
A table of contents for *Bibliotheca Sacra* can be found here:

https://biblicalstudies.org.uk/articles_bib-sacra_01.php

worthy for Infinite Excellency to receive, he planned and executed the work of the sinner's redemption, and only fails of attaining universal salvation in it, from the perverse rejection of sinners, in whose behalf his own honor will not allow his power and grace to work any longer nor any further. In this broad sense, rectitude demands more than justice, more than benevolence; it is a goodness that contains them both, and demands that they both meet and embrace each other for what the Lord Jehovah sees in himself is due to himself. Thus sin was, and much sin and misery ever will be, because divine power must work under the guidance of divine rectitude.

ARTICLE III.

SCIENCE AND THE BIBLE.

A REVIEW OF "THE SIX DAYS OF CREATION" OF PROF. TAYLER LEWIS.[1]

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"THE heavens declare the glory of God, and the firmament showeth his handiwork." Thus spake the Psalmist in view of the revelation which God had made of himself in his works. With deeper emphasis may we now utter the same ascription of praise; for that revelation, as its records have been unfolded in these later days, has opened more and more glorious thoughts of the Almighty Architect, and appears as unfathomable in its truths, as God himself is infinite. The world in general is satisfied to see this glory as exhibited in form, color, magnitude, and other outside quali-

[1] The Six Days of Creation, or the Scriptural Cosmology, with the Ancient Idea of Time-Worlds in distinction from Worlds in Space. By Tayler Lewis, Professor of Greek in Union College. 12mo. pp. 407. Schenectady, 1855.

ties. The external attributes of existences have indeed been graciously made so transcendent in beauty and full of harmonies, that "he may run that readeth." But there are also revelations below the surface, open to those who will earnestly look for them. For God's hand was never outstretched to create, but beauty and wisdom appeared in every tracing; and, if seemingly wanting in the outer vestments, they are still profoundly exhibited through the structure beneath, in the ordering of the parts from which the externals are educed, and in the universal laws there contained; these are literally secrets of the Almighty, to be diligently "sought out of all them that have pleasure therein."

Who are they that are trying to open this book of revelation? 'Men of Science' they are sometimes called; 'Students of Nature' is their true position. Nearly all the world besides pass the revelation by unheeded, almost as if God were only the God of external nature, a maker of pretty forms, colors, and fragrances on a grand scale. Many even speak contemptuously of him, who, in the study of stones, insects, or worms, busies himself with endeavors to read those records of God's wisdom. In the style and spirit of the Atheist, they decry his pursuits, and strive to throw opprobrium on all of the sect. They may think better of some, who deal with worlds, and mountains, and large quadrupeds, perhaps; as if material size were a measure of truth with God. They seem not to know that the minutest living being is as much above a universe of dead worlds as life is superior to matter.

This unworthy spirit is mainly due to prejudice and ignorance. They say that science, after all its claims, is no nearer to explaining the ultimate nature of matter or of life, than centuries ago, and at the same time decry its "boasted" laws. And here is a fatal misconception of science. Has metaphysical or sacred Science yet explained the nature of God or spirit? or has any mind yet measured eternity? The ultimate nature of matter or of life is as much beyond all investigation. Science claims not to fathom it; is not so presumptuous as to hope for success, although examples are

at hand of this prying into mysteries among many writers on the second revelation. These subjects are neither within its bounds or aims. It seeks only to ascertain the laws which God has established in nature, or rather, the methods in which he is constantly working in the universe, his plan or system, ordained in infinite wisdom and sustained in infinite power. Man were presumptuous in his searchings, were he not made in the image of God. Thus endowed, if also teachable in spirit, he may read and understand, and reach onward in his knowledge to brighter and brighter revelations.

Newton, by a flash of his intellect, conceived of the law of gravitation; and as he, inquiringly, looked around and above, he everywhere found testimony that the conception was a fact, a comprehensive truth. At once, cycles and epicycles, and all the cobwebs of past ages vanished, and our planetary system and the vast universe stood forth in its majestic extent, the whole like a vision from on high. After the thousands of years that the world had existed, there was, at last, a correct apprehension of the actual relations in space of the heavenly bodies. He announced the law of attraction and its ratio, called it, for convenience, the law of gravitation; and by it, the great highways in the heavens have been traced. What before had been thought out, and thereupon received as true, proved to be wrong in fact and principle. But who will say that we do not now *know* the relations of the heavenly bodies, and the law of their motions? This law is as immutable as God's will, for it is his ordinance. Newton did not dream about the cause or nature of gravitation; he had read the law, and rejoiced in the revealed truth.

Crystallization opens to us other laws, no less comprehensive. All are familiar with the pretty geometrical forms of some crystals. But the observing eye sees the world full of crystals. When it snows, the heavens are showering down crystals, for every flake is a congeries of crystalline grains, and they are often in elegant symmetrical forms. When the waters freeze, they become a mass of crystals, only so

blended that we distinguish not their outlines. When sea-water evaporates, it drops crystals freely; for every grain of salt that goes down, is itself a gem. A bar of iron is broken, and its whole texture proves to be an aggregation of crystal particles, showing the angular lines and cleavage of true crystallization. The granite of the hills is but a mountain of crystals; and every pudding-stone, although made of pebbles, has myriads of crystalline grains or fragments of crystals in and among those pebbles. Finally, the special fact first noted, develops into a general truth or law, that cohesion in the inorganic kingdom producing solidification, is actually crystallization; that we not merely see nature geometrizing, but matter in its profoundest quality governed by geometrical principles; and therefore that cohesion in solidification is not a sort of agglutination acting in all directions alike, which would be well enough for making spheres, but an axial or polar attraction, bringing out symmetrical forms according to fixed laws.

Examining further, more definite laws come out: each species or kind of substance, wherever found or however made, proves to have its distinct and constant fundamental crystalline form, so unvarying in angles and structure, although admitting of modifications by simple ratios, that it may be as easily known by it, as an animal by its form. These crystalline forms are cubes, square prisms, rhombic prisms either right or oblique, etc.; and in each case, the axes of the prisms, that is, their relative dimensions, admit of mathematical calculation.

Thus by widening our field of vision from the single fact to universal nature, we learn that molecules have their specific forms or dimensions, and cohesion in solids its mathematical basis. This fundamental quality of cohesion is sustained by every other characteristic of crystals: the hardness is different in the direction of *unequal* axes; so also the transparency, elasticity, conduction of heat, and refraction of light; and all in exact accordance with the law of symmetry in the crystal. Do we not see, here, that the very molecules, of which the universe is built, were modelled variously and

with precision by the hand of Deity? Looking deeper still, we learn that these molecules are not, like the blocks of an architect, squared and cornered for one place alone, but have their laws according to which they are adapted to numberless forms and structures. Gaining entrance to these inner temples of nature, we recognize, everywhere, the appointments of Him whose glories are infinite.

The chemist reads Nature in another of her departments: he watches the changes going on around him, and the changes which Nature, in her work, passes through in his laboratory. He thence learns not merely the absurdity of the ancient fancy that water, air, earth, and fire are elements, and not only that these are true elements, and that water is made of two, oxygen and hydrogen, and so each substance has its elemental constitution; but he goes further: he discovers, as his facts accumulate, that there is a law in these combinations; that oxygen and hydrogen, for example, unite only in certain ratios; that they exist in water in the ratio of 8 to 1 by weight; that, in another compound containing oxygen and iron, the ratio is 8 to 28; in another, containing oxygen and nitrogen, the ratio is 8 (oxygen) to 14 (nitrogen), or else, 8 to 28, 8 to 42, 8 to 56, 8 to 70, equivalent, in parts, to 1 : 1, 1 : 2, 1 : 3, 1 : 4, 1 : 5 parts; and so, throughout Nature, in compounds of all kinds, he ascertains that the elements have their definite combining ratios, and combining weights; and thence he learns to calculate, with the utmost precision, the constitutions of compounds.

Here then is a fundamental law of attraction, at the basis of chemistry, and upon it the science rests. It is a law of numbers and harmonic relations — the ordained will of God, which the chemical student has been enabled to apprehend, and is now endeavoring to follow out into all of its beautiful developments. No future research can revoke that will. The supposed elements may be resolved into others; but all matter, organic and inorganic, is constituted upon this law; and the law must stand, until the Being who said, "So let it be," reverses all Nature and his own enactment.

In the study of Light, the division of the beam into its

component colored rays, was a first fact; the different refrangibilities of those rays, a second. Then came the law that each color corresponds to a specific rate of vibration or of wave motion: the vibrations were measured; and finally, whatever the freaks of light, they were found to be explainable by the interferences and other inter-actions of just such rays with these specific rates of vibration. This established, science says: "sic Deus vult," and pays Him the homage due.

Thus we might go on with the departments of physical science, heat, magnetism, electricity, and others; and in all, it would appear, that science has reached immutable laws, simply by comparing one tracing in nature with another, and thus reading the hand-writing of God in his works. The attraction of gravitation, chemical attraction, cohesive attraction, light, heat, electricity, may yet be referred to some higher laws: they may be found to be but the workings of a common law, embracing the whole; and to this, science is tending. But in so doing, what are now laws will stand firm as laws under a more general law; what is knowledge will be knowledge still.

The laws in the kingdoms of life are of similar import, equally intelligible to the humble pupil of nature, and, if possible, more grand in their scope and relations.

The great universal law for all life Moses announced when speaking of the institution of the first life-kingdom, in the words: "which has seed in itself;" for this is the fundamental characteristic of living beings, as distinct from inorganic existence.

The evolution of the germ — in its essence, a simple memberless cellule — resulting in a successive individualization of parts: the more fundamental first; then, by degrees, leading on to the completed complex organism in all its details, is an exhibition of another grand law of the highest significance; one, in an important sense, typical of all progress.

The spiral line of development as the initial in evolution, and retained in its perfection in the spiral arrangement of leaves in plants, as well as in the parts of some animals, is

another grand law, which science has evolved from the mass of facts before us in the plant-kingdom. And this law has its more special announcements: follow the leaves, from one leaf (A) as a starting point around the stem, taking the course of the spiral, to another leaf (B) in the same vertical line with the first; and if there are 2 or 3 leaves in the spiral, the spiral goes around but once before reaching leaf B; if there are 5 leaves in the spiral, the spiral revolves 2 times before it reaches leaf B; if there are 8 leaves, it revolves 3 times; if 13 leaves, it revolves 5 times; if 21 leaves, 8 times; and so on, and the converse, by an inflexible rule. Placing the number of leaves above, and number of turns below, the following series expresses the relation: — $\frac{1}{1}$ $\frac{1}{2}$ $\frac{2}{3}$ $\frac{3}{5}$ $\frac{5}{8}$ etc. Now the last 8, the number of revolutions for a spiral of 21 leaves, is the sum of 5 and 3 of the two next preceding spirals in the series; and 21, of 13 and 8 of the same two preceding spirals. In this way the series extends on, in exact mathematical relation. Thus law rises above law, in God's plan, to mathematical harmonies; and when we shall establish the connection between the nature of growth and the production of such spirals, this will be still another law, not obliterating the former, but only opening a profounder view into the mysteries of creation.

In the animal kingdom also, there are laws above laws in a long progression. There are relations of structure or concurrent conditions that run through the kingdom as a whole; others for each class; others still of less profound character, but no less strict or beautiful, for each order, or family, or genus; and then in a species itself there are still other analogies between different parts, which are like higher tones in the grand system of harmonies. These science has partly studied out, and still she labors to comprehend them all.

As one example: after tracing the analogies of parts between the fore and hind limbs of a quadruped, it has gone on and shown that in the Divine plan, one system or type of structure is at the basis of the arm of man, the leg of the horse or lion, the wing of the bird, the paddle of the whale

and pectoral fin of the fish; and so precisely, that the homologous bones may be traced, and the changes or obsolescence of this or that bone, as the type becomes adapted to its various purposes. There is in this unity of structure an expression of one single fundamental idea.

This kind of research has been further pursued, and it has been found that there is a like parallelism through the whole structure even to the relations of every bone in fishes, reptiles, birds, quadrupeds, and man; so that there is one type at the basis of all.

Still deeper has investigation gone; and now we know that in a single vertebra and its appendages, all the elements of the bony structure in these classes of animals are comprised, the repetition and modifications of a type-vertebra, with its accessories, producing all the various results.

Thus God throughout nature has evolved diversity out of unity, eliciting ten thousand concordances out of single profound enactments in His plan of creation.

These laws are universal truths, limited so far only as the range of objects to which they relate is limited. Thus any truth with regard to *life* which characterizes all living beings, is a law in the Science of Life.. So as to the leaves of plants, any quality which is found to be a universal truth, as for instance their spiral arrangement, as explained, or their function of respiration, or their general structure, is a law in the Science of Plants. The chemical combination of elements in simple ratio and according to constant equivalents by weight, is another law or universal truth; and the general truths relating to the dependence of chemical combinations on heat, light, or electricity, are other laws. The parallel relations of structure or homologies between all vertebrates, is another law, universal as regards the vertebrates; and the other great groups have their corresponding laws. The reciprocal relations between the parts of an animal, due to the fact of type-structures, as between the hoof, leg, teeth, stomach, etc., through the structure, which is so exact, that a knowledge of one of these parts is equivalent to a knowledge of the general nature of all, is another law or universal truth.

Thus there are laws having reference to forces, motion, form, dimensions, general structure, functions, affinities of family, class, etc.; homological type-relations; reciprocal relations between the parts of a structure; development or growth, whether organic or inorganic. And such facts or conditions may be considered also with reference to one another, and afford still other laws; or specially with regard to forces or influences of any kind; and in this line are mainly what we call causalities. They may all be of various grades of generality; and they may be reduced in some instances to mathematical expressions, in which last case we reach nearest to the prototype enactments of Divinity.

Such laws are literally announcements of concordances in nature. They are not in any sense phenomena, but expressions of the relations of phenomena. They proceed from the oneness of system in the universe. They may rise above one another, in a grand series, and all still be true as laws; for they are exhibitions of the lines of truth which run through nature, all emanating from the will of the Supreme Architect.

In electricity, magnetism, and some related departments, the term *fluid* is commonly used, but only as a help in the expression of general truths. The science is not in the fluid, nor is the idea of a fluid a part of the science. The science consists of enunciations of general relations observed, and general methods of action or change; that is, the comprehensive facts or truths which research has developed.

The illustrations which have been given are sufficient to make clear the true goal of science, that toward which it has been moving with unceasing progress since man turned from excursions of fancy, and became an earnest and faithful learner at the footstool of his Maker. Nature, to such a one, is not a mere collection of things, of trees, and rocks, and animals, and man, but of living activities harmonious in plan and action.

These explanations may, to some, seem trite or out of place; and they would be actually so, were there not lamentable ignorance where we have a right to look for knowledge.

The work cited at the head of this Article, is an example to the point. Knowing something of the position and standing of the author, we had opened the book to receive therefrom such light as learning could give on the word of God in Genesis. We found much truth, well expressed and argued, with some philosophical notions as to causalities and phenomena, and much arrogance and error. We had heard that the author sustained the conclusions arrived at by geologists regarding the days of Genesis; and found the conclusions, indeed, but accompanied with sneers at geology and all science, which betokened a mind unfit for research. We found, too, a loose use of the Sacred Record, and a limited comprehension of the grandeur of its truths, which no less surprised us.

On the subject of facts and laws in nature, the author gives us early an exhibition of the depth of his philosophy. In a note on pages 38, 39, he explains his views with some detail. He writes out the mathematical expression:

$$P \quad p_1 \quad p_2 \quad p_3 \quad p_4 \quad p_5 \cdots\cdots p_n \cdots\cdots X.$$

as a series representing a higher and higher stage of causation from the fact or directly observed phenomenon P, to X the initial or most remote "act, fact, or energy;" and observes that, on attaining a knowledge of p_2, a higher energy or causality than p_1, p_1 then becomes *phenomenal* or a *manifestation*, and so on; so that P, p_1, p_2, p_3, etc., all below p_n are phenomenal to p_n, if that be a known "fact, act, or energy." After thus explaining himself, and adding other illustrations, he says: —

"Making an application of such views to science generally, we might say, the n th terms at the present stage of discovery are to be found in such words as *gravitation*, *magnetism*, *crystallization*, *elasticity*, etc. These do yet stand for *energies* or *causalities*, because there has not yet been discovered that still more remote energy of which they are *manifestations*, and which when discovered will convert them all into *phenomena*, that is, *make them appear*."

Hence, in opposition to all that has been said, knowledge is *not* knowledge. Since science is necessarily finite, and therefore its results cannot reach nearer to X than p_n, *ergo*, not only its present laws, but all the future may develop,

are ephemeral, fated, to the last one, or all but the last, to become "phenomena" in the progress of learning; one charnel-house for the whole, "cycles," "epicycles," "magnetisms," "gravities," "elephants," "turtles," etc. A hopeless prospect ahead for those who reason from or about nature; and we wonder when Professor Lewis was propounding his laws with regard to nature, in the following pages of his work, he did not fear lest they might, hereafter, be doomed to a place by the side of the "elephants."

That we may not appear to misrepresent him, we cite further:

Page 220: "Science may boast as she pleases, but according to her own most vaunted law, she can only trace the footsteps of a present or once-passing causation;" as if the laws of matter and of all existence were as mutable as the changing seasons.

In the same spirit, he speaks of the progress of science (p. 180), rendering "childish and obsolete all the doctrines and all the language in which she now so proudly boasts."

After a very cutting rebuke for the "savans of the nineteenth century" (p. 107), he observes that "the language of science, when it fails or has become obsolete, exhibits always the appearance of childish folly and pretence;" and then, after a few sentences, goes off as follows:

"Science has indeed enlarged our field of thought, and for this we will be thankful to God, and to scientific men. But what is it after all, that she has given us, or can give us, but a knowledge of phenomena, appearances? What are her boasted laws but generalizations of such phenomena ever resolving themselves into some one great fact that *seems* to be an original energy, whilst evermore the application of a stronger lens to our analytical telescope resolves such seeming primal force into an *appearance*, a manifestation of something still more remote, which, in this way, and in this way alone, reveals its presence to our senses. Thus the course of human science has ever been the substitution of one set of conceptions for another. Firmaments have given place to concentric spheres, spheres to empyreans, empyreans to cycles and epicycles, epicycles to vortices, vortices to gravities and fluids ever demanding for the theoretic imagination other fluids as the only conditions on which their action could be made conceivable."

The error of our profound author is plain enough after the remarks which have been made. The connection, in the same category, of ancient dreams with discovered laws,

laws deduced by science after experiencing the vanity of man's imaginings and turning to God's works as a sure fountain of knowledge, is certainly remarkable as a specimen of learning; and it abounds on other pages. We hardly know to what to refer the blindness that cannot see the wide gulf between "vortices" and "gravities."

On p. 170, again, he remarks on the "ever-increasing darkness of science," "unaided by any higher beams," not aware that science is itself an emanation from the Source of light. On page 110, he says well of the Book of God, though in the same perverse tone about science: "This grand Old Book of God still stands, and will continue to stand, though science and philosophy are ever changing their countenances and passing away."

Once more, we quote a forcible illustration, which presents his views in few words: "We may smile," he says, "at the old quackish story of the earth's standing on the back of the elephant, and the elephant standing on the head of a tortoise, etc.; but in our gravities, our magnetisms, our series of fluids, ever requiring other fluids to explain their motions, we have only introduced a new set of modern equivalents."

There is much more of the same sort. At first, this slashing away at science excited amusement, reminding us of the contest between Sancho and the windmill: but then, pain, that an infidel philosophy should have emanated from such a source. This placing in antagonism God's word and his works, or the results of the study of his works, is only fitted to make the young scout the former; for they know the latter has its great truths, having the best of all evidence.

Had the author simply condemned the false that is mixed with science, or the atheism that substitutes force or nature for God, it would have been well. But notwithstanding an occasional admission of good accomplished, he reprobates science in its foundation and essence, and also all who dare to believe, — very much, indeed, in the spirit of the Cardinals who judged Galileo.

But science is still alive; her progress is sure; and in her

readings of God's works, His word is daily finding support, fuller elucidation, and increasing sublimity.

In this attack upon science, which is a sort of by-play quite unessential to the object of the work, geology of course gets double share. And, strange to say, the author is at the same time sustaining essentially the conclusions of geologists. He adopts and proves, on exegetical grounds, that the days of Genesis were long periods of time, and speaks quite freely of the æons and æons, saying that the "feeling of the vast, the indefinite, the unmeasured, once received into the soul [in the opening period], is carried naturally through all the other periods" (p. 96); and, at first, we gathered that he and geologists were agreed. But when all seemed to be flowing on smoothly, suddenly the geologist gets an unmannerly rap for taking too much time. It would seem to be a trivial fault in a case where all is acknowledged to be so "indefinite," and where the periods are periods in the work of a Being who has existed from eternity; and especially since, if we go back even "billions of years" for each day, we get no nearer to the beginning of that eternity. But still it is not pardoned. The author thinks it gives too much time to the age of "Fungi and sea-weeds;" indeed, he says: "it is very strange that fungi, at least some fungi, should exist at all" (p. 172). He is not aware that geology accords somewhat with his notion; for it finds no Fungi whatever until the later periods of the globe. He does not anywhere mention the exact length of time which, consistently with divine wisdom, the periods could have occupied. But, although objecting so decidedly to a long age of Fungi, he thinks that a state of "huge nebulosity," "with an absence of solidity and cohesion," might have been continued "for millions and millions of years" (p. 60). Again (p. 398), he remarks, with some temper (alluding to geologists and the Bible), as follows: "Neither does the Bible mean what you, in your little science and still less Biblical learning, would ascribe to it. Your stale caricatures belong neither to its prose nor its poetry: they are alike alien to its letter and its spirit."

The author exhibits a constant fear lest geology should

teach something, and that thereby a belief, based on truth from such a source (he has it — "on Buckland, Lyell, or Hugh Miller"), should be substituted for a belief grounded on the Scriptures, which would be, he says, "a wretched self-deception;" — lamentable, indeed, if we should admit of help from God's works in understanding His writings!

In another place, he says of geology (p. 98): "Infidel as her spirit often is," she is "driven, more and more, to acknowledge the mixture of the natural and supernatural in the production of the earth:" very much, we think, as a current is driven by the boat it carries; for geology first proved that "the natural" was involved in creation, and, with a rare exception, has always admitted the supernatural; and she has finally drawn off exegesis so completely into the same course that some, like Prof. Lewis, as they are hurried on by the current, exclaim in great glee over their wonderful progress, and, in remarkable self-complacency, look down frowning upon the current that they imagine is trying to keep up with them.

As to infidel geology — the science which, almost alone, put down the pantheistic "Vestiges of Creation" and its "development theory," was geology. Not a geologist, in his writings, has supported the work; and the facts proving successive creations, in past time, instead of evolutions of species from species, have been uniformly regarded as conclusive against that theory. Yet our author admits that "a development theory, in the sense of species from species, may be as pious as any other," and may, possibly, have been true. He needs the bit of science to curb his fancy.

The work is remarkable for the confident air with which it brings forward principles that cautious science is slow to utter, thus dictating to nature in the true style of the old philosophy, while, at the same time, not adopting, or "caring" to recognize, any results established by geology or the other sciences. But it is useless to enter into further details.

We come now to the special subject of the work, "the six days of creation, or a Scriptural cosmology." We will first give briefly the general course of doctrine in the volume.

The six days are six periods, "indefinite, vast;" still, he says, not so long as "very flippantly and very ignorantly" asserted by geologists.

Creation, in the very beginning of beginnings, was a creation out of nothing. But Moses probably did not mean a real *bona fide* beginning either in the first or second verse of Genesis. The words of our author are (p. 45): "whatever may be believed, in respect to this first origination of matter, whether of the earth or of all worlds, there is good reason for doubting whether it is actually meant to be set forth either in the beginning or in any other part of this account." He says of the primal or originating force, in, or constituting, nature, that it is not "the divine power continually energizing in space;" but that "it is a real entity distinct from God, which God has originated, and to which he has given an immanent existence of its own in space and time." This is "the great ultimate fact of facts in the physical world." (p. 47).

The formless and void earth was probably a "huge nebulosity," as just now cited. But "how it came in such a condition, no one can say; whether it was the result of a progress or a deterioration, we have no means of knowing, either from reason or revelation." The creation of Genesis, was no creation, even *ab initio*, but rather a fashioning in or upon matter previously existing, "a separating, a dividing, a clearing up, a bringing into order, an arranging of outward relations." The original matter may have had only "the dead force of cohesion;" but at "the beginning" to which Moses refers, there was added "an inward power, a separating, arranging, selecting, organic power," and this was "the beginning of life, although, as yet, exhibited only in the chemical aspect, rather than the higher modes in which it afterwards energized" (p. 65).

The first effect of the new life was the elimination of light" (p. 65). And as light succeeded to darkness, a finished work to time when the work was not begun, so by a natural figure, morning succeeded to evening, or light to night, "boker" to "ereb." Thus the first day passed.

Creation thus begun, was throughout, a *growth*, a *generation*, as *Genesis*, in Greek signifies. Accordingly (p. 114), "there are the days or periods of quickening, and then, supervening on them, a season or seasons of repose, in which physical law, the physical law both of the material and the sentient nature, carries on the processes thus begun, or thus renewed. As the fœtus grows in this *hidden world*, which the Psalmist compares to the lowest parts of the earth, there is doubtless a most important part performed by nature." The author, seeing himself on the verge of an abyss then adds: "yet if we would avoid the grossest materialism, we must conclude that there are some things, even in this seemingly *natural* process, which nature never could have done, — something to which all her chemistry and all her laws of physical life, could never have given the beginning of existence."

The *second* day was the "evolving from the yet semi-chaotic world, that we now call the atmosphere" (p. 104); "the origination and completion of that apparatus of physical law, or that physical state of things, be it scientifically whatever it may — for we do not yet know in all respects what it is — by which were produced the combined appearances of the clouds, the blue heavens, together with other *outward* revealing phenomena connected with, and representative of, such interior causality." The author in this connection afterwards apologizes for his indefiniteness by a fling at unfortunate science, observing (p. 105), that "the more scientific our statements, the more abstract and conceptionless are they, etc."

On the *third* day, dry land appears coming up out of the waters through natural causes. The consideration of the creation of vegetation is passed over to the *fifth* day.

On the *fourth* day, the sun, moon and stars, long before created, became visible to the earth, or "made their APPEARANCE in the firmament." The sun was perhaps now first brought into the same planetary system with the earth; or else a veil was removed; or it then first became luminous; or the matter of the sun did not before exist; or in some way, the sun became visible.

On these several points, Prof. Lewis says (p. 136): "Science is dumb, and revelation says nothing;" and again as to the establishment of the relation of the earth and the sun at that time, he remarks with equal confidence (p. 144): "science cannot say anything for or against such a view;" and again: "how can science say whether there was then any revolution of the earth upon its axis or not," and so on to a depth the reader can explore on page 145. Science seems to haunt the author like a horrible ghost, and his cudgel is always up. After all this and much more, he adds as follows, in which the remarks on vegetation are noteworthy:

"We may conclude that at this fourth period, partly contemporary with vegetation, and before the earliest dawn of animal life, the sun assumed towards our earth the state and form of a luminous body, and the adjustment of the shorter periodic seasons commenced . . . . All that we can say is, that at this period the solar system was lit up, the phosphorescent light which the earth may have possessed went out as the planet became more dense, the veil was taken from the central luminary, in order that now there might be not only light and warmth, which existed before, but such *regulated* diversities of them as would be required for the later vegetation as well as for the animal and human life" (pp. 147, 148).

Between the chapters on the fourth and fifth days, a discussion comes in again on the word *day*, and on time, and the uses of the sun, which it is unnecessary here to consider.

The *fifth* day is now taken up, when the author speaks of the creation of vegetation, and animals generally, exclusive of man. The expressions, "Let the waters bring forth," "Let the earth bring forth," are explained thus:

"In its general effect, [the general effect of the account by Moses,] and still more, in the conceptions which lie at the roots of its most important terms, it forces upon the mind the idea of *a nature in the earth* acting through a real dynamical process of its own, and in periods, which, whether longer or shorter, contain within themselves all the changes and successive stages which we find it impossible to dissociate from the thought of birth and growth. And this, too, of the animal as well as of the vegetable world" (pp. 211, 212).

Preparatory to this conclusion he had said (p. 200): "holding Nature thus to be, in some sense, a self-subsisting, self-

acting power," etc.; also, p. 199, "from the necessity of our laws of thinking, as well as from revelation, we say, that it [nature] is a power given originally by God. But, though thus originated, we can distinctly conceive of it as a nature, only when we regard it as in some manner left to itself and operating by its own laws or methods;" also, p. 204, "if we thus view Nature as a stream of causation governed by a certain law which not only regulates but limits its movements, then the *supernatural*, as its name imports, would be all *above nature*, in other words, that power of God which is employed 'according to the counsel of his own will' in originating, controlling, limiting, increasing, opposing, or terminating nature, whether it be the universal, or any particular or partial nature;" also, "it [the devout mind] loves to read how Nature, ever so obedient to her lord, is sometimes commanded to stand away from his presence."

After this, he observes that a development theory, of species from species, is pious enough, and Crosse's manufacture of *Acari* may be in harmony with law and gospel, provided the law have a divine origination; and in this provision the *naturalism* of the view escapes *atheism*.

The discussions which next follow, as to "what is meant by God's making the plant before it was in the earth," are not particularly edifying. The following chapter, on "the cyclical law of all natures," urges, that, from the analogy of day and night, summer and winter, life and death, sleep and activity, Nature has had its passivity and activity. The author "infers not only the *fact*, but the absolute *necessity* of repeated creative or supernatural acts; and this, not only to raise Nature, from time to time, to a higher degree, but to arouse and rescue her from that apparent death into which, when left to herself, she must ever fall" (p. 241). This is "the cyclical law of all natures." He quotes, approvingly (p. 243), the following thought from Plato's "strange myth," in the Politicus: "When God suffers Nature to take her course, all things tend to disorder, decay, and dissolution; when he resumes the helm, Nature moves on in her law of progress,

order comes again from disorder, growth from decay, and youth from age."

Finally, he comes to the *sixth* day, under which head, *having disposed of the quadrupeds in his remarks on the fifth day*, he speaks only of MAN. He thinks that possibly a perfect *primus homo* could have been made, by God, from the earth, like the animals (p. 247); but the record is against it, asserting that man was made in God's image, and therefore he admits that "the origin of man, as *man*, was special and peculiar;" by which he means, as he says, "his distinctive humanity, as separate from all that he has in common with the lower animals" (p. 248). He thinks, further, as follows:

"We are not much concerned about the mode of production of his material or merely physical organization. In regard to this, there is nothing in the expressions, 'He made,' or 'He created him,' or 'He made him from the earth,' which is at war with the idea of growth or development, during either a longer or shorter period. Ages might have been employed in bringing that material nature, through all the lower stages, up to the necessary degree of perfection for the higher use that was afterwards to be made of it. We do not say that the Bible teaches this; we do not think that any one would be warranted in putting any such interpretation upon it. There is, however, in itself, and aside from any question of interpretation, nothing monstrous or incredible in the idea that what had formerly been the residence of an irrational and grovelling tenant might now be selected as the abode of a higher life, might be fitted up in a manner corresponding to its new dignity, might be made to assume an erect heavenward position, whilst it takes on that beauty of face and form which would become the new intelligence, and indeed, be one of its necessary results."

In other words, a monkey may possibly have been curtailed behind and straightened up into a man.

The *seventh* day is regarded as now in progress and as including the period of spiritual existence beyond this life.

The prominent points, then, in the system are:

1. His personifying Nature, after Plato's notion; and, as a consequence, regarding her as, in a sense, "self-acting;" yet needing occasional supernatural acts, to rescue her from the decay or death to which she tends, and having alternately her time of rest and action.

2. Hence making mother earth to bring forth, through her

"parturitive powers" (p. 206), plants and animals, and even man, as far as his physical nature goes.

3. Admitting that matter is not eternal, but neglecting the obvious meaning of the phrase "In the beginning."

4. Admitting that the higher forms of vegetation were not created before the sun.

5. Regarding the creation of the sun and moon as "phenomenal."

6. Taking the days of Genesis to be indefinite periods.

7. Admitting the expression "evening and morning" to be metaphorical, and implying progress from the beginning to the full completion of a work, which, on the first day, was literally from darkness to light.

With regard to the last four points, geology can make little exception to Prof. Lewis's conclusions.

On the first three, the author and the "Vestiges of Creation" are pretty well agreed, except that Professor Lewis is less consistent in his use of Nature; and besides, he admits the occasional need of the supernatural to wake Nature from her slumbers, arrest decay, and give new momentum to her activity.

But is this Scriptural cosmology? We fail to find it in Genesis or elsewhere in the Bible. Successive days of evening and morning are announced; but does this imply that God or Nature needed rest? We have been led, from God's word as well as works, to conceive of Nature not only as God's initial work, but his constant work, ever sustained, and never left to go alone; and therefore no more requiring rest than God himself; no more capable of self-acting obedience than as God's own acts are obedient to himself. The world, in this sense, is full of God, though still not God; for these are only physical manifestations, which he ever continues, through the system he has established; while above all is a Moral Governor, a personal will supreme, which, by this system, which we call Nature, is working out physical, moral, and spiritual ends.

The successive phases or conditions in Nature may have, on such a ground, the character throughout of an evolution,

or the working of a single purpose, in all its lines of details, — as much so as in the opening flower. Yet this is so because God is infinite in power and wisdom, needs not to revise his plan or institute new principles; but, at the inception, saw the end and all the steps leading thereto, as a series or succession throughout perfect in law and harmony. In such a plan we have no right to say that God stands by to see Nature go alone; but that, unceasingly, he sustains and directs the glorious work by his power. We have not to conclude, in order to avoid materialism, that there are "some things" which Nature could never have done; for, in this view, there is nothing which, of itself, or in any sense as a self-existent activity, it can do.

This view, which shines forth from every page of the Bible, is as correctly a growth or Genesis, as that of Prof. Lewis; and all his argument, based on the progress of creation by periods, or on the meaning of the word *Genesis*, or of φύσις in Greek, or *naturâ* in Latin, or the alleged irrationality of any other view, does not go one step towards sustaining his peculiar notion of a huge self-acting something, now and then aroused to progress by God.

Although Prof. Lewis may not regard the fact, we observe that science does not suggest such a view of Nature.

The whole essence of physical Nature is expressed in a molecule; for molecular laws are the laws of physical Nature. The mere aggregation of molecules into stones or earth, however large the amount, does not give powers that are not contained in the minutest particles. Or, if many balls of such stones and earth are set afloat in space, they still do not make "Nature" with higher qualities than the molecular forces; and however great the effort of laboring Nature, we have no right to assume that those forces could make a living germ. The dirt of a laboratory had the misfortune to set afloat the idea of the creation of *Acari*, by Mr. Crosse. But science has yet no reason to deny that physical forces are physical forces.

In fact, life and physical or inorganic force are directly opposite in their tendencies. There are, in compounds, two

extremes: one, the inorganic and stable; the other, the organic and unstable; the former, the oxygen extreme; the latter, the carbon extreme. In inorganic Nature, as oxygen is the element of strongest affinity, the tendency is mostly to combination with oxygen or an analogous change, and this occasions the speedy dissolution of the organic structure when life disappears, and continued interchanges until the stable oxyds are produced. In life, on the contrary, there is a constant rising in the scale; that is, a movement in just the reverse direction, to compounds of carbon, hydrogen, and oxygen, or carbon, hydrogen, nitrogen, and oxygen, of greater and greater complexity; the stem of the plant thus preceding the formation of the higher material of the flower; or, in the animal, the albumen of the germ preceding the multiplied compounds of the structure and the highest of all compounds, as we believe it, the material of the brain. Inorganic and organic nature thus move in opposite directions.

Again, in inorganic Nature, increase of size is only accretion, and does nothing more than increase gravity. In the plant-kingdom of life, increase from the germ, besides increasing gravity, develops and sustains the organic structure, and produces a rising scale of chemical compositions. In the animal-kingdom, in addition to all the results just mentioned, there is a gradual development of mechanical force, from zero in the germ to its maximum in each species, besides also the force necessary to sustain the growth and functions of the individual, including mental action.

On scientific ground we should, therefore, conclude that physical force could not, by any metamorphosis or genesis, give rise to LIFE.

But again, suppose life to exist. This means simply living beings, as plants and animals, and implies conditions of chemical change, growth, and decay, in such beings. But we have no right to assert that any aggregation of such living beings, or amount of life, is capable of more than simply living and reproducing itself. The greatest possible result is accomplished when a living organism produces its like, in its young; for it is a result precisely equivalent, in power, to the

parent itself; that is, the power at work. Let there be a universe of worlds, full of living beings, and we still have no authority, from science, to assert the existence of a principle of life actuating that universe, beyond what belongs severally to each living being in it.

A study of Nature gives us, therefore, no basis for the notion of a living universal nature, capable more or less completely of self-development. Suppose the world to be in its condition of inorganic progress; we have no scientific ground for supposing that it could pass to a higher state, possessing living beings, by any parturient powers within. Or if life exists; we still get no hint as to the evolution of the four Sub-kingdoms of animal life from a universal germ; nor as to the origin of the Class-types, Order,—Family,—or Genus-types, or those of Species, each of which is a distinct idea in the plan of creation.

Nature in fact pronounces such a theory of evolution false, absolutely false, as we observe more particularly on a following page. It also proves the Divinity to be present at every step in creation, in the ordering of the globe in each physical feature, as well as in the plan and evolution of the life-kingdoms. The perpetual presence of Mind, infinite in power, wisdom, and love, and ever-acting, is so manifest in the whole history of the past, that the pantheistic theory which makes Nature God, is much the least absurd of the two. It regards Nature more in accordance with the analogies of a being like man, in which mind is uninterruptedly immanent, instead of an entity only now and then roused by an external mind. From the pantheistic doctrine we rise to true theism, by recognizing that whatever perfections belong to Nature, must be in or of God, as his power and attributes, and in an infinite degree. Hence physical attributes do not constitute God: for if we reject the idea that a sense of justice, truth, and love is evinced by the physical world, still man has these moral qualities; and therefore they must be among the attributes of Deity. And in addition, man has over all a free will; and therefore this also, but in its infinitude, must be an attribute of the God of Nature. Such a

Deity is not Nature itself, which is only a plan in development, but a personal being above Nature, while ever *in* nature by his power and wisdom.

Our conclusion therefore is, that Nature, self-existent and self-propagating, now and then requiring a jog from the supernatural, may be an interesting myth, but cannot rise to the same point of view with Biblical truth or sound philosophy.

But let us pass on. We need better argument than Prof. Lewis has brought forward, to convince us that the phrase, "In the beginning," does not mean what it says. We have regarded the announcement, in the first verse, of creation out of nothing by the will of God, a will free, supreme, omnific, as the grand point distinguishing the Mosaic cosmogony from the Egyptian and all others; almost like the very hand itself of God on the first line of the new revelation. But he would have us suppose that matter was made at some earlier beginning; and perhaps had had its ups and downs, and finally was worked over at a new beginning announced in the first verse. It is true the Hebrew word used in this place for *create*, does not signify, necessarily, creation out of nothing. Yet such an inference cannot be resisted without doing violence to the spirit of the text, and the fundamental laws of human belief. We would ask Prof. Lewis, what Hebrew word he could substitute for the one used, that would convey the precise idea of creation out of nothing? When he has found such a one, his reasoning may then demand consideration. "In the beginning" refers directly to the existing "heavens and earth" mentioned in the following part of the verse; that is, the existing universe. We may suspect the existence of a previous universe that came to nought before this began; but it cannot be made a question of reasonable belief, or a basis for argument.

Some other points in Professor Lewis's cosmology (he will excuse us if we substitute his own name for the term "scriptural") demand from us a passing remark.

With singular inconsistency, Professor Lewis admits a "huge nebulosity" for the "formless and void" state of the earth, makes the progress mainly one by natural causes, and

then speaks contemptuously (p. 107) of nebular condensations, the very process required to evolve solidity from his nebulosity. He speaks of the power of cohesion in the nebulous matter as preceding chemical and other kinds of attraction, not knowing but that the existence of cohesion involves the existence of the rest.

Professor Lewis supposes that, on the third day, the world was finished so far as to have its seas and lands, mountains and valleys, and urges a general theory of evolutions; yet he thinks that this does not necessarily imply that, at that time, the central body, to which the earth is a satellite, was already in its place. The worlds, on such a view, were not evolved according to the analogy of embryogeny, by eliminating the systems and then their parts; but first the scattered parts, and then these, were afterwards put into systems. Science, as well as reason, most plainly teaches, that if any evolution-theory is to be adopted (and such our author aims at), the former is the true one.

In the Mosaic record it is said that, on the third day, dry land appeared; but nowhere does it announce, like our author, that the land was diversified with mountains and vallies: and neither does science.

It is remarkable, that, in a work on the six days of creation, the author's system should have led him so far away from the record, as to place under the fifth day, both his remarks on the creation of vegetation (the work of the third day), and all he has to say on the quadrupeds or mammalia (the work of the sixth). The convenience of his theory of *life from the waters and earth*, appears to have been, in part, the occasion of it. But is this reason sufficient, in a work entitled "The Six Days of Creation, or the Scriptural Cosmology," by an author who expresses great devotion to the Scriptures? — a work exegetical, profound, claiming to sift the Hebrew, and offered as a contribution to our Biblical literature? Can we be satisfied that the word of God has been sufficiently studied and apprehended, when not even a mention of the creation of quadrupeds is introduced into the chapter on the sixth day?

Besides this, the author doubts, on grounds he so contemns, —scientific grounds—whether the higher kinds of vegetation, if any, were created before the sun. He says: "For the development of these, if not for their origination, there is needed the orderly arrangement of the seasons and the regularly-adjusted light and heat of some great luminary."

Moreover, he mentions no reason for the wonderful fact, that two so diverse creations as that of vegetation and the dividing the land from the seas took place in one day; nor for the equally marvellous fact, that the creation of quadrupeds took place on the same day with that of man.

On the creation of man, we have the crude speculations that have already been cited (p. 98), a miserable substitute for wisdom that comes from above.

Temptations to remark and criticism follow one, all through the pages of such a work; there is so much to complain of, in the author's philosophy, his exegesis, his ready way of making the Mosaic record literal or "phenomenal," to suit his theory; his misapprehension of science, and denunciation of established truth. We therefore have had to cull sparingly, not to run to a tedious length.

Is it not a marvel that a learned Professor should accord, in his cosmogony, with the views of science in all their grander points, and yet lose no opportunity to denounce science: should adopt, with science, the idea of indefinite periods for days, and then pick a quarrel because geologists make the days, he thinks, too long; should build up a system out of Nature and natural causes, or what he supposes to be natural causes, and still abuse a science that also uses Nature and natural causes, and studies not to stretch those causes beyond what is warranted by direct observation; should attempt to grasp a subject that requires the highest knowledge of natural possibilities, without the least investigation as to what are the actual powers or capabilities of Nature? An honest doubt of the conclusions of geologists, in the mind of one who has not pursued the subject, is reasonable enough; but for such a one, in his acknowledged emptiness, to turn around and charge science or the students of Nature with flippancy and ignorance, is at least to prove

himself a subject meriting psychological investigation. Science, it is true, is so far conceptionless as to clip the wings of fancy in world-making; but it is not a fault that should send her to purgatory.

It can hardly be doubted by our readers that the "Cosmology" of Professor Lewis fails of exhibiting the spirit of the original. And we believe it will soon appear, if not so already, that it indicates no adequate comprehension of the philosophy or divine features of that record. It may be good Platonism; but it is, in our view, neither scriptural theism, nor true naturalism.

Having in our *first part* presented a general sketch of science, its aims and its laws, or the laws of Nature, as a basis of comparison with the opinions of Prof. Lewis, we have considered, in our *second part*, the "Cosmology" brought forward by him as an interpretation of Genesis. It now remains, as our *third part*, to mention those points in which science has thrown light on the Mosaic account; light which could have come from no other source. We pursue this method of meeting the views of Professor Lewis on the legitimate uses of science in Biblical interpretation, rather than that of direct argument and criticism.

As introductory, we would first offer a few thoughts on the authority of the Mosaic record, and then endeavor to correct some misunderstandings with respect to geology.

Since geology began to be a science, believers in the Sacred record have gradually divided off into four classes.

1. Those who hold, on exegetical grounds, that the account in Moses admits only of a strictly literal interpretation, and denounce all geological conclusions.

2. Those who take the same view of the record, but admit in the main the results of geological research, and regard the record as a myth, correct in making God the creator, and in the general notion of progress.

3. Those who adopt a liberal interpretation of the record as most consistent with its spirit and truth, and believe both the written word and the testimonies which are gathered from the study of Nature.

4. Those who adopt the liberal interpretation of the last, but with denunciations of geology, while at the same time accepting its main conclusions.

The truthfulness of the Mosaic record is admitted by all the classes here referred to, excepting the second. These, on the ground that the early part of Genesis bears evidence of being a collection of two or three distinct accounts, suppose that Moses adopted that particular ancient or traditional story which acknowledged God as the Creator; and they do not insist upon its being correct in details. It would at first seem as if this liberality of view were a consequence of a firm and well-defined belief in the deductions of science. This is so with some; but with many, it is just the other way: there is a vague opinion that geological facts cannot be set aside; and as the literal rendering of the Hebrew, in their view, is also inflexible, they consequently let the record go, — we can hardly say, as the least of two evils. They thus obtain a sufficient ground for rejecting all attempts to reconcile science and the Bible.

The fact, if it be a fact, that the account was a tradition which Moses adopted, would not necessarily prove it incorrect in any of its statements. The acts in creation had no human witness, and therefore the tradition either was originally from the Being who had before given man a living soul, or else it was only a human conception of world-evolution. If the former, it might still be, throughout, truthful; while at the same time we should naturally infer, in the case of such a tradition, that the exact literality might yield a little to research, provided the spirit of the whole were sustained. If the latter, then the whole is hardly better than a fable, except the grand pervading truth — God in creation. In this last case, the Divine signet is stamped on a false or suspicious document, and thus opens the Sacred Book — false not in mere drapery, for the account is peculiarly free from adjuncts or symbols, presenting a series of definite assertions as to the acts of the Deity himself. Admitting the account as thus untrustworthy, science becomes the only true record of the history of creation; and its facts should hence

have a vastly enhanced interest, especially to the religious world.

But we do not believe in this fabulous origin, as we show beyond. And if but little flexibility is allowed to the Hebrew by the exegetical student, the record will stand firm, sustained by Nature and the God of Nature. We call it flexibility; yet we have the authority of some learned Biblical scholars for concluding that the liberal rendering, required by science, is the only correct rendering of the original words of Moses. Our own faith in both records is the more confirmed, the deeper we pursue our investigations.

We cannot believe that Moses had a full comprehension of the events he narrates, any more than the Jewish prophets, of the spiritual kingdom of Christ which they foretold. The account is but an epitome of creation, in a few comprehensive enunciations. The details God had before inscribed in the earth itself; and science fulfils its end in reading those records and receiving the lessons they teach.

Accepting the account in Genesis as true, the seeming discrepancy between it and geology rests mainly here: geology holds, and has held from the first, that the progress of creation was mainly through secondary causes; for the existence of the science presupposes this. Moses, on the contrary, was thought to sustain the idea of a simple fiat for each step. Grant this first point to science, and what further conflict is there? *The question of the length of time*, it is replied. But not so; for if we may take the record as allowing more than six days of twenty-four hours, the Bible then places no limit to time. *The question of the days and periods*, it is replied again. But this is of little moment in comparison with the first principle granted. Those who admit the length of time and stand upon days of twenty-four hours, have to place geological time *before* the six days, and then assume a chaos and reordering of creation, on the six-day and fiat principle, after a previous creation that had operated for a long period through secondary causes. Others take the days as periods, and thus allow the required time, admitting that creation was one in progress, a grand whole,

instead of a *first* creation excepting man by one method, and a *second* with man by the other. This is now the remaining question between the theologians and geologists; for all the minor points, as to the exact interpretation, of each day, do not affect the general concordance or discordance of the Bible and science.

On this point, geology is now explicit in its decision, and indeed has long been so. It proves that there was no return to chaos, no great revolution, that creation was beyond doubt one in its progress. We know that some geologists have taken the other view. But it was only in the capacity of theologians and not as geologists. The Rev. Dr. Buckland, in placing the great events of geology between the first and second verses of the Mosaic account, did not pretend that there was a geological basis for such an hypothesis; and no writer since has ever brought forward the first fact in geology to support the idea of a rearrangement just before man;—not one solitary fact has ever been appealed to. The conclusion was on biblical grounds, and not in any sense on geological. The best that Buckland could say, when he wrote twenty-five years since, was, that geology did not absolutely disprove such an hypothesis; and that cannot be said now.

It is often asserted, in order to unsettle confidence in these particular teachings of geology, that geology is a changing science. In this connection, the remark conveys an erroneous impression. Geology is a progressing science, and all its progress tends to establish more firmly these two principles. (1) The slow progress of creation through secondary causes, as explained, and (2) the progress by periods analogous to the days of Genesis.[1]

[1] The various uses of the word *day* in the Mosaic account of creation are not all mentioned by Prof. Lewis. *First*, in verse 5, the *light* in general is called day, the darkness, night. *Second*, in the same verse, *evening and morning* make the first day, before the sun appears. *Third*, verse 14, day stands for *twelve hours* or the period of daylight, as dependent on the sun. *Fourth*, same verse, in the phrase "days and seasons," day stands for a period of *twenty-four hours*. *Fifth* at the close of the account, in verse 4, of the second chapter, day means the *whole period of creation*. These uses are the same that we have in our own language.

What other points science in its present state establishes or elucidates, we shall now consider. The best views we have met with on the harmony between Science and the Bible, are those of Prof. ARNOLD GUYOT, a philosopher of enlarged comprehension of nature and a truly christian spirit; and the following interpretations of the sacred record are, in the main, such as we have gathered from personal intercourse with him.[1]

The first thought that strikes the scientific reader is the evidence of Divinity, not merely in the first verse of the record, and the successive fiats, but in the whole order of creation. There is so much that the most recent readings of science have for the first time explained, that the idea of man as the author becomes utterly incomprehensible. By proving the record true, science pronounces it divine; for who could have correctly narrated the secrets of eternity but God himself?

Moreover, the order or arrangement is not a possible intellectual conception, although we grant to man, as we must, the intuition of a God. Man would very naturally have placed the creation of vegetation, one of the two kingdoms of life, after that of the sun, and next to that of the other kingdom of life, especially as the sunlight is so essential to growth; and the creation of quadrupeds he would as naturally have referred to the fifth day, leaving a whole day to man, the most glorious of all creations. Prof. Lewis, in making no allusion to the creation of quadrupeds on the sixth day, writes as if it were a mistake that this was not so done. Man, again, would never have separated the creation of light so far from that of the sun, to us the source of light; neither would he have conceived of the creation of the firmament, as that word is usually understood, and was under-

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The meaning of the words "evening and morning" we believe to be correctly given by Prof. Lewis.

[1] The views of Prof. Guyot have been presented at some length in this journal by Rev. J. O. Means (numbers for January and April, 1855). They are here brought forward from a different point of view with other illustrations, and additional deductions from the science.

stood by the Jews, without the stars as part of its decoration.

Moreover, there is a sublimity and system in the arrangement, and a far-reaching prophecy, to which philosophy could not have attained, however instructed.

The creation, in the first place, consists, according to the record, of two great periods; the *first three* days constitute the *inorganic* history, the *last three* days, the *organic* history of the earth.

Each period begins with LIGHT; the *first*, light cosmical; the *second*, light to direct the days and seasons on the earth.

Each period ends in a day of two great works. *On the third day*, God *divided the land from the waters;* and he "saw that it was good." Then followed a work totally different, *the creation of vegetation*, the institution of a kingdom of life, a work more unlike that of the former half of the same day than those of any two whole days preceding; as much a new creation when expressed in a sea-weed, as in an oak or apple-tree. So, *on the sixth day*, God created *the quadrupeds* or Mammalia, and pronounced his work "good;" and as a second and far greater work of the day, totally new in its grandest element, he created MAN; and he then pronounced his creation "very good."

There is here no chance parallelism; for God neither in his word or works can be charged with accidental or unmeaning harmonies.

Vegetation, while for physical reasons a part of the creation of the third day, since its main end is physical, was also prophetic of the future, the true organic period, in which the progress of life was the grand characteristic. So again, man, while like other mammals in structure, even to the homologies of every bone and muscle, was endowed with a spiritual nature, which looked forward to another period, that of spiritual existence and immortality. Thus the last day of each great period included one work typical of the period, and the other, while essentially of the period, prophetic of the future.

Surely, philosophy never could have attained to such a

glorious scheme. What now are the special points which God's testimonies in nature have made clear?

I. *The progress of creation mainly through secondary causes.* Time was lengthened back by geology to ages unmeasured. This had before been suspected: geology made it positive knowledge.

II. *The fact that the days of Genesis were as many long periods*, the progression of physical changes and of living beings, being, on this principle, in harmony with the Bible record. The Infinite God worked not by man's time-piece, or by the roll of a ball in space, counting the twenty-four hours, but in his infinitude and eternity, he directed events through the passing ages as if those ages were but moments.

We may remark here, that science explains, and general history also, what we must understand by epochs or periods in history. We learn that the importance of an epoch is generally inversely as its length, or rather, has no necessary relation to length of time. Take the life of a plant, for example: there is the epoch of the stem, that of the flowering, that of the fruit; the first much the longest, and yet the least important in itself. Then, again, the incipient stages of an epoch, are deep in preceding time: the changes leading toward it are at work, and now and then an event strikingly betokens the coming age, and is in fact a characteristic of that age coming up through the darkness of earlier time, foretelling or announcing the future. All history is alike in this; geological history is full of it. An age is marked by its great features, by the cresting of some characteristic; while its limits — its beginning and end — may be, and usually are, indefinite. It is thus that vegetation in the organic division of time was prophetic of the period when life should be the glory of the world.

As to the actual length of periods, geology gives us no definite knowledge.

III. *The true principles or law of development or evolution in nature.* We observe, as Agassiz has well illustrated, that the development of a living being brings out the profounder distinctions and afterwards those more external. First, in the

growing germ or egg appears a character that enables us to note the class; then, that of the order; then, that of the tribe, family, genus, in succession; and finally, that distinguishing the species. It is an individualizing process. We have already alluded to this subject on a preceding page.

Taking the earth alone as an example, geology proves that it was, at one time, a fiery ball in space; and, of course, with no more distinction of parts than in a germ. Then, dry land and seas appear; but the land is of small extent and without its mountains, the waters are all salt, and the climate is one over the whole sphere, the tropics reaching to the poles, for the same tribes of plants covered all zones, even to Melville Island and Spitzbergen. At a much later period, the mountains begin to enlarge, the dry land to expand, and gradually, as time rolls on, a temperate climate settles about the poles; the tribes of animals also become more localized. Then, in the last age before man, the continents take their full breadth, the Alps and Pyrenees are born, and other mountains attain their majestic dimensions; the rivers consequently multiply and increase in magnitude and in their erosive power, and valleys are everywhere formed in great diversity of beauty; moreover, the zones of climate become nearly like our own, and every region of the globe has its peculiar Fauna and Flora and temperature. Finally, the features, and climates, and life, attain all their present variety, as man appears to take his place at the command of his Maker. Thus the earth's features and functions were gradually individualized. The subject is illustrated also in various details in the organic history of the globe, to which we briefly allude beyond.

IV. *The universe one, in system and origin.* Threads of light and attraction bind the universe in one, proving an essential unity in the nature and laws of matter. Attraction of gravitation is the fundamental force of matter; and since the law is, in fact and ratio, the same here as in remote space, we may with reason conclude that matter is everywhere essentially the same, now and from its first existence; for the present system of the universe would be annihilated by a change in this law, and therefore it was begun when the law

was established. Bodies possessed of cohesion, necessarily have gravitation; and hence a general identity as regards attraction of cohesion is involved in the identity of gravitation. Light being dependent on vibrations, as science has shown, and these vibrations a result of molecular action, therefore, since precisely the same rate of vibrations and identical characteristics belong to the light of the stars, we have proof of the profoundest significance and of the most precise character, as to the identity of all matter in its general laws. Thus it is literally inscribed on nature that, CREATION IS ONE, GOD IS ONE, THE UNIVERSE ONE.

V. *Light necessarily the work of the first day—the signal of creation begun.* From the recent results of science we know that light is dependent not merely on molecular vibrations, but on vibrations of a certain requisite rate; and also that it is produced only by molecular disturbance, action, or combination; it is a result of chemical or molecular change, and is no independent entity. Without mutual molecular action there could be neither heat nor light. Matter in such an inactive, forceless state, would be literally dark, cold, dead. But let it then be endowed with intense attraction of different degrees or conditions, and it would produce light as the first effect of the mutual action begun.

The command "Let light be," was therefore the summons to activity in matter. The Spirit of God moved or brooded over the vast deep, an abyss of universal night, and light, as the initial phenomenon of matter in action, flashed instantly through space, at the fiat of Deity. Thus science, in its latest developments, declares as distinctly as the Bible, that "on the first day light was."

Light in its veriest universality, must have been the light created, as light is one and the universe one; and not light about the earth, a little satellite to the sun.

VI. "*The beginning*," *the actual beginning.* In the fact that light must have been the first phenomenon in creation begun, and that the universe is one in history, we have all needed evidence that Moses meant "in the beginning," where he so asserts.

"The heavens and the earth," as before stated, is obviously a comprehensive expression for all existence — then a lifeless existence in the extremest sense. The earth was not the earth in defined outline; for, if we may take our translation as correct (and Professor Lewis and others give it the preference), it was "without form, and void," actually formless, and merged in the great "deep," over which the Spirit of God afterwards brooded.

VII. *The earth gradually brought to a condition in which dry land and seas existed.* Geology, as we have observed, has taught that the earth was once in complete igneous fusion; and this would imply a heat at the surface equal at least to that of melted iron. Granting this, there are conditions of its waters and atmosphere, and of its rocky mass, which may be partly followed out; and when we know better than now all the effects of heat on the elements and their compounds, we may perhaps be able to write out the history of those times of chaos. It obviously involved a gaseous condition of the whole ocean, whose waters, if now placed evenly over the sphere, would make a layer averaging two miles in depth. From this state, there would have been a passage to successive stages of condensation, as the cooling went on. Finally, the waters would descend and envelop the surface; and afterwards, by unequal contractions of the still cooling earth, the dry land would have appeared.

As it would have required a temperature of at least 500 or 600 deg. Fahrenheit to have retained so much water in the state of vapor, the surface of the earth could not have been much below this, when the ocean descended to its place. It was still a highly heated earth and ocean, and the atmosphere must have been dense and murky with foul vapors. In Job there is a sublime description evidently of this period (38: 8—10). Jehovah says: "Who shut up the sea with doors . . . when *I made the cloud the garment thereof and thick darkness a swaddling-band for it*, and brake up for it my decreed place, and set bars and doors, and said, Hitherto shalt thou come and no farther, and here shall thy proud waves be stayed." From such a state, the earth gradually emerged,

that garment of cloud slowly dissipating. The tides and waves rolled around the sphere in ceaseless motion; and, however incredible it appears, we can point out the strata that were made by that ancient ocean. Geology has brought to light rocks of great thickness, without traces of fossils, and many of them crystalline, which belong to time preceding the creation of animals, after the descending of the waters to the surface. They are called the *Azoic* rocks, or rocks of the Azoic age, because no traces of animals occur in them. Geology proves, too, that before animal life began, large areas of these rocks were dry land, over North America from Labrador westward, and we may almost map out the "dry land" on this hemisphere, which is announced on the *third day*.[1]

VIII. *Vegetation part of the physical creation.* The introduction of vegetation on the third day, was one of the mysterious facts in creation until the recent revelations of science. Now we know that the prime mission of vegetation is physical, the removal from the atmosphere of a deadly gas, carbonic acid, and the supply to it of one eminently a supporter of life, oxygen. This it accomplishes by the simple process of growth; upon this great end, its vital functions and structure are based; this single criterion distinguishes all plants from animals. Feeding animals and giving joy by its beauty to the human soul are only concomitant ends of vegetation.

Moses in announcing the creation of vegetation describes plants in general. But the institution of the plant-kingdom was the great event; and if plant-life came forth first in the sea-weed, it was still life, a new feature to the progressing world. According to the records in the rocks, vegetation was for a long age only sea-weeds; then in the coal-period,

[1] We have omitted any special reference to the *second day*, as neither geology nor general science, apart from astronomy and general reasoning, afford much aid in interpreting the account. The step of progress was one between that of light through universal space on the first day, and the separation of the lands and seas on the third. The event of the highest character in that interval, that marking a grand epoch in terrestrial time, was the elimination or separation of the earth itself from the "deep" or "waters," (admitted to mean "fluid" in its most extended sense). See Prof. Guyot's views on this subject, in the article in this journal, for April last, p. 327.

flowerless trees, along with the pine tribe (coniferæ) which are almost flowerless; and as the last age before man was about to open, trees of our common genera, oaks, elms, etc., and also the palms, began to diversify the earth's surface.

The proof from science of the existence of plants before animals is inferential, and still may be deemed satisfactory. Distinct fossils have not been found: all that ever existed in the azoic rocks having been obliterated. The arguments in the affirmative are as follows:

1. The existence of limestone rocks among the other beds, similar limestones in later ages having been of organic origin; also the occurrence of carbon in the shape of graphite, graphite being, in known cases, in rocks a result of the alteration of the carbon of plants.

2. The fact that the cooling earth would have been fitted for vegetable life for a long age before animals could have existed; the principle being exemplified everywhere that the earth was occupied at each period with the highest kinds of life the conditions allowed.

3. The fact that vegetation subserved an important purpose in the coal-period in ridding the atmosphere of carbonic acid for the subsequent introduction of land animals, suggests a valid reason for believing that the same great purpose, the true purpose of vegetation, was effected through the ocean before the *waters* were fitted for animal life.

4. Vegetation being directly or mediately the food of animals, it must have had a previous existence. The latter part of the azoic age in geology, we therefore regard as the age when the plant-kingdom was instituted, the latter half of the third day in Genesis. However short or long the epoch, it was one of the great steps of progress.

IX. *The creation of the sun on the fourth day.* By arguments already mentioned, based on the oneness of the universe in origin, the sun, moon and stars are shown to have had their places, when the earth was established. But through a prolonged period, as has been remarked, the earth was shrouded in its own vapors, and warm with its own heat, and there was therefore no sun or moon, days or

seasons. Whenever the sun first broke through the dense clouds, it was a day of joy to the world, standing out as one of the grand epochs in its history.

The sun is almost the heart and brain of the earth. It is the regulator of its motions, from the orbital movement in space, to the flow of its currents in the sea and air, the silent rise of vapors that fly with the winds to become the source of rivers over the land, and the still more profound action in the living growth of the plant and animal. It is no creator of life; but through its outflowing light, heat, and attraction, it keeps the whole world in living activity, doing vastly more than simply turning off days and seasons. Without the direct sunlight, there may be growth, as many productions of the sea and shady grounds prove. But were the sun's face perpetually veiled, far the greater part of living beings would dwindle and die. Many chemical actions in the laboratory are suspended by excluding light; and in the exquisite chemistry of living beings, this effect is everywhere marked: even the plants that happen to grow beneath the shade of a small tree or hedge in a garden evince, by their dwarfed size and unproductiveness, the power of the sun's rays, and the necessity of this orb to the organic period of the earth's history.

The sun therefore leads off, not only in fact, but with peculiar grandeur and aptness, the organic history of the globe.

Thus, at last, through modern scientific research, we learn that the appearance of light on the first day and of the sun on the fourth, an idea foreign to man's unaided conceptions, is as much in the volume of nature as that of sacred writ.

X. *The invertebrates, fishes, reptiles, and birds, the earlier animal creations.* Geology has opened out the fact, that the earliest animals and plants of the globe were wholly water species. There was a long *marine era*, the lands small, the seas nearly universal, the continents marked out it is true in their grand outline, but only partly emerged; the animals only the inhabitants of the seas, as molluscs, corals, and fishes.

This was followed by a *semi-marine*, or *amphibian era*, as

it may be called, when land-plants took possession of the dry land, producing in its earlier half the coal era: but still the continents were at least half the time more or less submerged. Reptiles and birds were then the dominant animal types.

As God has recorded in the rocks by the burial of these races in their successions, so he has written in His word. On the fifth day, He said: "Let the *waters* bring forth," by *waters* implying apparently the marine or amphibian character of the species of life; and then, the account adds: "The waters brought forth *abundantly*," while the rocks testify also to swarming myriads in the seas. The species with few exceptions were oviparous. Prof. Bush shows that the "great whales" were as correctly *reptiles*, the same word *tannim* being used for *dragon* in Ezek. 29: 3, where the figure is drawn from the crocodile of the Nile; also that the word for *fowl*, means rather *flying thing*, whether insect, bird, or flying reptile, all of which occur in this era. He says moreover that the clause in verse 20, translated "and fowl that may fly above the earth" may be as correctly translated *and let the fowl fly above the earth;* so as to disconnect it from the clause, "Let the waters bring forth:" thus it stands in verse 22.

The harmony of geology with Genesis could not be more exact.

XI. *The creations of the tribes not simultaneous but successive, and occurring at many different times, after more or less complete exterminations.* The records in the rocks declare that these creations came not forth all at once, but in long progression. There was an Age when Molluscs (of which shell-fish, snails, and cuttle-fish are examples) were the dominant race, having as associates corals, crinoids, and trilobites. The earth, we may believe, was yet too warm, and the atmosphere too impure for more exalted forms. This was the *Silurian age* of geological science.

There was next an Age when Fishes first filled the seas, the *Devonian* of geology. Then another, when Amphibians (the inferior group of reptiles, including frogs and salaman-

ders, related to fishes in having gills when young) commenced, and land-plants were first in exuberant growth, the *Carboniferous age* (the land-plants, as stated, cleansing the atmosphere from carbonic acid for land animals). Then followed an Age in which true reptiles increased in numbers and diversity, by multiplied creations, until there were reptiles larger than whales in the water, immense leviathan reptiles on the land, and flying reptiles in the air, so that each of the elements was taken possession of by these scaly tribes. This was the *Reptilian age.* In its progress, reptiles passed their climax, and before its close, commenced their decline; the race, since then, has been a comparatively feeble one.

Moreover, in each of these Ages, there were many distinct creations succeeding to exterminations of previously existing life. Through the Silurian, Devonian, Carboniferous and Reptilian Ages in America, the fifth day of Genesis, *fifteen times* at least the seas were swept of their species, so that, in the rocky folios of the succeeding epoch, not a species of the former epoch occurs, or only half a dozen or so out of hundreds. After each, life was again reinstated by the Creative Hand, life in all the departments that had thus far been introduced to the globe, new mollusca, new corals, new crinoids, new trilobites; and if the Age of Fishes were in progress, new fishes also, and so on; making a complete creation for the time. Even in the Age of Fishes alone (the Devonian age), there were *four* such revolutions in America, with new creations throughout. Moreover, there were many partial destructions and restorations at other times. These exterminations can be proved, in many cases, to have been produced, either by the escape of heat, through fissures, from the earth's interior, or the elevation of the sea-bottom to dry land, or some convulsion in the earth's crust. They were, in general, connected with the earth's physical history.

Recapitulating the geological Ages mentioned, and adding those following, they are (naming them, as has been done by Agassiz, from the dominant type):

I. the Age of Molluscs, or the Silurian; II. the Age of Fishes, or the Devonian; III. the Age of Coal-plants and

Amphibians, or the Carboniferous; IV. the Age of Reptiles, including the periods between the Coal and the Tertiary; V. the Age of Mammals, or the Tertiary and Post-Tertiary; VI. the Age of MAN. The progress of Vegetable Life affords: *first*, the Age of Algæ or Sea-weeds, corresponding to the Silurian and Devonian; *second*, the Age of Flowerless Trees (Acrogens) and Coniferæ, or the age of Coal-Plants; *third*, the Age of Dicotyledonous Plants, or our common trees (oaks, elms, etc.), beginning just before the age of Mammals.

XII. *A gradual elevation of the successive races involved in the gradual refrigeration of the earth, as also in its other steps of physical progress.* The whole plan of creation had evident reference to MAN as the end and crown of the Animal Kingdom, and to the present cool condition of the globe, as, therefore, its most exalted state. It is hence obvious, that progression in the earth from a warmer to a cooler condition, necessarily involved progression from the lower to the higher races, such as actually took place. This cooling, therefore, implied almost necessarily the complete extinction of some earlier races, fitted for earlier time, as well as of species. The whole fifth day (using the term in Genesis) until its later epochs, was a time of warm climate from the equator to the poles. Not a species of the thousands in those ages now exists. Species and genera appeared and disappeared as time moved on: the last trilobite lived in the Carboniferous seas, and the last Lepidodendra in the forests of the Carboniferous continents; the last ammonite, flying reptile and swimming saurian existed in the Reptilian age, when molluscs as well as reptiles passed their prime, both as to numbers of individuals and rank of species. Even the fishes bear distinctly, in their bodies, the marks of the particular part of the fifth day in which they lived: for they first appear in the Devonian age with the spinal column elongated quite to the extremity of the upper lobe of the tail; and afterwards it becomes less and less elongated until the middle of the Reptilian age, when, for the first time, species occur with the body cut off square behind, as in existing species; moreover, the old type of tail disappears, and almost

completely too the Ganoid tribe of fishes, in which it was so striking a characteristic. Thus the world took its successive steps onward, towards the Golden Age, in the then distant future. The earlier races were of lower types, not because the Creative Hand was weak, but for the reason that the times, that is the temperature and condition of the globe, were just fitted, in each case, for the races produced, and the progress of the plan of creation, correspondingly, required it.

As between the hot equator and the frigid zones, tribes now have their limits in geographical distribution, so in geological time, between the warm Silurian age and the cool present, there was a localization of groups in time, a chronological distribution,—an increase and period of maximum at different epochs along the Ages. The Reptilian and Molluscan types attaining their maximum in the Reptilian age, are examples. A few genera reach from the very first dawn of life to the existing period: they are continuous lines, binding creation in one. This oneness also appears most strikingly in the fact that hardly a fragment of a fossil is taken from the oldest rocks that is not at once as well understood as if it were from an existing species.

The intervals of rest in "self-existent" nature, which Professor Lewis speaks of, are not in the records of the earth. The longest suspension of life in North America took place, as nearly as we can learn, between the Coal period and the Middle Reptilian. Moreover, the epochs of revolution in Europe and America were, in general, not contemporaneous; and this implies merely a non-contemporaneity in the convulsions or oscillations of the earth's crust in the two hemispheres.

XIII. *System of life-evolution.* The facts gathered from nature teach us:

1. That species have not been made out of species by any process of growth or development; for the transition-forms do not occur.

2. That the "original divine power" did not create a generic or universal germ from which all subordinate genera and species were developed; for, with any such system of

evolution, the Creator would have been incompetent to complete the creation begun; each revolution would have frustrated every new effort.

3. That the evolution or plan of progress, was by successive creations of species, in their full perfection. After every revolution, no imperfect or half-made forms occur; no backstep in creation; but a step forward, through new forms, more elevated in general than those of earlier time.

4. That the creation was not in a lineal series from the very lowest upward. The four sub-kingdoms of animal-life, the Radiate, Molluscan, Articulate, and Vertebrate, early appeared in some of their representatives; and the first three almost or quite together. The types are wholly independent, and are not connected lineally, either historically or zoologically; and this is a general principle with regard to subordinate groups. The earliest species of a class were often far from the very lowest, although among the inferior. The gigantic saurians appeared before turtles and serpents; trilobites were superior to many crustaceans afterwards created; and the fish that began the Vertebrata, were powerful species, even superior in attributes of life, though not in type, to some existing Amphibians.

5. That the creation of life was the unfolding of a plan, which involved distinct archetype enactments, and, subordinate to these, and in harmony with them, expressions of purposes or ideas of a less and less general character. The four sub-kingdoms of animal life were the four archetype enactments: they limited the development of the animal creation to these four directions; and every new group came forth in subordination to these established types. So the subordinate groupings, classes, tribes, etc., have the same relation to the groups under them.

6. That the development of the plan of creation, while by successive creations, was in accordance with the law of evolution, as Agassiz has explained, that is, progress from the simple to the complex, from comprehensive unity to multiplicity through successive individualizations. The institution of the Vertebrate type in the memberless fish, embraced in

its idea all those parts and organs, external and internal, which were afterwards brought out, and which have their highest individualization, in man; so that in the bony structure, for example, we may trace the homologies between the human skeleton and the primitive fish-type. The unfolding was, in some groups, a general rising in grade, until the time of maximum, as in the Reptilian type; but embraced expansions both upward and downward, that is, to superior and inferior tribes. In many cases, the original or earliest group was but little inferior to those of later date, and the progress was towards a purer expression of the type. Thus the earliest fishes had reptile teeth, a bony coat of mail, and other reptilian characteristics, foreshadowing the Reptile type afterwards introduced. In the unfolding of the type, the reptilian features were lost, the ancient race became almost wholly extinct, and gradually the fish type came out in its purity and full diversity. This is one of numerous examples of this kind.

The Molluscan type was unfolded, in all its grand divisions in the Silurian or Molluscan age. The Articulate type, on the contrary, appeared then only in the inferior water-species, crustaceans and worms; and gradually, as time moved on, one grand division after another was evolved, until the age of Man, the period of their greatest diversity. A reason for this difference consists in the fact that Articulates are, like Vertebrates, largely land species. Moreover, every new diversity of climate, soil, plant, or animal, enlarged the field for insect life.

7. That hypotheses as to the precise mode of creating a species are presumptuous. D'Orbigny, a distinguished geologist of France, in his Geology (1851, vol. II., p. 251), says well: "Quelle est la force créatrice qui a eu cette toute-puissance si extraordinaire? Ici nous devons confesser l'impossibilité complète dans laquelle nous trouvons de répondre à aucune de ces hautes questions. Il est des limites que l'esprit humain ne peut franchir, des circonstances où l'homme doit s'arrêter et se borner à admettre les faits qu'il ne peut expliquer."

XIV. *The revolution closing the Reptilian age in geology a universal one.* Although the catastrophes in the earth's history were seldom universal, that closing the Reptilian age swept both Europe and America alike, and, as far as we know, the whole earth. Its destruction of the life of the Cretaceous period (the last of the Reptilian age) was complete, with scarcely an exception. Thus geology and the Bible both mark the close of the *fifth day.* After such a devastation, the new creation began, that of Mammals or quadrupeds: not, be it understood, of Mammals alone, for all the lower tribes had their various representatives also, by the same creation, from molluscs and corals to fish and reptiles. All, by their new forms, express the character of the age. The climates of the earth, as this age of Mammals opened, were, for the first time, widely diversified; yet the facts show that they were not as cool as now, until the age had half elapsed.

XV. *The creation of Mammals introducing a new element into the world.* The type of animal life which began with this age, the *sixth day*, was that in which the earth was to reach its highest destiny. It was the full establishment of that special type of Vertebrates that was at last to be exalted by the endowment of a soul; that, in which the mutual dependence of the parent and young, indicated in the term *mammalia*, is its grand feature, the principal means, in this age of Man, of cultivating those affections which bind society together and man to his Maker. There is hence the highest beauty and philosophy in the Mosaic record, independent of its historical facts, in thus separating the Mammals from the other Vertebrates.

Some small insect-eating Mammals appeared in the age of Reptiles. They were few (four species have been found) and weak, in striking contrast with the huge Saurians that filled the seas, earth, and air in that age. They have been well called prophetic types, announcements, as has been already explained of the true age of Mammals next to open in its full grandeur. Such seeming exceptions are in fact

part of the system of progress, and afford no objection to the reality of the great Ages.

XVI. *Progress by revolutions, and by successive creations in the age of Mammals; but the revolutions diminishing in extent as the age of Man approached.* The age of Mammals had its revolutions like the Reptilian age and those preceding; but they become less and less general, and the continents more and more stable, and modern in outline and features. The *marine* and *amphibian eras* of the globe had passed; and this was the commencement of the *continental era.*

The quadrupeds did not all come forth together. Large and powerful Herbivorous species first take possession of the earth, with only a few small Carnivora. These pass away. Other Herbivora with a larger proportion of Carnivora next appear. These also are exterminated; and so with others. Then the Carnivora appear in vast numbers and power, and the Herbivora also abound. Moreover these races attain a magnitude and number far surpassing all that now exist, as much so indeed, on all the continents, North and South America, Europe, Asia, Africa, and Australia, as the old mastodon, twenty feet long and nine feet high, exceeds the modern buffalo. Such, according to geology, was the age of Mammals, when the brute species existed in their greatest magnificence, and brutal ferocity had free play; when dens of bears and hyenas, prowling tigers and lions far larger than any now existing, covered Britain and Europe. Mammoths and Mastodons wandered over the plains of North America, huge sloth-like Megatheria passed their sluggish lives on the pampas of South America, and elephantine Marsupials strolled about Australia.

XVII. *A dwindling of the race of Mammals as the age of Man approached.* As the Mammalian age draws to a close, the ancient Carnivora and Herbivora of that era all pass away, excepting, it is believed, a few that are useful to man. New creations of smaller size peopled the groves; the vegetation received accessions to its foliage, fruit-trees and flowers, and the seas brighter forms of water-life. This

we know from comparisons with the fossils of the preceding Mammalian age. There was, at this time, no chaotic upturning, but only the opening of creation to its fullest expansions: and so in Genesis, no new day is begun, it is still the *sixth day*.

The continents long before had had their marked characteristics: the Oriental (including Europe, Asia, and Africa) as the continent of *Carnivora*, the highest mammals; North America, of *Herbivora*, a tribe inferior to the Carnivora; South America, of the sloth and armadillo tribes (*Edentata*) still lower in rank; Australia, of the Kangaroo tribe or *Marsupials*, the lowest of all quadrupeds; for these were severally the characteristic races of the continents in the Mammalian age. As the age of Man opens, North and South America and Australia were still essentially the same in their tribes of Mammals, though with new and smaller species; there is no sign of progress. The Oriental lands, on the contrary, which had so prominently taken the lead in the age of Mammals, and even through the whole Reptilian age preceding,—since the species of animals in Europe as indicated by the fossils, were ten times more numerous than in North America,—may be said to have been marked out for the Eden of the world, ages previous to man's creation.

XVIII. *Man, the new creation.* In the living beings of former ages, there had been intelligence and a low grade of reason, affections as between the dam and her cub, and the joyousness of life and activity in the sporting tribes of the land. But there had been no living soul that could look beyond time to eternity, from the finite towards the infinite, from the world around to the world within and God above. This was the new creation, as new as when life began; a spiritual element as diverse from the life of the brute as life itself is diverse from inorganic existence.

The *first* great period of history, was the period of mere material existence and physical progress. Its beginning was far away in the dim indefinite past, when light announced the work of progress begun; and even beyond, in the forceless matter of preceding time; after many changes and

evolutions, it blossomed in the lands and seas and vegetation of the third day. The *second* great period was the period of life and organic progress. Its germs are traced in the vegetation of the former period; but the light of the sun first gave vigor to the growth, and after various developments progressing through long ages, it finally blossomed in the Mammals and man of the sixth day. The *third* great period is the more exalted period of spirit and spiritual progress; whose germs are even now expanding in the soul of man; but whose flowers and fruit will appear, only in time to come. The great evolutions of time are thus so closely in accordance with the evolutions in a living being, although all is by the direct power and wisdom of God as before explained, that we comprehend the system best in language recognizing the parallel relations and oneness of principle.

XIX. *Man the last creation: The day of rest.* Science has no evidence that any living species have been created since the appearance of man on the globe. All facts in nature accord with the Scripture record, that man was the last of the grand series. Ages and ages had rolled by, the world had, step by step, been fitted up, and life had passed through its long succession of forms, ever increasing in rank, until at last man stood up erect, fitted to subjugate the mightiest energies of nature, to read the records of infinite intelligence, to embrace a universe in his sympathies, and reciprocate the love of Heaven. Creation thus ended. God pronounced upon it his benediction and rested from all his work. Analogy with the other days of Genesis, in the light of geology, certainly would lead us to regard that seventh day, not as a simple twenty-four hours, but the period of rest still in progress.

The two records, the earlier revelation and the later, are thus one in their sublime enunciations of the history of creation. There is a like grandeur in the progress of the ages. They both contain conceptions infinitely beyond the reach of the human intellect, and bear equal evidence of their divine origin. The "grand old book of God still stands," and this

grand old earth, the more its leaves are turned over and pondered, the more will it sustain, enlighten, and illustrate the sacred word. The two are independent inscriptions, written in lines of light by the same Sun of righteousness; and the more deeply they are studied and loved for their truths, the higher may we rise towards the effulgence of their eternal source. The universe and the Bible are consecutive parts of one glorious volume; the *former* teaching of infinite harmonies, coming up from the deep past, and of man's relation through Nature to God; the *latter* of man's relation through his own soul to God, and of still loftier harmonies in the eternal future: the *first part*, telling not only of the wisdom and power of God, but also of man's exaltation, at the head of the kingdoms of life, the being towards whom, with prophetic eye, all nature was looking through the course of ages, preparing his earthly abode, arranging every ridge, and plain, and sea, and living thing, for his moral and intellectual advancement, and with so much beneficence that man, when he came to take possession of the domain, found everywhere lessons of love and adoration, and read in his own exaltation a hope, though a trembling hope, of immortality; the *second part*, after a chorus epitomizing the former revelation, pursues its closing thought, Man in his relation to his Maker, makes that hope of immortality sure, and points out the way of life, by which he may enter into everlasting communion with God his Creator and Redeemer. If students of nature fail of that way of life, it is not that science is evil, but man fallen.