effects, the catastrophe is prepared for by a gradual process, and is followed by changes which however rapid and extensive at first, become finally slow and gradual. What we would emphasize is that many of the greatest and most influential changes in nature are of a similar character—catastrophical—preceded and followed by long periods of slow and gradual modifications.

art and their juxtaposition to the members of a fauna indicative of an almost arctic temperature, goes far to prove that man had his home in Southern Europe at a period when the glacier system was with increasing rapidity passing away. The phenomena can only be explained on some such catastrophical theory as we are advocating. The very length of time required on the rate of change assumed by the rigid Uniformitarian is in itself a disproof of the theory. The men of the river-gravels and the caves would seem to have been destroyed or driven away by just such floods as must have occurred in the more and more rapid melting of the glaciers. Everything in the situation, character and relations, of the remains, suggest a sudden—if what may have taken a century or two, may be called sudden—change in climatic conditions.

The most probable explanation of this change supposes along with the depression of the center and south of Europe, an elevation of both Northern Asia and Africa—converting on either side of the glacier-capped mountains of Europe, what had been land-locked seas, into denuded plains. The effect on the north was a lowering of the temperature of Northern Europe and Asia, and the transference of the

belt of perpetual ice further north. While on the south the effect was the drying of the inland sea of Africa,—the converting it into the heated waste of sand, known as the Sahara, and this not only took away the most abundant source for the precipitation that fed the glaciers, but furnished the heated winds that caused them to melt so rapidly, that the rivers must be conceived as having fully a hundredfold the volume and force of to-day. The more such a catastrophe as this is made probable and well-nigh certain, the more likely does it become that its effects would be most wide-reaching, and abandoning the Uniformitarian's disproven method of reckoning, we can believe it need not have been more distant in time, than that deluge of which nearly every race and language retains the tradition. Whether this be so or not, certain is it, that time backward cannot be computed on the principle of rigid uniformity of the operation of nature's forces. And with this method of calculating time done away, the grounds on the score of geology and prehistoric archæology for claiming for man a vast antiquity also fail.

The extinct animals among whom he lived give, we further see, no criterion of age, because they themselves are old or not, just as we

determine the probable cause of their extinction. If, as is most probable, they were destroyed as much before the changes of climate, and the flooded condition of their habitat, as the weapons of man or the struggle with other beasts, the same events that buried the evidences of man's presence swept them away, and contemporaneousness with them does not add a century to the age of man. This is strongly confirmed by the structural condition in which many of these remains are found. Very many have even to-day more of the structure of bone, than stone. This is especially noticeable in the numerous remains of the mammoth in Russia; where, preserved by frost, specimens have been found so perfect as to give an almost complete idea of its appearance and habits. Indeed, there it is plain, that a sudden destruction overtook whole herds of these massive mammals, and that, at no extravagantly remote period. And the fact that sudden glacieration destroyed them, favors, very decidedly, the hypothesis, as to the causes which destroyed the glaciers of central Europe, referred to above.

In considering the facts deduced from the ancientness of race peculiarities, and diversity of language,—the science of Culture,—in their bearing on man's antiquity, we have need to

invoke the same principle we have been considering. Quiet and slow as are nature's forces when in equilibrium, they act violently and rapidly when the equilibrium is disturbed, —when they are seeking a new adjustment. We are ignorant of the causes that produced the original divergence alike in races and speech, but there seems little doubt in the light of all analogy that whatever they were, the limit of divergence was, within a short period, reached. Since then the environment and the nature responsive thereto, have remained so constant, and the causes likely to produce change have been so few and slight during the whole historical period, that the principal types alike of races and language have remained substantially fixed.

If this be correct, then the argument for a long antiquity in order for man to differentiate his form, and color, and speech and arts by slow and gradual steps, is completely done away. Probably the very same cataclysm that so radically changed the climate, the flora and the fauna, of man's dwelling places, may have started the train of causes that has given us the races of men and led to the confusion of their tongues. The geological strata in their breaks, upheavals, convolutions, etc., as well as in their proofs of sudden transforma-

tions of life,—extensive destructions of old forms and the incoming of new ones—afford evidence that if these changes were brought about by existing forces, they were operating far more widely, energetically and rapidly than now. They could not have been wrought by a law like natural selection or survival of the fittest, which only admits of slow and almost imperceptible modifications. Clarence King did good service a few years since in showing this, as to our American continent, particularly with reference to the more recent geological ages. There is even stronger evidence of the same fact as to the fields in Southern and Western Europe in which the remains of prehistoric man are found. He had to struggle with, and flee from, if not succumb before, a rapidly and catastrophically changing environment.

The weakness of the argument for a great antiquity, drawn from a changed fauna, and the time requisite to develop a high civilization in the same territory where savagery has prevailed will be apparent, if we suppose, the history of our own country were lost, and had to be reconstructed from the material with which Archæologists have to work.

If there were no other data but those marking the contrast between the present evidences

of an advanced civilization, and the arrow-heads and flint implements dug up in our fields and gathered in our museums, the tokens of a pre-existent savagery, together with the decrease verging to extinction of a fauna natural to a savage social condition, the inference would be drawn that an enormous length of time must have elapsed in order to so great and radical a change. According to the reasoning of Lubbock, Tylor, and others, the number of years necessary to work such changes, for the stone age to develop into the bronze, and the bronze into the iron, for the old fauna to yield to one substantially new, would on the hypothesis of slow, gradual modification, be numbered by the hundred thousands. Yet in the light of history we know that most of these changes have been wrought in a single century, and all have required less than three hundred years.

A careful weighing of the evidence leads us to the conclusion that man's antiquity is far less than has been claimed. We deem it certain that he has not been a denizen of earth for the period that must be allowed on the supposition of nothing but slow and uniform rates of change in himself and his surroundings.

His antiquity we can safely say is not such

as to support the hypothesis of mechanical, unintelligent evolution.

In our next lecture we shall endeavor to show that equally there is no good or valid ground for the assertion that man was originally a brute-like savage.

LECTURE IV.

EVOLUTION AND CIVILIZATION.

In support of a necessary evolution, inclusive of man and everything below him, much attention has been given to the proving that his origin was back in dim geological time, and that his original condition was far below that of any known savages. Both these postulates are necessary to the hypothesis sought to be proven. For while the establishment of both would not weaken the objections on other grounds to mechanical evolution, or favor it, more than the supposition that an intelligent Supreme Being has begun in Creation and has guided by Providence, whatever evolution there has been; we readily see that the failure to establish either of them is fatal to any theory of necessary evolution as accounting for man's origin and progress.

In our last lecture we briefly presented some

of the arguments against accounting for man as an evolution from the brutes, and then examined the claim as to his antiquity. We found that the claim rested on an unproved and improbable theory of uniformitarianism in nature's operations. That the facts adduced proved indeed extensive and radical changes of land, and water, and climate, of vegetation, animal life and man, but that such changes could as well have been effected in one millennium as a hundred, and did not probably antedate the historical period more than, if as much as, a thousand years. We now turn our attention to the other postulate, that man at his origin was but a slight advance over the brute, and that he has risen by slight and progressive modifications from an ape-like savage to his highest present condition.

He must be supposed, without intervention from a Divine Maker or Ruler, to have acquired his speech, his arts, his morals, his religion; and to have passed from the lowest manifestation of each to the highest, by a principle of progression inherent in himself, or imposed by his environment.

Of course if this could be proven, if man has come to be what he is by a process as slow and gradual as that of natural selection,

it would be a strong presumption in favor of man's claimed antiquity. In fact this *is* the argument principally urged and relied upon to establish that fact.

This is the argument for man's hoary antiquity deduced from the science of culture, to which in our last lecture we scarcely more than alluded. We then deferred its discussion, because a full reply to it turns upon the questions we are now to consider: viz., *Whether man was originally as brute-like as is claimed?* And *by what process has he become what he is, in his most civilized condition?* These questions are to be answered, not by the "it may be supposed" and "we may readily conceive" style of argument which is so frequently employed by the advocates of an unintelligent evolution, but by a careful weighing of evidence, an appeal to facts. If man has descended from the brutes, if he has ascended from an ape-like savage, it is to be properly decided only by an examination of his oldest remains, the study of his earliest records.

Now the first question to be asked is, where are these to be found? Assuredly, at the original home of the race,—the center from whence he has radiated. For the evolutionist holds as most accordant with

his theory, what is otherwise most probable, the unity of the human family, and if the diverse races have descended from a common ancestry, there must have been somewhere an original central home. It is the concurrent opinion of nearly all ethnologists that this home was somewhere on the great plateaux of Central Asia, and that from thence man has migrated or extended unto the various habitable portions of the globe.

Now, it will be conceded that the evidences thus far adduced for savagery, and an originally low type of humanity, have not been gathered in these the earliest seats of man and his works. On the contrary, they have been collated from what must have been, supposing the opinions of ethnologists to be correct, the very outposts of population, from the scenes of migrations most distant from the original centres. The study of the so-called "prehistoric man" has thus far been chiefly confined to his European habitat. The classification of men according to the materials used in meeting their necessities,—the division of prehistoric times into Ages of Stone, Bronze and Iron, is based on what has been learned respecting man, as he has lived and wrought in Western Europe, in Denmark, Belgium, France, Switzerland, and Great Britain. Sir

John Lubbock in his interesting and authoritative work on "Prehistoric Times" (p. 2) says: "In order to prevent misapprehension, it may be well to state at once, that for the present, I only apply this classification to Europe, though in all probability it might be extended also to the neighboring regions of Asia and Africa." Should we concede all that is claimed respecting the successive periods through which man is supposed to have lived in Europe, there is absolutely nothing presented to show that his lowest and rudest condition there, was not contemporaneous with not only a higher, but an exceedingly high civilization, in the older homes of the race. In fact the evidence is entirely wanting of a stone age, not only in the supposed original seat of man, but in the countries earliest settled. In the valleys of the Euphrates and the Nile, where archæology has pursued its investigations most thoroughly, that which is earliest in time is usually found the fullest of evidence as to the skill and ability of artisan and builder. As far back as we are able to go in the antiquities of Egypt, and Babylon, of Persia, India and China, we are able to discern no inferiority in man, his works or his civilization. His achievements bespeak him the peer of his descendants. If his first

exercises of skill, his first attempts in the arts were with stone, he so soon passed beyond it and out of its limitations, that there are no such relics or remains of stone weapons or implements, as would suggest a time when their use was general.[1] What prehistoric archæologists are fond of terming "primitive men" "the oldest known types of humanity," are by no means likely to have been really such, since they are found just where, and only where we would expect to find the strays and exiles from the ancient home, and amid surroundings that made the struggle of life most severe. Hence to find rudeness of art, and inferior civilization, yea, savagery here, would tell nothing as to what might have been the condition at the same time in the older abodes of men. Bearing in mind that the facts we are to consider refer not necessarily to primitive man, but only to the earliest inhabitant of Western Europe, let us examine into their significance as showing his original condition, and the successive steps of his upward progress.

It is conceded by all that the men of the

[1] Implements and weapons of stone are found in Egypt and Babylonia, but not under such circumstances as to indicate exclusive use, or a "*stone age*." *Vide* Southall's "Epoch of the Mammoth," Chap. XIX.

Drift, the contemporaries of the cave bear and the mammoth, the claimed to be oldest inhabitants of Europe, were true men, and removed many degrees from the brute. As was seen in our last lecture—the few human crania and bones that have been discovered, prove the men of that age to have been far removed from the ape, to have been human in form, and with brains promising as much native ability and intelligence as their descendants. There is an utter failure to connect them with the brute. The earliest men in Europe possessed, we have good evidence, not only speech, and reason, but the rudiments of the arts, and morality,—characteristics which mark them as of a different order from the brutes. The facts that man *has progressed* to where he is, and that no savages have been found so degraded and debased, as not to be susceptible of improvement, conclusively show that man's powers as man differ in kind from those of the brute tribes, otherwise the failure to find animals capable of similar progress and improvement is inexplicable.

It is a confirmation of this view that the savage races existing to-day, and, on the hypothesis supposed, the survivals of an ancient savagery, afford, it is now conceded, no in-

stances of any race without speech, or morals, or religion; and equally none who fail to exhibit capabilities of progress, and such community of nature as stamp them as one with man, and separated by an impassable gulf from the highest brutes. The natural powers of the savage, even of the lowest, are far greater than they seem, to those who estimate their achievements and adaptations in the light of a radically different environment and civilization. Everything connected with them has suffered in being reported to us by those who have had absolutely no points of sympathetic contact with them. Their strange speech, and habits of life, are often altogether unintelligible to a casual observer. Travellers, judging everything by their own standards, have frequently reported them as simply brutish. But when their languages have been mastered, their customs and views sympathetically studied, and their devices to meet experienced needs investigated, it has always been found that they possess,—in a rudimentary form indeed, but really,—all the human capabilities and powers which have wrought out higher civilizations. The late Charles Darwin, whatever we may think of his theories, was a careful observer and an honest reporter of facts, and his testimony on this point is wor-

thy of note. In his "Voyage of a Naturalist" he expresses his belief that the Fuegians exist in a lower state of improvement than any other savages. Comparing them with the Australians, while assigning superiority to the latter in acquirements, because they can boast of the boomerang, the spear, and throwing-stick, their method of climbing trees, of tracking animals, and of hunting, "It by no means follows," he says, "that they are likewise superior in mental capacity." From what he saw of the Fuegians on the "Beagle," who had spent two years in England, he says, "compared with what I have read of the Australians, I should think the Fuegians the more improvable." Of these Fuegians on the "Beagle" he further says, "I was continually struck with surprise how closely they resembled us in disposition and in most of our mental qualities."[2]

And the more it is looked into, the more will the conviction grow, that it is the use of a false criterion of judgment,—it is the trying them by the standard of our modern and artificial civilization, that has led to the assignment of savages to kinship with the brutes. The savage, despite the fewness of his wants, the limited range of his thoughts,

[2] Darwin's "Voyage of a Naturalist," pp. 207, 434.

shows all the attributes of humanity—and in mental capacity, in the essentially manlike quality of intelligent adaptation to his environment, is the equal of his civilized brother. The degree of skill and the extent to which he uses it, the actual inventions and contrivances which prove thought and reflection, the adaptations that show the possibility of progression, may greatly vary, and be fewer among savage than civilized men, yet so far as he feels his needs man everywhere and under all circumstances exhibits the capacity to meet them. And it will invariably be found that the savage has attained to and practiced the best devices attainable in his circumstances. If the civilized man were placed in exactly the same environment, with all his superior knowledge and skill acquired under civilized surroundings, he would we believe much less successfully wage the struggle for existence than the savage, and would be driven in the end to adopt substantially the same devices, weapons and utensils, with which the despised barbarian has fought and won the battle with nature. The wigwam of the Indian, the mere brush shelter of the Fuegian, the hut of the Hottentot, is much more serviceable in the migratory life they are compelled

to live, than the more commodious and stable and valuable dwellings of civilization.[3]

The invention of the boomerang, the catamaran, the outrigger that converts the canoe of the South Sea Islander into a very life boat that can ride in the perpetual surf of his reef-bound home, serve in themselves to show that the savage is not tied down to his savagery by any natural or inherent incapacity. His

[3] Indeed civilized man adopts the same habitations when similarly circumstanced. Ernest Ingersoll, in "Harper's Monthly," April, 1882, p. 691, describing the "hoodies" occupied by the builders of the Denver and Rio Grande R.R., says:—"You will see numbers of little huts about three logs high, roofed flatly with poles, brush, and mud, and having only a window-like hole to creep in and out through; or into a side hill will be pushed small caves with a front wall of stone and mud and a bit of canvas for a door; or Icelandic fashion will be imitated in a regular dug-out, *i. e.*, a house all cellar and roof, entered by a slanting passage cut into the ground. In these kennels the laboring men find shelter and when they have finished the difficult work . . . . there is no regret in leaving or bother about locking up." In Parker's "Early Fortifications of Rome," in Plate I. of Supplement, showing Primitive Fortifications of Gabii, can be seen a village of huts occupied up to 1870 by peasants, in close proximity to a mediæval tower, a fine and very early temple, and to walls of massive and cyclopæan structure. Anything more primitive than these thatched tents,—looking like haystacks,—it would be difficult to find. They were used because sufficient for the need, and if they must be abandoned, the loss would not be felt.

condition is what it is through other causes than this. The severity of the struggle for bare subsistence is what holds him down. Where there is no division of labor, where the individual must centre all trades in himself, where there is no dependence save on personal skill, prowess or labor; habitation, utensils and weapons will be naturally rude and simple,—just what may be needful and no more to accomplish the desired end. A Robinson Crusoe with no wrecked vessel to draw from, however well conversant with the arts of civilization, would be forced to commence life on his island, and long continue to live, in what Archæologists would term the Stone age, and would do it no better than, if as well as, the savage. This natural capacity to supply by intelligent contrivance his needs, as characteristic of man wherever found, is further manifest in the fact, that though widely separated by distance or time, he has secured the same ends by substantially the same devices and methods. There is just variety enough in the application of the principle to prove the independence of the conception. This might be widely illustrated did time allow. I can only barely refer to the primitive methods of securing fire; the identity of the principle of the primitive lamp, whether

among the Esquimaux, the inhabitants of the Faroe islands, or the ancient Greeks, Romans, Assyrians, or Egyptians: the sling, the bow and arrow, the spear and battle-ax, as weapons, among races and tribes most widely sundered in time as well as locality; the similarity of primitive pottery, in shape, manner of formation, and even decoration, whether from the tombs of Egypt or Peru, the mounds of America or the caves of the Palæolithic Age in Europe, or made to-day among widely scattered bands of savages, or by the outcasts of civilization.

Applying these principles gathered from the study of the lower races of to-day, to the men of the Stone age in Europe, we find in the simplicity and rudeness of their weapons, utensils and arts, evidence not of natural inferiority, but only of the fact that they were waging a hard struggle for life, were in the midst of adverse circumstances. And in the fact that they successfully waged the battle, that, surrounded by such natural enemies as the cave bear, the cave lion, the mammoth and the uroch, they yet asserted and maintained the mastery, we have the best of evidence that they were true men—not half brutes. Their appliances were indeed rude and simple, but they were sufficient, and there

is unmistakable evidence that even in the midst of such surroundings and of such a struggle, the taste and aptitude for drawing and carving,—the rudiments of what have come to be known as the Fine Arts,—were developed. These men of the caves and gravels were unmistakably the kin of the European of to-day. Men can be classified as to their civilization, we care not to dispute, both conveniently and profitably according to the materials on which they exercise their inventive genius and executive skill, and we do not object to the particular classification which has been proposed for the earlier inhabitants of Western Europe.

The Rude Stone Age, or Palæolithic, the Polished Stone Age, or Neolithic, the Bronze Age, and the Iron Age, well represent the distinctive characteristics of the different conditions in which the prehistoric inhabitant may be supposed to have lived. How far any or all of them were contemporaneous, and how far and long they were successive, is not proven, and we doubt much if it ever will be proven. It is assumed by prehistoric archæologists with a bias toward mechanical evolution, that they were not only successive, but that they most slowly and gradually passed one into the other. Going backward from the

Iron Age, which is set down as having lasted over two thousand years, each age is claimed as vastly longer than the other, and that the earliest, or Palæolithic, was the longest of all.

Now both these postulates we hold to be mere assumptions, based in part on an assumed time-measure that is deceptive, as pointed out in our last lecture, and in part on the assumption that the changes have been entirely wrought by a process of natural selection, or one that has operated as slowly and gradually.

We do not consider the question of successiveness as at all settled, but waiving that for the present, for it is after all unessential, the real issue is as to the causes and manner of the changes that merged the Palæolithic into the Neolithic, and that into the Bronze, and that into the Iron Age? Did they operate slowly or rapidly? Now in assigning vast time for these changes, the cause is invariably assumed to be the continuation of an evolution which had its beginning in an ape-like man. In dismissing this as a mere begging the question, and in the absence of reliable data for computing time, we can only reason as to the causes and manner of these changes by what we know to have taken place in historic time, and what would be likely and ne-

cessary on the well-established postulate that man everywhere is as to his capabilities and faculties the same. If the Palæolithic man was not, we have seen, a merely improved ape, he was endowed with capacity and skill to meet his most urgent wants. All the remains of his art attest that he was so endowed. The material on which he exercised his ingenuity, and, we might add, the rudeness of his work, tell absolutely nothing as to his mental endowments, his cranial development, his native and potential ability. They merely tell us something of the conditions and circumstances under which he waged the struggle for existence. They tell us that the struggle was severe, and that it was carried on in practical isolation, an isolation due either to sparcity of population, to geographical causes, or the misfortunes of warfare.

The effect of these causes was precisely what is seen among savage races and tribes to-day, a necessary bending of every energy to the mere preservation of life. But as numbers increased, as natural and human enemies became less formidable, as the severity of the struggle relaxed, as isolation became less complete, man had more scope for the exercise of his powers, and naturally and gradually the Palæolithic man became the Neolithic.

His weapons, his utensils, become more elaborate; though still of stone there is more pains taken in the shape, the finish, the ornamentation, *i. e.*, there is regard paid to beauty and elegance, in addition to mere utility. Later, they are also made from a greater range of materials, betokening the dawn of commerce; while the more numerous specimens of carving and drawing prove the further development of the æsthetic sense.

The bronze age manifestly could only come in with the breaking down of separative barriers. It tells of the abatement of warfare; of the dawn of commerce; of intercourse with older settlements, with the ancient civilization, whence weapons and implements and ornaments were obtained, or if manufactured by themselves, as eventually they were, equally of such intercourse, since only thus could they secure the copper, and particularly the tin, which enter into their composition.

All the evidence as well as probability goes to show that iron, in the same way, came in through outside influences, and for many purposes drove out the use of bronze, just as that had driven out the use of stone.

Now these changes would go on, we see, almost of necessity, unequally. Some tribes

more favorably located, as respects gaining subsistence, the forsaking their isolation, and the carrying on of commerce, would pass rapidly from one age to another. Others would continue for generations with little or no change. This is axiomatic, and does it not render probable much of contemporaneousness in the assumed-to-be successive ages? These considerations render the classification that has been made worthless as a basis for the estimation of time, however valuable as descriptive of condition. Some measure of contemporaneousness of the four periods or conditions is necessarily conceded by every archæologist, and whether there was much or little as respects the different tribes and communities whose remains have been studied, there is no reasonable doubt but that all, even the oldest, were contemporaneous with higher civilizations nearer man's original home. It seems reasonably certain that the portion of Europe where are found the remains of the so-called primitive man, was already the scene of one of those forced migrations, by which ever and anon tribes and races are thrust out from their homes, and by being brought into new regions and a fresh environment forced to begin over again and at a disadvantage the struggle of life.

This supposes the possibility of degradation not only of individuals but of races and communities. But no student of history or of civilization can for a moment doubt that such degradation has occurred, yea, is constantly occurring.

The comparison of the evidences of a former civilization, with the condition of the known descendants of its possessors, as witness Persia, Greece and Egypt; the absolute loss of a remarkable civilization such as the ruins of Peru, Central America, and Mexico tell us existed, but of which the natives of those countries scarcely retain the tradition; with numerous instances of the same fact as to lesser civilizations and in narrower spheres; make certain that there has been degradation as well as progress in the career of nations and races. Wherever savagery is found, it still remains a question, as Von Humboldt puts it, "Whether it is to be looked upon as the dawning of a society about to rise, or whether it is not rather the fading remains of one sinking amid storms, overthrown and shattered by overwhelming catastrophes." American archæology since Humboldt's day, by making known the existence in the heart of our continent of a civilization superior to any existing at the date of its discovery, has

served to greatly corroborate his opinion that the savages of America, in all their gradations, were the deteriorated remnants of races once in a higher social condition. The advocates of a necessary upward evolution, a general progress of the race, are constrained to admit, along with it, occasional instances of deterioration and cases of degradation. Degeneration in culture is accordingly conceded by Tylor and Spencer as a secondary cause of the barbarism and savagery in the world. As where the history can be traced it is found to be invariably the primary and single cause, it would certainly seem that the burden of proof that it is not the cause in every case rests upon those who dispute it. But such degeneracy not only has occurred, but is constantly occurring. It goes ever along with and as a consequence of advancing civilization. Human progress has its waifs and wrecks, as well as its successful ventures. And those who fail in the constantly intensifying competition, who do not succeed in keeping pace with the advancing requirements of the age, are dropped and lost to sight. They are crowded out and down, and are compelled to wage the struggle in a less exacting sphere and on a lower plane. In such instances there is a reversion to what

is simple and unexacting in labor, ingenuity and skill. And so right in the midst of the highest modern civilization may be found that which is as rude and primitive as the relics of the Stone age and the cave men.

Dr. Arthur Mitchell, in his admirable book, "The Past in the Present," has gathered a most interesting series of facts illustrative of this principle, and of the survival because of adaptability to situation and circumstances of the arts and utensils of the so-called Stone age among those who live in the very midst of present civilization, and who want neither for capacity nor culture.

If the settler on the frontier of our own country, driven thither by the severity of the struggle in the more thickly settled portions of the land, were judged as to intellectual power and social culture, by the rudeness of his sod-house or "dug out," and by many an extemporized appliance, he would stand a chance to be classified as of the Palæolithic age. Certain is it that all the so-called successive ages—of stone and bronze and iron—are co-existing to-day, have been co-existent during the historic period, and it seems not an unwarranted inference that they have been co-existent during the prehistoric period also. And this is strengthened by the fact, that

in the fluctuations of population it is certain that a people in the Palæolithic condition may follow on the same site as well as precede those of a more advanced culture. This probability has been verified and proven by the excavations of Dr. Schliemann on the sites of Ancient Troy and Mycenæ.

The report of the excavations at Troy shows the remains of five successive cities, the fourth from the surface being identified by Dr. Schliemann as the Troy of the Homeric Poems. Whether the identification be correct or not, the fact of the succession of cities and different populations on the site remains, and the relics show, from the oldest period to the latest, the associated use of stone and bronze: implements and weapons of stone predominating at one time and of bronze at others,—the epoch most markedly of the Stone age being the third, or the one exactly intermediate between the others. The very oldest relic-bed yielded terra-cotta whorls and fine pottery, with articles of silver, bronze and ivory. His excavations at Mycenæ reveal the same intermixture, the seemingly oldest workings in gold and silver and bronze being the most perfect and beautiful, and found in association with arrow-heads of stone.

These facts, deducible from what has been

observed and ascertained respecting the laws and course of culture and civilization in historic and prehistoric times, leave no ground whatever to infer from the character of the weapons, implements, dwellings and utensils, of the early inhabitants of Western Europe, either their natural inferiority to the man of to-day, or a very great lapse of time in order to have undergone the changes in culture denoted by the use of stone, bronze, or iron.

There is prevalent an erroneous idea as to the nature and possibilities of human progress. It has been born of the wondrous achievements in Science and the Arts which are the boast and pride of our century. The indubitable advance in knowledge and power over nature, in many novel appliances and adjustments, have fostered the idea that we are wiser, more skilful, better endowed men than any that have preceded us. We have solved so many problems, conquered so many difficulties, that it seems as if we were likely to press on to unlimited attainments. All this has been favorable to, if not the origin of, the theory of a necessary upward progress of the race. And because of this, many have been won to acceptance of mechanical evolution as the explanation of man's seemingly unlimited upward progression. Hence it is the more

important that we come to a discernment of the true nature and the limitations of human progress. What is commonly called progress, and what we hail as an advance along the whole line, and regard as a slow, gradual and universal movement upward, is in reality nothing but the complex effects of advances in a few particular directions. The causes of modern progress have been in nearly every instance discoveries. It has not been by the slow and gradual uplifting process that the mechanical evolutionist claims and many imagine, but by leaps. A new principle has been discovered, a new device contrived, an invention made, each a sudden projection into the current of activity, which has deflected it into new channels, or entirely turned its course. The effect of every discovery is at first revolutionary within the sphere where it operates. The advance in the new direction is rapid until the potentialities of the principle or suggestion are exhausted, when progress ceases, the evolution stops, or, as sometimes, is converted into a retrogression. For example: A chief factor in modern progress has been the discovery and application of the force of steam. It is scarcely more than a century since it was first successfully applied to the generation of power. Yet for twenty-five years not a sin-

gle new factor or element has been discovered whereby to increase its potency or extend its applications. One generation nearly sufficed to carry the discovery to its furthest limits and exhaust its potentialities. We are now engaged in doing the same thing with electricity, and less than fifty years will probably be enough to perfect the analysis and determine all its capabilities.

It is the same with that other characteristic of our age,—the saving of labor by mechanical devices.

Within a very brief period substantial perfection is reached. The spinning-jenny, the sewing machine, the mower and thresher soon reach the full measure of adaptability to their work and thenceforward there is no improvement. Man's natural capacities are such that applied to the solution of any problem, the meeting of any necessity, it is soon accomplished and that fully. The element that is new in modern progress, is not any increase or change in that capacity, but only in the circumstances under which it has been called to act.

The greatest achievements after all are not those of which our times can boast,—those things most essential in the struggle for existence and comfort, were devised,

invented or discovered way back in the obscurity of a dim past. And their discoverers and inventors were by that very circumstance shown to have been men of like capacity with us. The most useful processes and arts, the most essential of implements and devices, the fundamentals of mechanics, as the making of bread, the moulding of pottery, the mechanical powers, were not only discovered by the progenitors of the race, but were so early carried to their perfection that nothing has since for thousands of years been added to them. When the possibilities have been tested and exhausted, as they soon are, the world is by so much enriched, but progress in these channels ceases. Much so-called progress is only re-discovery. Arts are lost through change of taste and method, and are so speedily and utterly forgotten, that when revived and practiced in response to a revived demand they are hailed as new discoveries. When subsequent research shows them ancient, it is frequently and almost invariably found that the older and forgotten forms are the superior, attesting that the capabilities of the ancients were no whit inferior to the moderns.

All the facts bearing on the past of our race, on the development of civilization, favor

the conception that man came on the theatre of earth in the plenitude of his powers,—not in his lowest but in his highest type.

Placed in the world to master it, he soon won the lordship over nature and the brutes; beginning at first with weapons and implements rudely fashioned of stone, he early improved them, and rapidly passed from one stage of progress to another. But along with advance in civilization and culture went deterioration and degradation. And in the struggles for power and supremacy, by the necessary law of the survival of the best endowed in the old and crowded homes of the race, many were driven forth to inhospitable regions and compelled to begin over again the upward struggle. Such we believe to have been the Palæolithic and Neolithic men of Europe. How long they were in that condition we can only guess, but to account for their upward progress, it need not have been many generations.

It seems from the configuration of skull and skeleton, they were the progenitors of what history calls the Iberian and Celtic races, the descendants of which yet occupy side by side the old habitat.[4] Their later impulse in civ-

[4] The grounds for this inference based on the characteristics of crania examined are well summarized in an

ilization, when developed and known as the Bronze age, was almost demonstrably the result of contact, and extensive commerce with that mysterious people, the Ancient Etruscans.

The remains found in Western Europe countenance, we thus see, neither of the inferences of mechanical evolution. The facts give no indication of a brutish origin for man, or a necessary ground for assigning him a very great antiquity.

The evolution that has culminated in the present civilization is not one that began at the brute, and has necessarily operated. It began with a man, made in the image of God, and has been divinely ordained and controlled. It seemed likely to be only downward when disobedience brought discord and violence. The degradation and deterioration produced by sin, seemed to promise extinction rather than upward progression. Upward evolution began and has prevailed, alone through the recovery of the true knowledge and image of God: and the rapid and peculiar progress of modern times is the fruit of that

article on "The Present Phase of Prehistoric Archæology," republished from the "British Quarterly Review" in "The Eclectic Magazine" of January, 1873, Vol. XVII. p. 87.

fuller revelation and redemption which we have in Jesus Christ.

This I believe to be the true philosophy of civilization, and the key that explains why, in the opposing tendencies upward and downward, the outcome has been the improvement rather than the deterioration of the social condition of the race. I have not time to pursue the inviting theme. For the present I must be content with having shown the failure at every point of Mechanical Evolution, be it Materialistic or Agnostic.

LECTURE V.

EVOLUTION AND THE BIBLE.

We have seen in the discussion of evolution and its applications that its truths and untruths inhere in the form of the theory which is held. These are reducible to simply two.

The one may be properly designated as mechanical evolution, since it acknowledges no other cause or causes than what inhere in things themselves: it operates necessarily and continuously, and everything now existing, man included, has been differentiated from an original nebulous mass without intervention or control of any power above or outside itself. In this bald form it seems purely materialistic or atheistic, and fails so signally to give any satisfactory account of crucial facts that it is with difficulty maintained or defended, with any show of reason or by any considerable body of adherents. Hence the vast majority of those who accept and hold to this form of the theory, suppose a first cause, an initial

creative act, a sort of Deity, to bring into existence the matter and force, whose interaction in accordance with fixed laws have produced everything that exists. And as these evolutionists, while conceding that there may have been a creation and a Creator, and by this concession escape some of the difficulties of pure materialism, yet claim that this originator of all, is and must ever remain "the unknowable," they are properly termed, agnostics.

Whether atheistic or agnostic, such evolution is blind, unintelligent and necessary, knowing no causes except mechanical and efficient ones.

The other form of the hypothesis may be termed purposive evolution, in that it is a process which proceeds in accordance with a plan or purpose, has in it the evidences of design, and necessitates not only the interposition of a personal intelligent First Cause at the beginning, but also the wise and powerful superintendence and control by such a Being of all the after progress.

This divergence in the very definitions and forms of the hypothesis, naturally extended through all its proposed applications. There is no occasion that I should fully recapitulate the contents of the previous lectures. In them I sought to point out how the materialistic, me-

chanical theory failed to account for the origin of matter and force and the laws that regulate their interaction; for that wonderful co-ordination by which the world has escaped ruin and is reaching forth to a better rather than a worse future; how it equally failed to account for life, intelligence, and many of the features that characterize their diversity. I still further sought to point out that it failed still more conspicuously in bridging the gulf that separates man from the brutes, and that its necessary postulates of a vast antiquity for man, and an almost brute-like savagery as the starting point in his civilization, were discredited when we carefully examined the evidence by which they were assumed to be established. Along with this exhibition of the untruths, I was careful to express the conviction that there is an important truth in evolution as descriptive of the general method by which the present condition of things has been reached. It seems well established that we may not longer conceive of all things, and especially species of plants and animals, as having originated at one time and in one creative act.

It seems most probable that by laws, of which natural selection is doubtless one, but one of very limited and subordinate efficiency, and by forces, whose working we see,

but which as yet we cannot formulate, new species of life have sprung out of old ones, and the present has been born of the past; that in short a development,—progress in accordance with law,—has been characteristic of nature, and the general rule of its activities, and in this sense there has been an evolution. It seems highly probable that just as the tree is developed out of the seed, and the animal from the egg, so the classes and families, the genera and species in which living beings are grouped, have been evolved,—developed,—have grown out of simpler and less complex forms. It is we hold a worthy study to seek the efficient causes, the general laws of this evolutionary progress, and we are grateful to the science which is so industriously seeking out and illustrating the hidden bonds that connect diverse phenomena and forms. But we have sought to show by pointing out some of its failures and fallacies, that a purely mechanical process, which recognizes only material and efficient causes, is not a sufficient explanation of the evolution.

There is throughout the whole process the evidence of a working toward an end, of the unfolding of a plan, of an adjustment or coordination of laws and forces, which bespeaks design and a designer controlling the inter-

action of the mechanical and efficient causes. Single laws act uniformly and invariably; brought into juxtaposition, knowing the action of each on the other, having before us all the forces and conditions, we can predict with certainty the result,—the necessary outcome. The achievements of our modern arts and civilization, have been brought about by just such intelligent co-ordination or combination of fixed and unchangeable laws. When useful and beneficent results thus issue from the interaction of selected forces or laws, when the finished pattern comes from the Jacquard loom, or time and distance are almost annihilated by steam and electricity, we are constrained to recognize the intervention of a co-ordinating intelligence and will. Such results are not explicable by a consideration of the efficient causes merely, for they depend on the purposive collocation and regulation of the causes rather than the mechanical energy which makes them efficient. Finding therefore in nature results indicative of a purpose, and in the general course of nature a progression,—an evolution—we in like manner are forced to the assumption of a controlling Intelligence and Will, to at all adequately explain the particular collocation and co-ordination by which such results have come to pass.

The universe had an Intelligent Creator, or it was born of a lucky chance.

It has throughout been my endeavor, in developing what of truth there is in evolution, to emphasize the necessity of a Providence continuously directing and controlling, as much as of a Creator planning and producing, the universe. It is a conception, not particularly repugnant to the mechanical evolutionist, that the world is only an infinitely perfect—a self-propagating, and self-regulating—mechanism, even though an act of creation be assumed for its origination.

It was shown that such a theory, though it be in a sense Theistic—conceding as it does the existence of a God, and the infinity of His knowledge and power,—affords only a partial and inadequate explanation of the facts.

I have therefore pointed out that, granting much for the operation of unknown and unformulated causes in producing modifications and new adjustments, the interposition of a power outside of nature is as necessary to explain many things in the course of this evolution subsequent to its beginning;—*e. g.*, the advent of life, sensation, intelligence, and man—as to account for the first creative act.

The inference of repeated interpositions of

creative power is as unavoidable, as of the first; while concession of one takes away every *a priori* objection to others. If God has interposed once and again as Creator, it renders most probable, if not certain, such a supervision of His work as is expressed in the idea of providence.

We saw that the evolution which earth has experienced went forward, not merely by slow and gradual modifications, but also by leaps, by great and sudden transformations, indications, if not of the introduction of new forces, at least of a new collocation and adjustment of existing ones; and, by consequence, a strong suggestion of some superior power co-ordinating, governing, and controlling them.

All this was only confirmed and established by the study of man.

We saw that mechanical evolution utterly failed in its endeavor to connect him with the brutes. However much his body suggests kinship with lower creatures, the points of divergence are so great and radical, above all his mental and spiritual attributes are so different not only in degree but in kind, that it is impossible to view him as other than the creation of God.

We further saw, from his civilization, that always and everywhere, whatever his environ-

ment, man is a controller and co-ordinator of the forces and objects around him for the accomplishment of his purposes,—is a self-determining Providence to himself and those dependent on him; and this serves to prove him akin in his nature to that Being who is supreme over all. Through his spiritual nature, his capacity for abstract thought, his self-determining will, his moral sense, he is able to attain to a knowledge of God. Through these attributes of Spirit, he, though a finite being, is able to catch a true, though it may be a partial, glimpse of the Infinite Spirit.

Evolution viewed thus as a divinely planned and ordered process, becomes we believe even a better and surer basis of Natural Religion, than the conception of special multitudinous creations. Rightly viewed it carries with it the conviction that God in power, wisdom and goodness has made and governs the world.

The older theory chiefly emphasizes his power. This throws into prominence more particularly his wisdom and goodness. The failure of mechanical evolution, and the establishment of a purposive, teleological evolution, thus strengthens instead of overthrows all the inferences as to God, His nature and His works, which Natural Religion has drawn. It only remains for us to show the relation of

such evolution to the Bible and the Bible to it. Many readily concede the consistency of evolution and natural religion. But not a few who admit and rest upon this, claim that it has discredited the Bible, as the Word of God, and made necessary the abandonment of the idea that we possess an authoritative Revelation from the infinite Creator and Ruler. At the same time it is not to be disguised, that many have hesitated to accept any sort of evolution, and have been troubled at the very suggestion of its possible truthfulness, lest its establishment might involve the overthrow of revealed religion. We believe the boast of the one, as the fear of the other, is without foundation. Evolution helps us to understand and interpret the Bible; and the Bible equally helps us to better understand and explain evolution. They rest upon different lines and kinds of evidence, and the claimed antagonism is very largely the result of exclusive attention to the particular criteria by which their truthfulness is respectively established. The truthfulness of the Bible, its claim to be the Word of God, rests upon as good evidence of its kind, as that whereon scientific truth reposes; and it is a kind which as appealing to the individual consciousness and experience as well as the reason, is to

many minds more convincing than that to which evolution, or any scientific inference, must appeal.

It is not necessary that I should enter upon the broad theme of the rightful and different criteria of truth, and show on what convincing evidence rests the conclusion that our holy religion is true, and that the book which tells of its origin and history, and which is the only sufficient explanation of the fact of its existence, is God's book and truth itself. I only claim that, supposing it to be such, it is authoritative upon the points on which it speaks. Did we as infallibly understand, as God has here infallibly revealed His truth, it would be conclusive in matters of science so far as touched upon, as well as in religion. But in the interpretation of the Bible, as well as of nature, there is need of caution and moderation of statement. It may well be doubted if our exegesis of Scripture is as yet in all points satisfactorily decided. Doubts and obscurities have been removed by a more exact criticism of the text, by a more thorough application of grammatical rules, by the discoveries of history and archæological research, and this good work will continue, to our better understanding of the Word of God. And among the rightful appliances for shedding light

on the Bible we believe the ascertained facts and truths of Natural Science are as deserving of regard, as those of grammar, history, or archæology.

There are those who because the science of geology or of biology, the probable hypothesis of evolution, contradict their exegesis of some passages of Scripture, are ready to assert they are antagonistic to revelation. And equally others who because their traditional views of Bible teaching have been contradicted by scientific discoveries which they are constrained to accept, are ready to declare the authority of the Bible overthrown. Far wiser and more likely to be fruitful of advantage to the truth will it be to let each interpret the other, and seek rather for the points of agreement than those of difference. Believing as I do the Bible to be the Word of God, and nature the work of God, I am confident that time will prove their entire agreement, and if meanwhile there seem points of antagonism, I can wait in faith the clearer light which will show their real agreement, and meanwhile examine the more carefully alike the accepted interpretations of Scripture and the postulates of science to the end of discovering wherein the error that certainly exists and makes the antagonism, may lie. It

surely ought not to surprise us or trouble us, if we may not at once bring every detail into accord, especially when our knowledge is yet so imperfect and so much of our science, if not of our exegesis, is hypothetical. It will speak much for the probable truthfulness of evolution as a divinely ordered process, if it is not only not absolutely contradicted by the Bible, but is found in general features to be in accord with its revelation of God and His working. This, I believe, is the state of the case. As has already been seen, evolu tion leaves unaffected the old argument from the evidences of design, for the existence of God. It proves that God exists, that He has an interest in all His works, and especially in man, and thus makes probable that to beings endowed with capacity to know Him, and enter into spiritual communion with Him, He would more fully reveal Himself and His purposes of grace.

Assuming that what is thus probable has actually occurred, that in the Bible we have this fuller revelation of the divine nature and works, how does it correspond with what we have gathered about Him from His other book, that of nature?

Evolution, if embodying a truth, will fit into what we learn of God from the volume of

revelation, and at no point will there be irreconcilable antagonisms.

We will briefly examine the two points on which the Bible seems to many in conflict with every form of evolution, and because of which some have renounced the Bible and some have opposed every form of evolution: viz., its account of creation, and the comparatively brief time, according to its chronology, that has elapsed since the advent of man. As to the first I need not greatly enlarge. Evolution has not materially changed the condition of the case as settled in the light of geological facts. Before evolution became probable as a method of Creation, geology had made it well-nigh certain that earth and its living inhabitants had not been brought into being less than ten thousand years ago, and in the course of six days of twenty-four hours. Its revelations as to successive strata and their distinctive fossils made necessary a vast extension of the age of the earth, and produced the conviction that the days of Genesis were time-cycles commensurate with the vastness and magnitude of the works wrought in them, rather than ordinary days. A re-examination of the Biblical account in the light of these facts, has led to a general acceptance of the view, as old at least as Augustine,

that the days of Genesis are not and were never really intended to be ordinary days, but God-divided or measured, rather than sun-divided, periods of time. Such scientists as Hugh Miller, Guyot, Dana and Dawson have pointed out how on the hypothesis of the days of Genesis being long periods characterized by distinctive creative acts, there is a most remarkable analogy between the Biblical and geological records.

One of my predecessors in this lectureship, a recognized authority as a Biblical scholar, the late Dr. Tayler Lewis, not only in his lectures on this foundation, but in his admirable additions to Lange's Commentary on Genesis, has well-nigh put an end to controversy on this very point by showing that in the history of events so far removed from human experience as those recounted in the first chapter of Genesis, we must, just as in prophecy, look to have words used in their primitive and profounder senses, since in their ordinary significance they are altogether inadequate for the purpose in hand. Hence in Genesis, "day" is a period through which a thought of God and a creative fiat is worked out; "evening" and "morning" are not indications of time, but characteristics of the process. The first, de-

scribing the *mixed* and chaotic condition in which the new order begins—an עֶרֶב, only the secondary sense of which is evening, and the other describing the sureness and steadiness with which the process went on,—even as the *breaking forth* of the dawn out of the darkness of the night, which is the root meaning of בֹּקֶר, the secondary sense of which is morning.

His exhaustive discussion of the matter leaves nothing to be added, and has practically settled the exegetical controversy as to the time involved in creation, and proven that the narrative allows of all the time that the very slowest of processes may require. As bearing on evolution, applying the same principle to other expressions, as to the supposed indications of time, Dr. Lewis makes it plain that the writer of the history of creation used throughout the narrative expressions susceptible of meanings in exact accordance with what seems now the most likely conclusions of science. The terms used seem to suggest and necessitate the conception of an evolution. The very name of the book—תּוֹלְדוֹת, literally "births"—suggests it. The terms of the fiats—"let the waters be gathered together," "let the dry land appear," "let the earth bring forth (grow) grass," etc., "let the waters bring

forth abundantly," "let the earth bring forth the living creature *after his kind*,"—all imply not a simultaneous, rapid and hurried process, but one of development, succession, progress, —as plain intimations of evolution as we could expect.

In the light of the best exegesis and the best science there is no real contradiction by Genesis of this most probable scientific theory as to the method of creation.

As to the other contradiction claimed, which respects the age of man on the earth, we saw in our Third and Fourth Lectures that the space of a few thousand years, or even a single thousand previous to the historical period, is all that the facts as to the claimed-to-be-proven great antiquity of man really demand. If the uniformitarian principle in geology be abandoned, and I believe it must be, and modification by nothing but short and slow steps be disproven, as it has been, man need not be older than the shortest time that Biblical chronology allows.

But while this is so, it may be well to emphasize the fact that the chronology of the Bible is a matter of deduction from incidental expressions. There is in that divine history no attempt to give clews as to time, and many dates in the chronologies suggested are ob-

scure and uncertain. The extent of the uncertainty may be gathered from the fact that the various systems of chronology that have been proposed, differ nearly fifteen hundred years. The Bible history gives time enough for every change that man has witnessed or experienced: for the rise and development of the ancient civilizations, and the diversifications of races and languages, on the only hypotheses which at all adequately explain the facts.

The Bible contains nothing that is not consistent with all the requirements of such evolution as we find in nature. Beyond this it contains much that serves to enforce and illustrate the conception that evolution rightly conceived is God's method of working out His purposes; that when He creates it is by touching the sources of being at points beyond the ken of science and human observation; that when He governs, it is by so collocating forces and laws that the result comes to pass through means so slight and insensible as to almost escape discovery and analysis.

The Bible itself as a Revelation is an excellent example of God's method, as evolutionary.

The Divine Teacher in the first and most

profound of His parables expressly says, "The seed is the Word of God," and thus presents the word as not only having capacity for growth, when received in the heart, but itself the result of a growth, the fruition of an evolution.

The Bible has one living central theme—Christ the gift of God unto salvation. All its parts are grouped harmoniously about this central living germ. To explain its unity, despite the fact that it was given in bits and portions through more than twenty centuries, to account for the growth in fullness and clearness of the Revelation, until it culminates in the Incarnation, the Crucifixion and the Resurrection of the Saviour, and the outpouring of the Spirit, we are constrained to see the controlling hand of God guiding and co-ordinating human agents and events unto the unfolding more and more of His Divine will and purpose. The history of God's kingdom or church which the Bible contains, equally bears evidence that God is bringing to pass the glorious consummation promised through a divinely governed growth, or evolution. We catch glimpses of the same thing in the wider history of the world, only less manifestly since the history is less fully written out in the light of its great Ruler's pur-

poses. Yet everywhere in human events is to be discerned the working of "a power that makes for righteousness," and Revelation bids us see the solution of the fact, in a righteous God's controlling the springs of action, making the wrath of man to praise Him and restraining the remainder of wrath.

His purposes are wrought out, while the absolute independence of action, the fullest freedom of will and choice, on the part of the agents, is never once, so far as consciousness goes, interfered with. God's method manifestly is to work His purposes, as far as possible and ordinarily, through secondary causes, by means of natural laws and forces.

This is not only perceptible in his providential government, but in many of the signs and wonders that attest His interposition on behalf of that Redemptive work, which is the theme of the Bible. Many of these were only new collocations of ordinary laws, miracles merely because out of the usual experience of men; and where there is a direct exercise of creative might, the introduction of new forces, or unknown agencies, such as when Christ changed the water into wine, and fed the five thousand, the mode is still to use the ordinary and natural as far as it

will go, supplementing, rather than superseding, the usual laws of nature.

The creative touch is ever applied at the sources of being, and back of the visible phenomena.

The Bible, in its account of God's workings, enforces the conception which evolution gives us, that His ends are accomplished through creative power calling into being germs which unfold through the ages under the control of a watchful Providence. Because of this God never makes haste. Time is one of His servants, and He lets time do much that we, in our short-sightedness, would say might as well be done by a single momentary exercise of might.

Hence the Bible's time—measures, as applied to God's working, are expressed not in years, or centuries even, but in "Olams," (עוֹלָם), and "Eons" (*αἰών*), epochs during which a thought of God is wrought out, periods measured less by the lapse of time, than by the succession of events. I cannot pause to develop or illustrate this marked characteristic of the Book of God, and I scarcely need point out how such time measures fit into the conception that the Divine method of compassing His results, is by evolution.

Still further, it is a marked characteristic of the Scripture history that most of God's purposes are wrought out by ordinary Providential control, by collocation of natural laws and usual agencies, and only at crucial points in the history has He interposed by supernatural manifestations, by inspired men and measures, by signs and wonders that are miracles. This is precisely analogous to what a right theory of evolution makes us to see in nature. There, as in revelation, God ordinarily and for long periods wrought exclusively through second causes, by natural forces in their ordinary collocations, and degrees of strength, but the history of earth shows, just as the Bible history points out, that there have been times when a Creative touch gave a new impulse and direction to its development; when life and intelligence, and the soul of man were introduced, and new epochs begun.

Evolution while essentially a progression, as applied to man, is confronted with the fact of deterioration, degradation. It is the Bible alone that unlocks this anomaly. In its light all is plain. The cause of the persistent tendency downward is a moral one. It is due to the presence of sin. Because of this, selfishness and violence have prevailed—when

might makes right, the weaker is oppressed or driven forth, or debased.

Evolution also tells us of an upward trend, but fails to show its cause or limits. The Bible here also supplements the light of nature. It shows us that this also depends on right moral principles.

It shows us that real human progress is alone in connection with God's Kingdom of righteousness. Even the Mechanical Evolutionist has to concede that all things are manifestly working unto an end, and that this end is man. The Bible shows the same fact, but clears it of its difficulties and limitations, by showing that it is not man, a mortal automaton, that is the end whereunto all things conspire, but man the child of God, the heir of immortality, the possessor of a spirit that is capable of oneness with God. It presents as the worthy end to which a Divinely ordered Evolution has been and is tending, the one model, perfect representative man, the man Christ Jesus, through whom oneness with God is attainable, by all who come into fellowship with Him. Thus in many ways do the books of Nature and Revelation supplement one another, and a rightly conceived evolution and the Bible agree, rather than conflict.

There are mysteries, and there will be mysteries, so long as we see through a glass darkly, and know only in part, alike in nature and in Revelation.

We may never here perchance pass altogether out of the shadows which surround us, but sure are we that most of truth will be gained when we look for it in the light shed by the converging rays that go forth from Nature and Revelation, when rightly studied as having for their source and end, the glory of God, as manifested in Jesus Christ the Saviour of all who trust in Him, the Fountain of truth, the Light by which we see light.

"For of Him, and through Him and unto Him, are all things. To Him be the glory forever. Amen."

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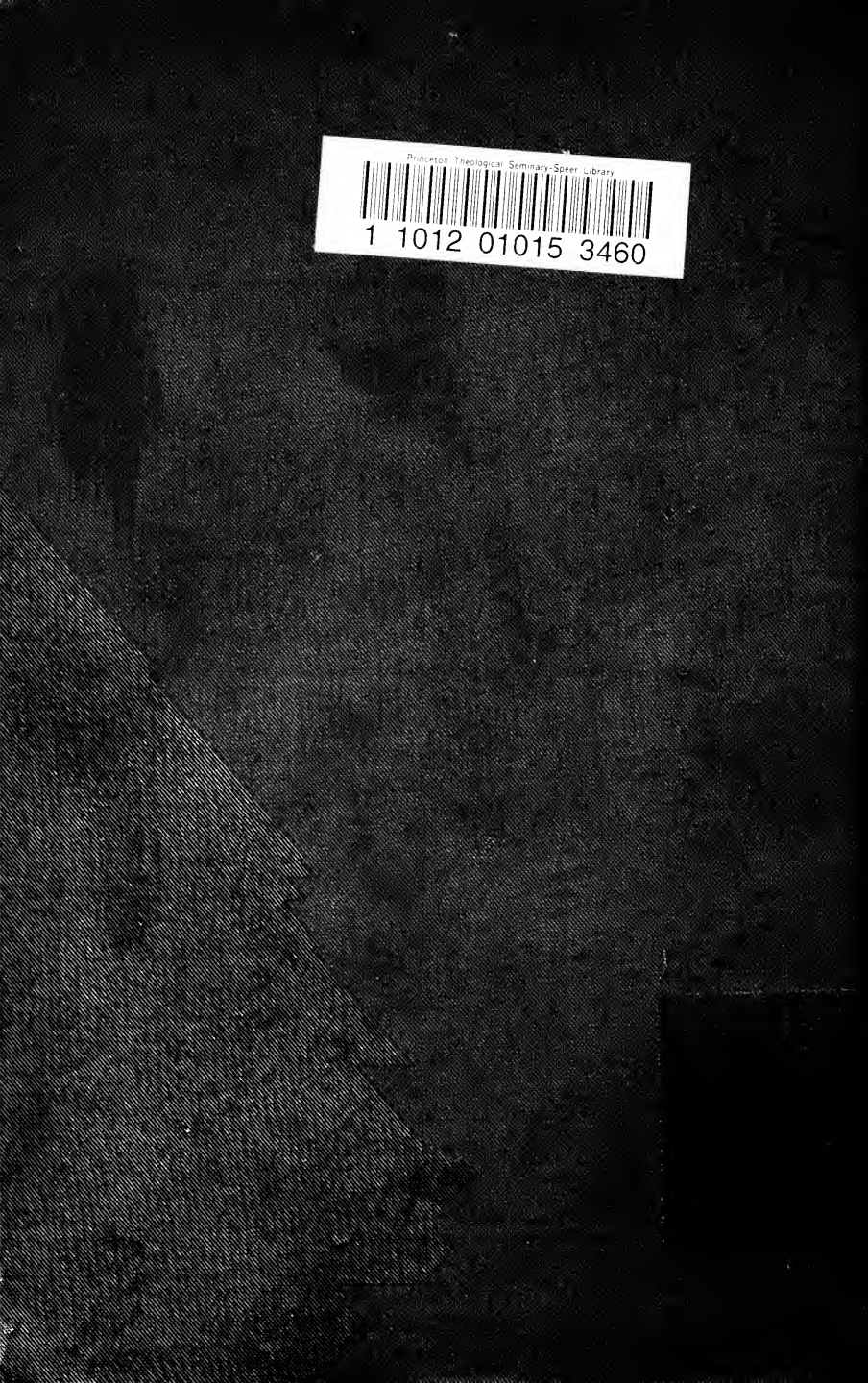
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