LECTURES

ON THE

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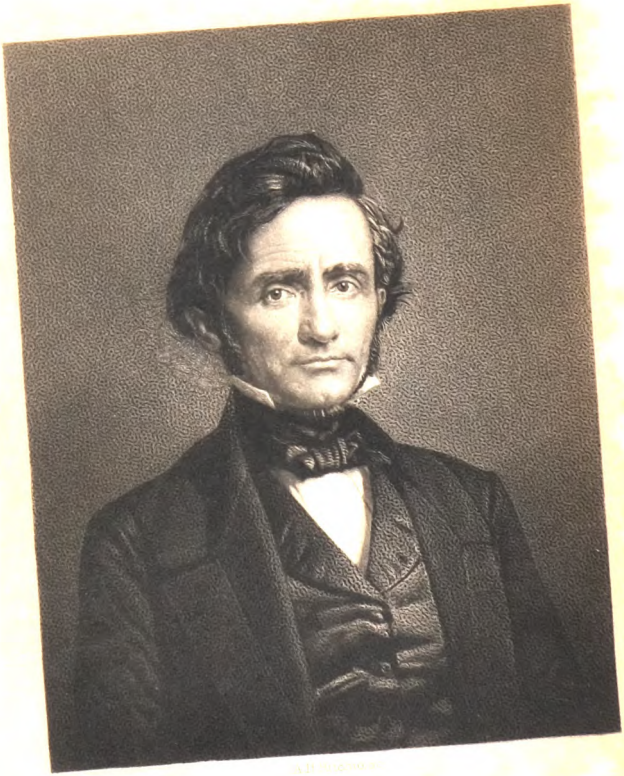

L. W. Green

The Harmony of Revelation and Natural Science;

WITH ESPECIAL REFERENCE TO GEOLOGY.

TWO LECTURES.

BY

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I.

GENERAL SPIRIT OF MODERN PHILOSOPHY—MIRACLES—RECENT ORIGIN OF MAN—AND THE FINAL CONFLAGRATION.

THE spirit of infidelity is not the spirit of true philosophy—intellectual, physical or moral. Doubt is to the mind what hunger is to the body—the stimulus which nature, or the God of nature, has provided to incite and prepare us for the enjoyment of healthy nutriment—but it is not that very nutriment itself. *Habitual skepticism* is intellectual disease—the *atrophy* of mind, the ordinary cause, the invariable symptom of mental inanition, or ill-digested knowledge—and bears the same relation to that calm love of truth, and scrutiny of evidence, which characterizes all large and healthy understandings, that the insane and insatiable craving of some dyspeptic patient, after stimulants and trash, bears to the discriminating relish and healthy appetite which belong to every vigorous and well-developed human frame. To doubt may be "the beginning of philosophy;" but devout and assured faith in God and nature—this is its glorious and triumphant consummation. Hence, of all those mighty men who have stood foremost in every department of inquiry—have enlarged the boundaries of knowledge—have fathomed the depths of the human understanding—unveiled the mysteries of nature—penetrated the infinitudes of space, or mastering the whole wide domain of matter and of mind, have given new laws to guide our investigations in either—your Bacon, your Locke, your Newton, Leibnitz, Des Cartes, Euler, Kepler, Tycho Brache—of all those mighty men of old, who tower before us, there, upon the page of history, in their colossal grandeur and gigantic strength, high above all their fellows, the luminaries of their own age, and of all succeeding generations—*scarce one* has been *an unbeliever*. "I had rather believe all the fables of the Legend, the Shaster and the Koran," exclaims Lord Bacon, "than that this universal frame is without

a mind." And, in his "Advancement of Learning," "A little or superficial knowledge of philosophy may incline a man's mind to atheism; but depth in philosophy bringeth men's minds about to religion."

On the contrary, there is a sympathy deep, intense, all-pervading—a harmony profound, stupendous, universal, between the revelations of the Bible and the discoveries of modern science, in the broadest range and the boldest grasp of its largest and most comprehensive generalizations—in the whole spirit, tone and temper of its legitimate inquiries—in that attitude of devout humility and conscious ignorance, yet of erect and fearless, of hopeful and even confident attention, with which she stands in the great temple of nature, and traces each "Footprint" of the Almighty, whether amidst the infinitude of space or amidst the depths of a past eternity—the chronicles of extinct races, or the wreck of departed worlds.

If the Creator of the universe be, indeed, an intelligent and moral agent—infinite in wisdom and goodness, as boundless in his power—then, besides the physical universe around us, there is *another*, of rational and moral beings, of correspondent extent, variety and grandeur.

Now let any one appropriate, if he can, at a single glance of thought, all that our modern astronomy has discovered—the universe of greatness above us, which the telescope has revealed, and the descending universe of littleness, which the microscope has made known—let him accept her boldest assertions as indubitable truths, and follow onward in her most adventurous speculations, till the fevered brain grows dizzy, and the strained intellect bewildered, as whirling by suns and systems, as they rise, in rapid and dazzling succession, in ever-enlarging magnitude and increasing splendor around, he strives to picture to his imagination that lapse of ages and those intervals of space for which arithmetic has no formula, and language no expression, and the mind of man, in its boldest efforts, *no approximate conception*. Then let him turn to the Bible, and in the revelations there will he find the parallel and exact counterpart of all which, in the grandeur of the material creation, has most awed and subdued, most enlarged and exalted, his conceptions. Will he not find here, too, the march and the movement of a high moral administration—the progressive evolution of one stupendous system, coëval with all ages, and coëxtensive with all worlds—the

omnipresent majesty of one supreme and all-pervading legislation, binding together, as in one bond of sympathy, the remotest parts of this great moral universe—system after system of intelligent existences—angels and archangels, and cherubim and seraphim, rising one above another, in ever-ascending progression, indefinitely high, until at last the eye of inspiration is dimmed with excessive radiance, and the telescope of revelation rests upon those upper Intelligences—those mysterious and nameless "*Powers in heavenly places*," for which earth presents no analogies, and language has no titles—yet *unto them* "*is made known through Christ the manifold wisdom of God?*"

And now, when he learns that the whole family in heaven look with intensest sympathy upon our fallen race; that the Great Father of *all* has so loved the world that he sent his own Son upon an errand of infinite compassion to redeem it—that he who was mighty to save, "travailed in *the greatness of his strength*," and all the attributes of the Godhead were summoned and concentrated here, as for some high achievement; while he contemplates with adoring wonder this amazing condescension, will he not find an analogy, at least, if not an adequate illustration, in the ways of him who, though he has garnished the heavens by his power, and called forth the stars by number, hath given to Saturn his girdle of light, and to the sun his diadem of fire—yet hath stooped to gild the insect's wing, and to pencil the hues of the lowliest floweret of the valley; nay, hath not disdained to lavish *all* the resources of his infinite wisdom, his boundless benevolence, and Almighty power, in moulding the minutest portion of the minutest member of one of those invisible animalculæ, whose teeming myriads live, and revel, and die *unseen*, amidst the sweets and fragrance of a single flower. Doth God care for the flower of the field?—and will he not care for you, oh ye of little faith?

Did it become him thus to concentrate all the attributes of the Godhead, and lavish all the resources of omnipotence on such as these, and is it inconsistent with the dignity of his exalted nature that he should stoop to redeem a whole lost world of immortal spirits?

Again, long centuries before Herschell handled a telescope, or Newton had studied the laws of the planetary motions, or Cuvier had touched a fossil bone, or Hume had reasoned upon the permanency of a course of nature; while all those astounding facts

of the cognate sciences, astronomy and geology, which have thrown such startling light upon the history of our own, and perhaps all other globes, lay buried deep beneath the huge strata, where they had been chronicled for ages, or lost amidst the unfathomed depths of space; a Galilean fisherman has furnished us with a broad outline of modern science; distinctly stated the fundamental sophism of that atheistic metaphysic, which constitutes the basis of all the infidelity of modern times, and given to it the very refutation which is offered by the most distinguished geologists of our day. In the last days, according to the apostle (2 Pet. ch. iii.), shall arise a new form of infidelity. The objector shall take his stand upon the invariable operation of nature's laws, and immutable succession of nature's phenomena: "In the last days shall come scoffers, saying, where is the promise of his coming, for since the fathers fell asleep, all things *remain* as they *were* from the beginning of the creation?" To this the apostle answers, in language precisely corresponding with that of our scientific geologist, and capable, with a very slight and legitimate modification, of including all his most important principles: "The present condition of our globe is not the first, and shall not be its final state. Our present continents were once submerged beneath the ocean, from which 'εξ υδατος' they at length arose, were then swept by a terrific deluge, and having thus passed through successive catastrophes, are yet reserved for another and more fearful visitation,—'*Reserved unto fire.*'" But think not that this destruction spoken of will be *annihilation;* it will be *purification rather.* The former condition of our globe adapted it for the abode of irrational animals only; the last great crisis in its history, prepared it for the higher order of rational and moral agents. The next will be another step in the ascending series of God's providential arrangements, and instead of a habitation for imperfect fallen beings, it will be the theatre of a glorious moral manifestation, the blissful abode of holy, happy intelligences. "Nevertheless, *we look for new heavens and a new earth*, wherein dwelleth righteousness."

Indeed, the whole tone and tendency of our modern geology, *when rightly understood*, is intensely and profoundly Christian. It furnishes by far the most conclusive of all arguments for the existence of a God; explodes the atheistic theory of an infinite series of beings; and thus dispels the last remaining doubt that might otherwise have thrown its shadow over the soul of man.

It refutes the only plausible objection that has ever been devised against the miraculous evidence of the Gospel History (Hume's celebrated argument against miracles); for it *lives amidst the innumerable miracles* of ages past, and reads and *acknowledges* their record, engraven indelibly upon the everlasting rocks. Its spirit, rightly understood, is the spirit of awe and reverence. It places us at once, amidst the infinitude of ages and the immensity of space; it tells of catastrophes long since past, and of other catastrophes yet to come; of stupendous powers, even now at work all around us, far surpassing our conception, which have left the traces of their agency deep on the whole face of nature; in the huge mountains they have heaped up, the valleys they have hollowed out; in the masses of dislocated strata, torn from their native beds, and dashed together in wild confusion; or twisted and bent in all directions from their horizontal position, as if held fast by some Titanic hand, and writhing amidst the agonies of some terrible convulsion.

Amidst the wild play of these terrific powers, the mighty succession of these incalculable ages, she traces the steady march of *one vast and comprehensive plan;* and the direct interposition, often repeated and distinctly visible, of the same almighty power, which originated the whole design at first, and still presides over every movement of the complicated machinery. *The theology of natural science*, then, is in perfect harmony with *the theology of the Bible.* She starts with *one instinctive principle, one intuitive conviction*, of the invariable connection between a CAUSE and its *appropriate effect;* and by the light of this single principle, she deciphers the hieroglyphics of dynasties long entombed, and penetrates the mysteries of the celestial motions, and rises, step by step, with irresistible demonstration, to *a First Great Cause*, that can exist, without absorbing all subordinate causes into his own mysterious being, and operate without merging all inferior agency in his own inscrutable omnipotence. But she bears along with her another principle, alike immediate, universal, irresistible, coëval with the origin of the race, coëxtensive with the globe, inseparable from the constitution of our nature—the intuitive conviction of the *relation between right and wrong*, that there is a moral element in man, and a moral law in the universe, that the *highest power and the highest right are at one, and both* are enthroned, supreme over all worlds.

And now that almighty power and infinite holiness are en-

throned together, let natural science accumulate her facts and multiply her demonstrations. Let Astronomy enlarge each world into a system, and each system into a universe of suns, pouring their blazing radiance over our midnight skies, with their attendant planets, sweeping over orbits of illimitable extent. Let Geology transform each individual of its extinct races into a separate species; and each species into the representative of an era; and expand each era over incalculable ages. Let the eye of man be kindled up with seraphic vision, and the intellect of man be moulded to the stature of tall archangels, that he may stand upon some high eminence in the upper skies, and looking abroad over the immensity around him, may discover new systems of worlds, which no telescope as yet has brought within the scope of human vision; and from that new and untrodden field of observation, gather fresh evidences of the existence of a God, and fresh illustrations of all his attributes; yet would the Christian welcome joyfully, and appropriate each successive revelation. For at each step, in the onward progress of this high argument, as fact was piled on fact, and illustration on illustration, and this ethereal intelligence, kindling with the grandeur of his theme, bore every understanding and every will along upon the rapid tide of a resistless and overwhelming demonstration, still, as the earth faded from our view, and nought but immensity and eternity was there around us, would not the reverence, and solemnity, and breathless awe of eternity rest upon our spirits? Nay, could that audacious dream of ancient and modern impiety be realized, and the mystery, that ever from of old, has shrouded the invisible and eternal one from human gaze, be *all laid* bare, and we be introduced into the presence-chamber of the Most High, and stand face to face with God; would we not find *there too*, enthroned above all worlds, eternal justice and almighty power? and beneath the broad blaze of that omniscient eye, and with all our sins upon us, would not the language of nature be the echo of that voice, which startled the patriarch of old, when in visions of the night, when deep sleep falleth upon men, "A Spirit passed before his face, and the hair of his head stood up," and a voice was heard amidst the stillness of the midnight, "Shall *mortal man* be just with God? *A man with his maker!*" And the awe-struck patriarch exclaimed, "*How shall* man be just *with God?* For *he is not a man* as I am, that I should enter into judgment with him; neither is there a day's-man betwixt us, that he might lay his hand upon

us both." Such, then, is the theology of natural science. Such the utmost goal of her most magnificent discoveries, and proudest demonstrations. They "shut us up" absolutely to the "faith." They serve as a schoolmaster to bring us unto Christ, in whom alone, "God can be just, and justify the ungodly."

We have thus presented a brief and rapid view of that mutual harmony which prevails between the discoveries of science and the revelations of the Bible, in their broad outline, their general tone and spirit, their tendency and ultimate results.

That amidst this general harmony there should nevertheless arise apparent discrepancies and real difficulties, difficulties more easy to be discovered than to be solved, lies *manifestly* in the nature of the case, and will surprise no one who remembers those strange and inexplicable anomalies that present themselves in the phenomena of nature; those irregularities in the movements of the universe that seem to threaten its destruction; those perturbations from unseen causes in the orbits of our planets; those huge chasms in the order of the creation, where its progress seems to be suddenly arrested, its harmony interrupted, its best established analogies *all defiled; yet* that, in every instance, unwavering confidence in the very harmony thus apparently violated, has suggested the *true solution;* and the solution, when attained, has confirmed the harmony; thus, by progressive approximation, establishing *the scientific assurance* that *each apparent* anomaly will hereafter be merged in some higher law, and the difficulties which our ignorance has suggested will be removed, *as heretofore,* by our advancing knowledge. It is manifestly impossible, that *any human* theory should be able to embrace and harmonize all the phenomena of the physical or moral universe, for the human mind is finite; and the scheme of the universe, devised by an infinite intelligence, if not absolutely infinite, like its author, is yet vast, beyond all powers of conception; including all worlds and all systems, with their myriad inhabitants, and their manifold relations; stretching over the whole infinitude of space, and eternity of duration. Hence, the very advance in science which solves one difficulty, often discovers many more to be solved; for our ignorance and our knowledge seem to be inseparable correlatives; the opposite poles of the same mysterious potency; and every enlargement of the *boundaries of the known,* is a correspondent extension of the *vast and limitless unknown.* Let him, therefore, declaim against apparent difficulties in the Bible, whose theory

can comprehend and explain all the mysteries in the phenomena of nature, and in the existence and character of the God of nature! For, let it not be forgotten, that if the Bible be from God, then there is not only a probability, but a certainty, that it will be liable to *the same objections*, and from *the same causes*, which are urged against his existence, and his character—his natural government and his moral legislation. That mysterious and incomprehensible eternity of God, without a beginning and without an end, present through all time, yet without relation to time! That omnipresence of God, pervading all space, yet bearing no relation to it—intensely present *in the totality* of his attributes in the most distant portions of his universe, at once, at every moment in time, and every point in space! That invisible and fearful moral government of his, the unchangeable enemy of sin, encompassing us on every side, with its terrible instances of moral retribution here, and premonitions of still more fearful punishments hereafter! That absolute sovereignty in the distribution of his favors amongst men, guided by infinite wisdom doubtless, yet according to a law which baffles our scrutiny, and heeds not our murmurs! Let any man consider for a moment what are the ordinary objections against divine revelation, and he will find that they are principally aimed at the being, or character, or government of God, as revealed in the works of nature—and amount to this, that the Bible *is the book of God*, the transcript of his wisdom, holiness and justice, imbued with his spirit, and overshadowed by the awful majesty of his mysterious being. The most fearful tendency of scientific skepticism, metaphysical and physical, in modern times, *has been and is*, to deny the existence of a personal God, and by necessary consequence, the reality of all moral distinctions, and all moral obligation. The transcendental pantheist does not aim his blows at Christianity exclusively or mainly, but at the existence of a Deity, distinct from the universe which he has made; and of a moral government distinct from the blind agency of natural law. He, *even*, patronizes Christianity, and honors Christ as the "*Divine Man*," the latest and most wonderful manifestation of the infinite in the finite. The school of Lamarck, Oken, and other advocates of the development hypothesis, only touch Christianity as they may be supposed to sap our faith in the existence of God, or the natural immortality of the soul of man. The celebrated argument of Hume against the miracles of the Bible, is equally conclusive against the miracles of creation, and all the

miracles of geology; and its fundamental principle is accordingly applied (in his treatise on the natural history of religion) to annihilate our belief in the existence of a God. And what is still more to our purpose here, it will be found in the course of our discussion, that the most serious geological objection against the truth of the Bible is based upon a similar assumption. Indeed, we feel assured that *all* objections against the Bible, theoretical or practical, whether *uttered* by philosophy, or indistinctly *felt* in common life, are based upon the vague, almost unconscious impression, that "*There is no God;*" and could we produce upon the minds of men the profound and abiding conviction of *his existence* and *his presence*, of the awful majesty that overshadows us, the omniscient eye that rests upon us, the infinite holiness that encompasses us on every side, all the illusions of skepticism would spontaneously vanish. Hence, the great difficulty *in practical life* is not to lead men to believe the miracles of the gospel, but that still more stupendous miracle, which by day and night is around us everywhere, of an omnipresent Creator, and an invisible and fearful moral government; *and in philosophy*, to disenchant mankind of that fond imagination of *a law* without an *intelligent legislator*, and A COURSE OF NATURE independent of an AUTHOR OF NATURE.

The multitude of objections against Christianity—the variety of the sources from which they are derived—the earnestness, ingenuity and confidence with which they have been urged—the learning, eloquence and genius by which they have been sustained, have led many to conclude without the labor of investigation, that a book against which so many objections had been urged, is one of suspicious and objectionable character, and of *doubtful authority* at best. As well might it be contended, that the granite ramparts of some rock-bound coast, which, for eighteen successive centuries, have hurled back the billows that dashed in impotent fury at their feet, are of *doubtful durability and strength.* Far from being legitimate occasion of alarm to the Christian, or idle exultation to the unbeliever, they really constitute an independent and most powerful argument for its divine original. For, if the Bible be from God, then it is divine and perfect truth, and cannot possibly harmonize with erroneous or defective views on any subjects which it treats; and *must, therefore*, from the very necessity of the case, meet new objections from each new phase of human science, in all its revolutions, necessarily imper-

fect still. Now Christianity comes forth before the world with high pretensions. She presents a broad front to every assailant. As a theory of God and man, of time and eternity, and of the universe itself, it sweeps a stupendous circle of thought—stretches over the whole wide field of human knowledge—touches upon all the varied phenomena of the intellectual, moral and physical creation—embraces, in historical narrative and prophetical delineation, the whole history of *the world as God's world*, and of the *human race* as *one in origin* and destiny, through a period of more than three thousand years, from the earliest patriarchal ages to the Roman emperors, and thence to the end of time—thus presenting an *almost infinitude* of points, where it can be confronted with the matured results of human investigation in every department of inquiry. *With all this*, she comes before the world, and demands universal belief and universal obedience. She courts investigation—she invites scrutiny—she challenges discussion—she throws down her gauntlet of defiance to every antagonist—and, *in every age*, a thousand foes have leaped forward to mingle in the assault. They come from every quarter, and of every character—each hoary superstition, each beardless science. They wield every weapon of refined or barbarous warfare, drawn from the domain of history or fiction, of imagination or of fact. They dig into the bowels of the earth, and hew the granite mountain—they explore the unfathomed depths of space—search the sepulchres of buried nations—decipher hieroglyphical inscriptions in temples, pyramids and tombs—study the fabulous genealogies, and fabulous astronomies of races whose sublime progenitors, according to their own account, must have been contemporaries of the Saurian tribes of an earlier world.

There is not a false religion upon earth that could bear the test of such a scrutiny for a single year—that would not vanish instantaneously before the light of a single science. *The telescope and microscope* alone would suffice to overthrow all the ancient religions of Farther Asia. That the sacred Scriptures should have come forth not only unharmed, but victorious from all the conflicts of eighteen centuries; that not one of their fifty writers has ever uttered or suggested an opinion contrary to any of those facts which the lapse of twenty-three hundred years has revealed; that each new discovery in science—each fact drawn forth from pyramid or pillar, from sepulchre or coin, from mutilated monument or half-defaced inscription, should only serve to throw new

light upon their meaning, and add new evidence to their credibility, is, perhaps, the completest specimen which the whole range of human learning has yet afforded of the truth of a theory established by millions of independent harmonies; and mounting up, in their combined and multiple result, to billions of probabilities in its favor, with absolutely nothing to the contrary.

The history of these objections against Christianity would be, indeed, her proudest vindication. Geology herself, in all her cycles, does not present more curious specimens of extinct species, than these successive infidel objections, long buried and forgotten beneath the huge masses of argument and learning, with which consecrated genius has overwhelmed and preserved them—at once their monument and sepulchre. First, it was objected, against the genuineness of the sacred records—"That we have not the very works of the evangelists and apostles themselves." Sacred learning has distinctly proven that these identical writings existed, and were read in public assemblies throughout the civilized world, during the first century—were quoted by numerous writers, their immediate successors, during the three succeeding centuries, in such profusion, that the whole New Testament, in every essential fact and doctrine, might be reconstructed from the quotations by these various authors; thus presenting a larger amount of testimony, to this single book, in the course of three centuries, than could be gathered, *from all the writers, of all centuries*, in behalf of the Greek and Roman classics, *all combined.* It was then objected, against their "*uncorrupted preservation*," "That they had been transmitted, through many centuries, by means of various manuscripts, written by different hands; and that Mill, and other critics, had discovered a corresponding number of various readings, casting thus a serious doubt over the integrity and authority of the received text." The most profound investigations of modern times have proven that all these doubtful readings are really of slight importance; and, even were each admitted, or the passages in which they occur all stricken from the Bible, not one essential doctrine of our faith would be, in the slightest degree, affected; and the great fabric of sacred truth would remain as complete in its proportions, its symmetry and strength, as some vast cathedral, from whose strong foundation, or lofty dome, the hand of folly, or the lapse of time, had crumbled the minutest portion of the cement, which

served to unite, but did not constitute, the massive marble of which the building was composed.

Driven by successive defeats from the sure *terra firma* of historical testimony, infidelity took refuge amidst the hieroglyphics of Egypt and the astronomy of the Hindoos. Bailly proved, to his own satisfaction, from the record of eclipses amongst the Hindoos, that the existence of man upon earth was many thousand years earlier than the Mosaic history would allow; and this whimsical vagary of a visionary man, though hooted out of France by the wit of Voltaire and the science of D'Alembert, was long an established article of faith amongst the enlightened infidels of England, Scotland and America. Mathematical demonstration and historic testimony have since combined to show that these eclipses were calculated *clumsily*, backwards, for ages that were past, and cannot be dated so early as the commencement of the Christian era. Some French savans, attached to Napoleon's army, during the expedition into Egypt, discovered mysterious zodiacs, at Denderah and Esneh. Though unable to decipher the hieroglyphics with certainty, one thing was indisputable—that the zodiacs were constructed at the lowest, 17,000, probably 18,000, years ago; and the writer well remembers how his boyish faith was shaken by the bold assertions and contemptuous sneers of the Edinburgh Review, against all who hesitated to receive their ocular utterance, founded, as they said, upon mathematical demonstration. Champollion and his co-laborers have read the inscription, and find that it belongs to the age of Tiberius Cæsar. Comparative anatomy, meantime, had become, through the genius of Cuvier, an important field of investigation, and presented many striking examples of analogical resemblance between the structure of man and that of other animated beings. Professor Oken, descending, one day, the Hartz mountains, beheld the "beautiful blanched skull of a hind. I picked it up—regarded it intensely," says he—"the thing was done." "Since that time, the skull has been regarded as a vertebral column." Rapidly, over all Europe, and throughout all scientific circles, spread the bold hypothesis that the skull is but a development of the spine; part of that other more comprehensive theory of development which represents man—intellectual, moral, immortal man—as the development of the brute—itself the development of some monad, or mollusc, which has been smitten into life by

the action of electricity upon a gelatinous monad.* This vertebral portion of a brutal theory, sprung from the skull of a beast, long since emptied of its brains, had passed, "like a flood of lightning," through his *disorganized brain;* and he, very naturally concluded that *all human intelligence* is the result of an

* It has recently been asserted, with great confidence, that "There is no connection between Oken's discovery of the hind's skull and the development theory. *All that Oken inferred from the skull is now* ESTABLISHED TRUTH."

Our only reply is contained in the following quotations, which express the views of three individuals of at least respectable acquirements in several departments of Natural Science: Sir David Brewster, Agazziz and Hugh Miller.

"The facts and reasonings contained in this chapter," says Brewster, as quoted and endorsed by Agazziz, "will, we doubt not, SHAKE TO ITS VERY BASE THE BOLD THEORY OF PROFESSOR OKEN, which had been so generally received abroad, and which is beginning to find supporters, even among the solid thinkers of our own country. In the Isis of 1818, Professor Lorenz Oken has given the following account of the hypothesis, to which we allude. 'In August, 1806,' says he, 'I made a journey over the Hartz. I slid down through the wood on the south side, and straight before me, at my very feet, lay a most beautiful blanched skull of a hind. I picked it up, turned it round, regarded it intensely, the thing was done. It is a vertebral column, struck me, like a flood of lightning, 'to the marrow and bone;' and, since that time, the skull has been regarded as a vertebral column.' This remarkable hypothesis was *at first* received with enthusiasm by the naturalists of Germany, and, among others, by Agazziz, who, from grounds not of a geological kind, HAS MORE RECENTLY REJECTED IT. Whatever support this hypothesis might have expected from geology, *has been struck from beneath it* by this remarkable chapter (4th) of Mr. Miller's work: and though anatomists may for awhile maintain it, under the influence of so high an authority as Professor Owen, we are much mistaken if it ever forms a part of the creed of the geologist. Mr. Miller has, indeed, by a most skilful examination of the heads of the earliest vertebrata, known to geologists, proved that the hypothesis derives no support from the structure which they exhibit; and Agazziz has, *even upon general principles, rejected it as untenable.*" (Memoir of Hugh Miller. By Louis Agazziz. Page 29–30, incorporating Dr. Brewster's Review in the North British.) The chapter on "Footprints," to which Dr. Brewster here refers, is entitled, "Cerebral Development of the earlier vertebrata;" and treats this theory of Oken throughout as only one form of the more general "Development Hypothesis." Indeed, one can scarcely comprehend how there should be "*No connection* between a theory of Cerebral Development and *the Development Theory.*"

"According to Professor Oken," proceeds Dr. Brewster, "one of the ablest supporters of the development theory, 'there are two kinds of generation in the world: the creation proper, and the generation that is sequent thereupon; or the original and secondary generation. Consequently no organism has been created of larger size than an infusorial point. No organism is, or ever has been created, which is not microscopic. Whatever is large has not been created, but *developed.* Man has not been created, but developed.' Hence, it follows that during the great geological period, when race after race was destroyed, and new forms of life called into being, 'Nature had been pregnant with the human race;' and that immortal, intellectual man, is but the development of the brute." (*Memoir*, p. 27.) Of this general hypothesis, Oken's theory of Cerebral Development is but the specific exemplification. "When we find it urged by at least one eminent assertor of the *Development Hypothesis—Professor Oken*—that light was the main agent in the development of nerve—that the nerves ranged in pairs, in turn developed the vertebræ, each vertebra being but 'the periphery or envelope of a pair of nerves;' and that the nerves of those four senses of smell, sight, taste and hearing, which, according to the Professor, 'make up the head,' *originated the four cranial vertebræ, which constitute the skull,* it becomes us to test the central idea (elsewhere called 'the ideal exemplar'), thus converted into a sort of historic myth by the realities of actual history. What, then, let us inquire, is the real history of the cerebral development of the vertebrata, as recorded in the rocks of the earlier geologic periods?" (Footprints, p. 64.)

And again (on page 94), as the result of the whole discussion. "But while we find

electric spark passed through an unorganized gelatinous monad. It has been well remarked, by an able writer, that the strongest argument in favor of this theory is, that any human being should ever have been found willing to adopt, much more to assert with eagerness, this high relationship to the ourang-outang and ape. Congeniality of sympathies may prove community of origin.

"A fellow feeling makes us wondrous kind."

Hooted from the earth, the development hypothesis took refuge amidst the distant nebulæ of the further heavens. Driven thence by Lord Rosse's telescope, it returned again to the earth; and the last sad record of its tragic fate assures us that, hemmed and jammed in, at last, between granite pyramids and huge masses of old red sandstone, it was shivered to atoms by a blow from the stone hammer of a Caledonian quarrier: and, of all its prodigious "*Creations*," now, no "*Vestiges*" remain.

It will now be perceived how intimate is the relation of these general remarks to that particular discussion which is our design, hereafter, to prosecute. Christianity does not present herself to-day before the scientific world to seek its patronage or propitiate its favor. She stands not before us as a discredited witness, to bolster up a doubtful reputation; but as a witness whose evidence has been tested, for eighteen centuries, in a thousand ways—that has been followed, scrutinized, confronted at every point—subjected to every torture which power could inflict, or ingenious cross-examination could devise yet *always vindicated;* and, in proportion to the severity of that ordeal through which she has passed, and the multitude of the tests previously endured, is the antecedent probability in her favor. She comes *not* as a trembling culprit, on trial for her life; but as a queen, with the long train of her attendant evidences,—prophetical, historical, miraculous—and the hosts of her conquered and captive foes, to vindicate her fair fame, establish her title to the crown, and claim

place in that geological history, in which every character is an organism for the 'ideal exemplar' of Professor Owen, we find *no* place in it for the vertebræ-developed skull of Professor Oken. The true genealogy of the head runs in an entirely different line. The nerves of the cerebral senses *did not*, we find, originate cerebral vertebræ, seeing that the heads of the first and second geologic periods had their cerebral nerves, but not their cerebral vertebræ; and that what are regarded as cerebral vertebræ, appear, for the first time, not in the early fishes, but in the reptiles of the coal formation. The line of succession, through the fish, indicated by the continental assertor of the development hypothesis, is a line cut off."

The "Ideal Exemplar," the ARCHETYPAL CONCEPTION IN THE DIVINE MIND, is one thing, the self-developing power of nature is totally different.

universal dominion. The question is not, then, at the present day, when any single science is arrayed against Christianity, whether, *with our existing knowledge of the facts of this solitary science*, there be not an equipoise of evidence, or even a preponderance of argument, against that view which harmonizes with the Bible history. But, whether there be such an overwhelming preponderance in favor of the opposite opinion as will neutralize that whole long array of cumulative evidences, external and internal, historical, miraculous, prophetical, upon which the credibility of the gospel is established?

And here it would be an easy, and, perhaps, in a purely polemical discussion, a legitimate procedure, to plead to the jurisdiction of these sciences—to deny their authority as judges—their competency as witnesses—*because of their immature age and discordant testimony.* We might say to these discordant sciences, "Settle your own disputes;" to these juvenile sciences, "Tarry at Jericho till your beards be grown." We might array system against system, and theory against theory, which have arisen in the geologic world in rapid and brilliant succession, each as arrogant, as impious, and as transient as its predecessors; and show that the same changes are in progress *now;* that, upon many questions of fundamental importance in this discussion, the ablest geologists are arrayed against each other. That each new decade of the last half-century has produced its new facts, and the corresponding modification of existing theories, until the same writer is found, not only in opposition to other, but, both as to facts and theory, in contradiction with himself; and, having thus thrown suspicion upon the science itself, conclude that the objections which it offers are to be treated with indifference, as irrelevant or premature. But such is not our method. Of Mosaical cosmogonies, and Fairholme geologies, and aspects of the universe, with their pre-Adamic Adams, we know little. To what particular geologic formation they belong, would be, perhaps, a curious question to a serious thinker. Perhaps they might be considered as examples and illustrations of that peculiar order of "progressive degradation," which Hugh Miller has recently described, with that keen wit of his, and keener logic—all whose features are twisted awry, as by some strange dislocation, with one great *central* eye, fixed intensely upon some ancient commentary; another *lateral*, and turned asquint towards geology. We are willing to receive truth, from whatever quarter. Amidst

much doubtful and audacious speculation, there are, in geology, many ascertained and indubitable facts. Amongst these, we are ready to acknowledge a pre-existing condition of our globe, as evidenced by successive species of animated beings, whose remains are found imbedded in successive strata, beneath the surface of the earth. And yet, even a candid inquirer may surely ask, in a discussion such as this, where many disputed questions are connected, directly or remotely, with our subject—Amidst this conflict of opinions, what shall I believe? You seek to take my feet from off the rock of ages, and now, while the ground shifts perpetually beneath me, as with the quiverings of an earthquake, or the heavings of internal fires, where shall I stand? When doctors disagree, whom shall I follow? Shall I follow Buckland, in his "Reliquiæ Diluvianæ," supported by Cuvier, De Luc, Dolomieu, and other distinguished geologists, when he supposes that he has discovered indubitable traces of the historic, Mosaical deluge; or Buckland, in his "Bridgewater Treatise," where he seems, at least, to modify his views? Shall I follow Hugh Miller, when, in his "Old Red Sandstone," he discovers "that the ichthyolites of the *lower* old red sandstone were of comparatively small size, while those of the upper Old Red were of great bulk;" that the "system began with an age of dwarfs, and ended with an age of giants?" Or shall I follow him in his "Foot-Prints," where, at the very base of the system, he "*discovers one of the most colossal of its giants;*" and instead of an ascending order of progressive development, asserts a descending order of progressive degradation? Shall I follow the "Catastrophists," or the "Uniformitarians,"—those who see, everywhere, the evidence of terrible convulsions, that shook and rent the earth, and ages of tempests that heaved the ancient ocean; or those who deny all great catastrophes, and assert the absolute uniformity of the course of nature, through all geological cycles? In regard to the change of climate, apparent on our globe, shall I adopt the astronomic, or geologic theory? Concerning the origin of our vast mountain ranges, shall I adopt the ordinary theory of scientific geologists, of a *sudden* upheaval by some great paroxysm of nature? Or that asserted by Mr. Lyell, of slow and gradual elevation, through centuries of comparative repose? In regard to the *central heat* of the earth, now no longer disputed, or disputable, shall I adopt the theory of La Place and Herschell, and all the bolder theorists, concerning a great ocean of internal fire,

not many miles below the surface, and deepening in intensity as you approach the centre? Or the chemical theory of Lyell and Sir Humphrey Davy, which attributes all to the combination and decomposition of various elements, beneath the influence of some great subterranean current of electricity, the earth itself being as one vast voltaic pile? Shall I agree with those who consider geology and astronomy as *parts of one great comprehensive* science, each the necessary complement of the other, and both under the guidance of wide-extending cosmical laws, which operate, if not similarly, at least analogously, throughout the visible universe? Or shall I, with Mr. Lyell, divorce these cognate sciences, and build up geology upon the basis of its own peculiar and independent phenomena? Or, lastly, shall I follow Mr. Lyell, when he asserts the *absolute uniformity of the course of nature*;—or when he *denies this uniformity*, and acknowledges, in the creation of man, the direct interposition of an extraordinary power, superior to all the agencies either before or since existing in nature, and really divine? Or, finally, shall I follow him into that logical catastrophe into which he plunges, through horror of the physical; when, startled by the absurdity of a *uniformity which is not uniform*, he seeks to relieve the difficulty by asserting, with laudable impartiality, an *extraordinary agency which is not extraordinary*; and then with true grammatical precision, deducing from this double negative, a single affirmative—in attempting to reconcile the two annihilates both?

But however great the diversity of sentiment upon these and other questions bearing directly and indirectly upon the Christian argument, on one point, at least, ALL MEN ARE AGREED: *there is not a geological theory extant which would not be overthrown, and the whole science revolutionized*, by the discovery of a *single new and extraordinary fact.*

This is not the language of a foe, but of its wisest, most judicious, and most competent defenders. Witness the last utterance from the geologic oracle (Miller's "Foot-Prints," page 313): "It (geology) furnishes us with no clue by which to unravel the unapproachable mysteries of creation; these mysteries belong to the wondrous Creator, and to him only. We attempt to theorize upon them, and to reduce them to law, and all nature rises up against us in our presumptuous rebellion. A stray splinter of cone-bearing wood—a fish's skull or tooth—the vertebra of a rep-

tile—the humerus of a bird—the jaw of a quadruped—*all*—*any* of these things, weak and insignificant as they may seem, become in such a quarrel, too strong for us and our theory—the puny fragment in the grasp of truth forms as irresistible a weapon as the dry bone did in that of Samson of old; and our slaughtered sophisms lie, piled up, 'heaps upon heaps,' before it." Is it possible, then, that such a theory, which would thus be annihilated by a single fact, within the limits of its own appropriate domain—which would be brained by the humerus of a sparrow, or the tooth of a fish—shall be allowed to exercise so despotic a control beyond it as to annihilate the whole array of evidence in favor of the Bible, *within us* and *without*—to erase the mighty footsteps of the gospel, as she has gone abroad over the world, to sanctify and to bless—to hush the voice of conscience—to stifle the sense of guilt—to quench the hopes of immortality? Should such a theory seek to contradict our consciousness—to reverse the principles of morals—deny the great facts of civil and sacred history, and overthrow the foundations of our faith—without the slightest hesitation, we would reject the theory, and hold to the fact; clasp the Bible to our hearts, and reject geology! Such *would be* our conclusion, on the broadest principles of the inductive philosophy—which ever prefers the well-known, familiar, indubitable fact, whether of outward observation or inward consciousness, and the direct, immediate, intuitive convictions of the mind, before all the plausibilities of ingenious hypothesis, based upon remote or doubtful or complicated facts, and subtle ratiocinations. But we do not believe that the *ascertained facts* or *received principles* of geology do thus contradict the Bible; on the contrary, we are convinced that they have done important service to the cause of theology, both natural and revealed; and furnished to each some of its most conclusive arguments and sublimest illustrations.

The first coincidence which we shall notice between the teachings of geology and the revelations of the Bible, is upon a vital and fundamental question in the historical Evidences of Christianity —"*The Possibility and Credibility of Miracles.*" GEOLOGY HAS UTTERLY ANNIHILATED HUME'S CELEBRATED ARGUMENT AGAINST THE MIRACLES OF THE BIBLE.

The Bible asserts the occasional interposition of divine and supernatural power for moral purposes in the ordinary course of physical events. This, infidelity, in all its forms, denies and de

rides. The atheist denies the existence of such a power, and asserts an infinite series of successive beings. The pantheist asserts a progressive development from the lowest gelatinous monad to the highest animated existence, through the *spontaneous agency of natural causes.* The deist acknowledges the existence of this power, but denies his immediate agency in the universe, which he has created.

To all these geology replies by pointing to the same great series of wonderful discoveries. To the atheist, she says—"I have followed up your 'Eternal Series' for six thousand years, and there it abruptly terminates." To the pantheist, she says, "I have followed up your 'Ascending Series of Progressive Development,' and find it contradicted by ALL THE FACTS. I find a giant, where you had asserted a dwarf; and in my lowest strata, examples of a high organization." She points to the MYRIAD MIRACLES recorded indelibly upon the "everlasting rocks," and says to the deist: "These are the 'foot-prints' of the Creator, whose existence you admit, and whose direct agency you deny. Each new formation, and each animated species, whose remains are perpetuated there, is cumulative evidence of the miracle which brought it into being." To all she says, in the language of her latest, and one of her most gifted advocates: "What say you to the relics that stand out, in such bold relief, from the rocks beside us, in their character, as the results of MIRACLE? The perished tribes and races which they represent, *all began* to exist. There is no truth which science can more conclusively demonstrate than that they *all had a beginning.* The infidel, who, in this late age of the world, would attempt falling back upon the fiction of 'An Infinite Series,' would be laughed to scorn. THEY ALL BEGAN to be. But how? No true geologist holds to the 'Development Hypothesis.' It is resigned to sciolists and smatterers; and there is but one other alternative. They began to be through THE MIRACLE OF CREATION. Through the evidence furnished by these rocks, we are shut down to the belief in miracle. Hume is at length answered by the severe truths of the stony science." (*"Foot-Prints," by Hugh Miller*, p. 301, 302.) Such is the language of one who is rapidly assuming the first position amongst contemporary geologists; and for whom Brewster, and Buckland, and Lyell, and Murchison, and Agazziz, have all expressed the profoundest admiration. Such is, without exception, the language of scientific geologists in our day.

This theory of Hume was revived during the year 1815 in the Edinburgh Review, the same journal which had patronized the dreams of Bailly, long after the wit of Voltaire and the science of D'Alembert had hooted them from France, and had deduced such prodigious conclusions from the zodiacs of Denderah and Ezneh. But scarce three years had passed away before the progress of geological science forced that infallible dictator in literature and science *openly to retract and refute its own superficial infidelity.* Our limits will authorize a brief extract only from the Edinburgh Review (No. 104). "The recent discoveries in geology lead IRRESISTIBLY to another observation. It is one of still greater importance; for it seems to us to be FATAL TO THE THEORY (Hume's) which we have presumed to call a misconception of the uniformity of causation, as signifying *an unalterable sequence of causes and effects.* Those who have read neither Cuvier nor Lyell, are yet aware that the human race did not exist from all eternity. Certain strata have been identified with the period of man's first appearance. We cannot do better than quote from Dr. Pritchard's excellent book (Natural History of Man), his comment, and application of this fact. 'Mankind had a beginning; since we can look back to the period when the surface on which they live began to exist. We have only to go back in imagination to that age to represent to ourselves that, at a certain time, there existed nothing on this globe but unformed elements; and that, in the next period, there had begun to move, and breathe in a particular spot, a human creature; and we shall already have admitted, perhaps, the *most astonishing miracle* recorded in the whole compass of the sacred writings.' No greater changes," continues the reviewer, "can be well imagined, in the ordinary sequence of cause and effect, such as constituted the laws of nature as they had been previously established, than took place on the day when man was, for the first time, seen amongst the creatures of the earth."

Even Mr. Lyell, whose fundamental tenet is, "The absolute uniformity of the course of nature, through all geologic epochs," —the continued agency of the same causes, "*the same both in kind and degree*" in "the organic and inorganic world,"—recoils from the legitimate results of his own favorite principle, when he comes to man;—and acknowledges here, "a real departure from the antecedent course of physical events;" "an anomalous deviation from the previously established order of things;" "a peculiar

and unprecedented agency, long after other parts of the animate and inanimate world existed; which affords ground for concluding that THE EXPERIENCE, DURING THOUSANDS OF AGES, OF ALL THE EVENTS WHICH MAY HAPPEN ON THIS GLOBE, would not enable a philosopher to speculate, with confidence, concerning future contingencies." This "anomalous deviation from the established order of things," he attributes, on the next page, to a "*moral source*"—"*new relations between the material and moral worlds*"—"*circumstances not of a physical, but a moral nature.*" (See "*Principles of Geology*," p. 257–260.)

Here, then, we have the triumph of Christianity—complete—decisive—final—irreversible; and on the field selected by her adversaries. The whole vast array of Christian Evidences, historical, prophetical, miraculous, remains untouched; with nothing to resist their combined and overwhelming power. And we might leave the subject here. The centre is broken; the rest is an affair of the wings; the skirmishing of outposts, when the citadel has been carried; the pattering of small arms, when the strong battery has been silenced, and the heavy artillery spiked.

And it might serve perhaps to quiet the anxious fears of timid Christians, trembling for their faith, to know that all this has been conclusively accomplished through the discoveries of geology.

Nor ought we to omit in this rapid sketch all notice of another stronghold of infidelity, where she took refuge long amidst the mists and obscurity of distant ages; and from which she has been irrecoverably driven by the discoveries of geology. I allude to the supposed inaccuracy of the Bible in regard to—

2d. The recent origin of man. All ancient history, except the Bible, terminates, as you trace it upwards, in an age of fabulous mythology, where all looms large in the distance, all is exaggeration, and all is prodigy. Years are exaggerated into centuries; centuries into thousands of years, or incalculable ages; warrior chieftains expand into heroes, heroes into demi-gods, and demi-gods, at last, are converted into gods. Thus, excited imagination and national vanity have combined, in all ancient chronicles, to multiply the numbers and extend the duration of successive dynasties, and give to the founders of various nations an indefinite antiquity, which is lost in the dimness of the past, and allies them in lineage, and in the era of their existence, with the immortal gods themselves. The Bible alone, with the calm sobriety and

dignity of truth, comes forward with its simple narrative of men and of events, without apology and without exaggeration, giving minutely names and dates, the period of the birth and death of successive individuals; and as the result of the most accurate examination of her records, it appears that the existence of man upon the earth cannot extend much beyond a period of six thousand years. At this all infidelity stands aghast, and contemptuously exclaims, "The Bible is contradicted by all human records, by astronomical calculations, by zodiacs, still remaining; by that strong conviction of the human bosom, which leads all men, spontaneously, to attribute an indefinitely long duration to the present condition of the world." We have already shown how mathematical and astronomical science had combined to refute one part of this objection; and how an improved knowledge of hieroglyphics had swept away another. But to all of them geology has offered a direct and decisive contradiction, and a confirmation as decisive of the sacred record.

"I need not dwell," says Mr. Lyell, "on the proofs of the low antiquity of our species; for it is not controverted by any experienced geologist; indeed the real difficulty consists in tracing back the signs of man's existence upon earth—to that comparatively recent period, when species now his contemporaries began greatly to predominate." "From the concurrent testimony of history and tradition we learn that portions of Europe, now the most fertile, and most completely subjected to the dominion of man, were less than three thousand years ago, covered with forests, and the abode of wild beasts. The archives of nature are in perfect accordance with historical records." (*Principles of Geology*, p. 249, 250.) Cuvier, having reached the same conclusion by a minute and careful examination of a vast variety of geological facts enumerated in his "Essays on the Theory of the Earth," remarks: "This result is one of the best established, and least attended to, in rational zoology; and it is so much the more valuable, as it connects natural and civil history together in one uninterrupted series." Thus fades into dim oblivion—never to reappear—this once celebrated objection of a philosophic infidelity.

It is a remarkable fact, that wherever the assaults of infidelity have been most confident and most contemptuous, with the loudest flourish of trumpets, and the boldest tones of defiance, *there* the progress of scientific inquiry has most completely unmasked her pretensions, and confirmed the credibility of the sacred

Scriptures. Especially is this true in regard to that permanent topic of infidel derision,

"THE FINAL CONFLAGRATION."

Whatever may be our theory of the earth's "Internal Heat,' whether we believe in a great ocean of central fire, increasing, as we descend, to an intensity of heat far surpassing that of melted iron, with Sir W. Herschell, and all the bolder theorists; or attribute all the phenomena, with Lyell and Sir Humphrey Davy, to the influence of chemical agencies—to the combination and decomposition of various elements, beneath the constant play of subterranean currents of electricity, the earth being as one vast voltaic pile; whether we consider geology and astronomy as complemental parts of one great, comprehensive science, founded upon wide cosmical relations; and observe the numerous analogies between our own sun, and planet, and the other central suns and planetary worlds around us, with the modern followers of La Place and Herschell; or with Mr. Lyell, divorce these cognate sciences, and eschewing these wider analogies, build up geology upon the basis of its own independent and separate phenomena; *on any theory, and with any process of investigation, the facts remain the same;* and the conclusion, not the result of doubtful disputation, but of scientific, and almost irresistible deduction, is openly proclaimed by every competent authority, and Mr. Lyell with the rest: *that the termination of our present system by a terrific conflagration, is an extremely probable, according to Mr. Lyell,* AN INEVITABLE CATASTROPHE. The facts on which this conclusion has been based, are so numerous, so various in their character, and derived from quarters so different and remote, that it would be impossible to enumerate them all within the limits assigned to this whole discussion. They are derived from mines, from artesian wells; from earthquakes and volcanoes; from hot springs, from the elevation of mountain ranges, the overflow of igneous rocks, covering vast regions of the earth; and taking a wider range, look to the condition of other worlds, to the moon, the sun, the planetary globes, the comets, and the fixed stars.

We must confine ourselves to the statement of results generally admitted.

"The observation made by Arago in 1821 that the *deepest artesian wells are the warmest,* threw great light," says Humboldt,

"on the origin of Thermal springs; and *on the establishment of the law, that terrestrial heat increases with increasing depth.*" A vast variety of experiments have since been made with the greatest precision by distinguished philosophers in the mines of various regions of the globe—in France, England, Switzerland, Peru, Saxony, and Mexico, and with the same general result. The average ratio of increase as you descend from the surface to the centre, is (over all measured distances) about 1° Fahrenheit to 41 or 51 feet. "If this increase can be reduced to arithmetical relations, it will follow, that a stratum of granite would be in a state of fusion at a depth of nearly twenty-one geographical miles, or between four and five times the elevation of the Himalaya Mountains, and the water from the hot springs between Porto Cabello and Nueva Valencia, at 205·5° of temperature, would issue from a source 7140 feet, or above two miles in depth." (*Cos.* vol. i. 174–221. See *Lyell*, v. ii. 433, 434.) This calculation proceeds on the supposition of a progressive increase of heat in the unobserved depths of the earth, a theory adopted by the great majority of modern philosophers.

But this internal heat, FROM WHATEVER SOURCE DERIVED, reaches to vast and unfathomable depths, and is of universal extent, far beneath the outer surface of our globe. To THIS, HOWEVER GENERATED, are attributed all the great changes in the condition of the earth; those huge mountain ranges, the Alps, the Appenines, the Pyrenees, the Himalaya, the Ural, the Alleghany, and the Andes; those Thermal springs of unvarying temperature, which burst from the ground, in every climate, and on every continent; those igneous rocks, once in a state of manifest fusion, which underlie all our more superficial strata, and burst upward from the depths below, deluging whole regions many hundred thousand square miles in extent, till the earth is covered "many hundred feet in depth" beneath the fiery inundation, and its whole "surface roughened, and mottled by these Plutonic masses, as thickly as the skin of the leopard by its spots." (*Foot-Prints*, p. 312.)

The magnificent extent and terrific energy of this internal power—if not infinite—at any rate absolutely immeasurable and irresistible—is manifested in those mountain ranges of 4000 miles in extent (as the Andes), where a solitary giant, Cotopaxi, lifts his head 19,000 feet above the level of the ocean; the flames from his crater rising full half a mile above his summit, and the

scoria, and huge rocks thrown out by his explosions, and scattered over many leagues around, "WOULD FORM, WERE THEY HEAPED TOGETHER, A COLOSSAL MOUNTAIN." (*Humboldt's Researches*, i. 115–125.) It will assist us to form some approximate conception of the illimitable energy employed in these stupendous upheavals; to contemplate a slight elevation over a comparatively limited area, which has been reduced by Mr. Lyell within the compass of human calculation. In the year 1822, an extent of country in Chili equal, perhaps, to one hundred thousand square miles, was elevated by a single earthquake *three feet* (*not* 19,000) on an average, and Mr. Lyell gives us in the following words the result of his calculations: "The whole thickness of rock between the subterranean foci of volcanic action and the surface of Chili MAY BE MANY MILES OR LEAGUES DEEP. Say that the thickness was *only two miles, even then* the mass which changed place and rose three feet, being 200,000 cubic miles in volume, *must have exceeded in weight* 363 MILLION PYRAMIDS." (Vol. ii. 305, 306.) He adds immediately, "It would require seventeen centuries and a half before the river Ganges could bear down from the continent into the sea, a mass equal to that gained by the Chilian earthquake." A pyramid presents some definite object to our conception. Three hundred and sixty-three millions are but one million daily for a year. When, however, we begin to calculate the mass thrown out in only two of those overflows of igneous traps—those, namely, in Hindostan and Southern Africa, covering an area, double in extent, and on an average, 200 feet in thickness;—our pyramids are multiplied by 145,200,000,000—and arithmetical numbers become the vague symbols of a power which transcends imagination. But when we attempt to calculate the amount of force necessary to heave up those mountain masses, varying from 3000 to 25,000 feet in height, and stretching over several thousand miles in extent; when we seek to pile Vesuvius upon Etna, and Etna upon Atlas, and Atlas upon Cotopaxi, and this upon Chimborazo, and Chimborazo on the loftiest of the Himalaya, we are lost amidst magnitudes which arithmetic indeed might calculate, and language might imperfectly express, but the human mind is totally unable to comprehend.

What shall we say of those earthquakes which not merely shake the largest mountains to their base, and engulf whole cities with their myriad inhabitants, but rock the solid globe from continent to continent, and heave the deep ocean from its bed; as that

of Lisbon in 1755, which was felt from Lapland to Martinique in the West Indies, and from Greenland across the continent to Africa; while the sea rose from fifteen to sixty feet on different coasts, and the land rose and fell in rapid undulations, as if tossed by the billows of an agitated ocean. (*Lyell*, vol. ii. p. 266–268.) In the second volume of the "Principles," commencing with the 254th page, we have the record of a terrific eruption of lava from Skaptár Jokul, one of the volcanoes of Iceland. We have not room for the startling details, and can give only the general results. The lava rushed from the volcano in two different streams, and in opposite directions, varying in width from one mile to fifteen, and in depth from 100 feet to 600, as it chanced to flow between the high rocky banks of the Skaptar river, or meeting with obstacles in its course, expanded over wide alluvial plains, and formed broad burning lakes, fifteen miles in breadth, and 100 feet in depth. The length of the stream was in one direction forty miles, in the other fifty. It has been calculated that this mass of lava would have covered an area of 1800 square miles to the depth of 150 feet, or 6000 square miles to a depth of near forty feet, producing, of course, a corresponding vacancy beneath the surface. Two thousand of these eruptions occur, as Mr. L. supposes, during each century; and in view of these and other equally important facts, he announces the deliberate conviction, that "*vacuities must* also arise from the subtraction of the matter poured out by volcanoes, and from the contraction of argillaceous masses by subterranean heat; and *the foundations having been thus weakened*, THE EARTH'S CRUST SHAKEN AND RENT BY REITERATED CONVULSIONS, MUST, IN THE COURSE OF TIME, FALL IN." (P. 478.)

Indeed, if that theory be true which was propounded by Sir Humphrey Davy, and adopted by Mr. Lyell, that the earth is a great "voltaic pile," carrying on a perpetual process of combination and decomposition, and thus feeding perpetually its own inward fires; and if, as he asserts, the water of the sea resolved into its component elements, oxygen and hydrogen (p. 454–456), and even the atmospheric air (p. 460) rushing in upon these volcanic foci, be the principal sources of their tremendous energy, then, when that great predicted day of conflagration shall arrive, and air, and earth, and sea shall be on fire, the sublime and terrible catastrophe will be but the result of laws and agencies intensified and variously combined, which are now in operation all around

us; "the earth's crust shattered and rent by reiterated concussions, falling in;" the atmospheric air, and the waters of the agitated ocean, rushing into the yawning chasm, and feeding the fury of the flames, which they are unable to extinguish; and well may Mr. Lyell exclaim (vol. ii. 451), quoting the words, and sharing the wonder of Pliny, "*It is the greatest of all miracles, that a single day should pass* WITHOUT AN UNIVERSAL CONFLAGRATION."*

Such are the conclusions which we are forced to draw, when we confine our attention to phenomena, visible upon, and beneath the surface of our globe. But there is, in our day, a bolder and more comprehensive philosophy; which considers geology and astronomy as branches of one great science; and our earth, not as an isolated world, but as the member of a vast family of worlds, bound together by one common relationship, and under the control, at every stage of their onward development, of great cosmical laws; and when we come thus to connect the phenomena of this, our globe, with the mysterious changes going on, even now, in the universe above us, and the evidence of past revolutions which the telescope affords, our astonishment, which we had shared before, with Pliny, is converted into a loftier and holier emotion; of awed sublimity and devout and reverential adoration. In the sun, in the moon, in the planets, in the comets, and in the distant stars, are evidences, manifold and more clear, in proportion as we can better examine them, of mysterious and portentous changes, springing in all human probability (as their ordinary phenomena indisputably do) from the same inscrutable forces which have produced similar revolutions on our earth. The sublimest portion of our modern astronomy is that which is devoted to the study and elucidation of these extraordinary phenomena. Here too, it may be said, as was said before, that whatever may be the theory, the facts and the legitimate conclusion, are the same.

* The words of Mr. Lyell are so remarkable, and so distinctly to our purpose that the reader will be pleased to find them in the following quotation. (*Principles of Geology*, vol. ii. p. 451.) "When we consider the combustible nature of the elements of the earth, so far as they are known to us; the facility with which their compounds may be decomposed and enter into new combinations; the quantity of heat which they evolve during these processes: when we recollect the expansive power of steam, and that water itself is composed of two gases which, by their union, produce intense heat; when we call to mind the number of explosive and detonating compounds, which have been already discovered; we may be allowed to share the astonishment of Pliny, that a single day should pass without a general conflagration: 'Excedit profecto, omnia miracula, ullum diem fuisse, quo non cuncta conflagrarent.' —*Hist Mundi*, Lib. ii. c. 107."

The moon, which, from its near vicinity, is best known of all the heavenly bodies, has been daguerreotyped; and the relation of its various regions, perhaps, more distinctly apprehended than that of the several portions of our own larger world. It is—on the only side exposed to human observation—an extinct volcano; with its giant mountains, its abrupt precipices, its deep and cavernous abysses; a world, in preparation, probably, to be inhabited. ("*Outlines*," p. 151.)

In those dark spots upon the disk of our sun, whose diameter is sometimes equal to six diameters of the earth, and whose enormous extent must be measured in square miles, by millions, astronomers believe that we see the dark body of the sun laid bare through openings in the bright clouds that environ and illuminate it; and that this agitation in its luminous strata, is occasioned by some mysterious energy, analogous at least, if not similar, to that whose agency has been observed in the moon and upon the earth. "*Herschell's Outlines*," p. 225–30. "*Planetary System*," 320–37. "*Nichol's Solar System*," p. 120–32.

Prodigious revolutions in the luminous atmospheres of the sun are no longer matter of visionary speculation, but, says one of our most eminent contemporary astronomers, "*an absolute fact.*"

The present century has witnessed the successive discoveries of several extraordinary bodies, and under circumstances as extraordinary as the bodies thus discovered. As in the case of the planet Neptune, so in that of the "Asteroids." *The search and the discovery* were preceded and directed by the hypothetical assumption, based upon broad and bold analogies. As in the case of Neptune, the distance had been previously calculated, the quarter of the heavens pointed out, the telescope directed to the spot—the star discovered. That there is SOME LAW, in regard to the inter-planetary distances, as in every other department of creation, could hardly be doubted by any devout or any philosophic mind. Now it was long since discovered that this *law* was apparently suspended, and the harmony of the universe interrupted in the amazing interval between the orbits of Mars and Jupiter. More than two hundred years ago, with that strong faith in the analogies of nature which characterizes all real genius, and when wisely directed, leads to all philosophical discovery, Old Kepler had predicted the future discovery of a planet, in this apparently unoccupied space. Long derided as the daring

speculation of a great, but visionary mind, the discovery of Uranus, by re-establishing the interrupted harmony, directed the minds of astronomers to the old prediction of Kepler, and to the search after the undiscovered world. Three years had scarcely passed after the discovery of Uranus, when in 1784, the Baron De Zach computed the distance and the period of the now generally suspected planet. In 1800, a congress of astronomers met, and gravely discussed, and ultimately adopted the apparently chimerical enterprise of discovering a world, whose existence was announced by faith alone in the harmonies of nature. On the first day of January, 1801, the telescope, directed to the appointed spot, discovered the star, and justified the calculation, both as to distance, and actual period. But as to magnitude. Ceres—the newly-discovered star—was 163 miles, at most 1000, in diameter. Soon, another was discovered. Then came the boldest hypothesis; and based upon it, the boldest prediction recorded in the annals of human science. Olbers suggested the opinion, that these diminutive asteroids were fragments of a larger world, long since exploded; and predicted the discovery of many other fragments, in a particular portion of the heavens—at the point of mutual intersection of their orbits. The very suggestion of such an hypothesis, and its wide acceptance by philosophers, would be sufficient for our argument. It involves *a fact and a supposition. The fact* is the existence of actual forces in our earth, analogous to those required by the hypothesis, in the exploded planet. *The supposition* relates to the existence of similar forces in other worlds. *Without the reality here, the supposition there* WOULD BE INCREDIBLY ABSURD. But the test of an hypothesis is its conformity to the facts. Telescope after telescope was directed to the spot which the hypothesis indicated. Asteroid after asteroid twinkled visibly in the vault of heaven, until fourteen, with constantly recurring new additions, were discovered. "The theory of Olbers," writes Prof. Mitchell, in 1848 (*two years after the discovery of Iris*), "receives new accessions of strength from the discovery of every new asteroid." SIX HAVE BEEN ADDED SINCE. "The same theory," says Prof. Loomis, "would lead us to anticipate the discovery of numerous other fragments;" and adds in a P. S., "Since the preceding was in type, it has been announced that a new asteroid was discovered, May 11th, at the Naples Observatory." "Whatever may be thought of such a speculation as a *physical hypothesis*," writes Sir J. Herschell, in

1849, "this conclusion has been verified to a considerable extent, AS A MATTER OF FACT, by subsequent discovery—the result of careful and minute examination undertaken with that express object."* As to the supposed impossibility, or incredibility of such an event, the following language of Prof. Loomis of New York, may be considered as expressing the general views of the scientific world. "No doubt, then," speaking of the division of Biela's comet into two distinct parts, "no doubt, then, Biela has been separated into two parts. *When, and how?* Was it caused by an explosion arising from some internal force? *Forces of this kind we see in operation in our own globe*, ejecting liquid mountains from the bowels of the earth. The surface of our moon bears marks of similar agency. The sun appears agitated by powerful forces, perhaps the expansion of gaseous substances; and it has been conjectured that a planet was once split into numerous fragments. If we knew that Biela's comet was a solid body, WE MIGHT EASILY SUPPOSE IT TO HAVE BEEN DIVIDED BY SOME FORCE SIMILAR TO VOLCANIC AGENCY." "*History of Astronomy*," p. 105-6.†

* See "Edinburgh Encyclopedia." An article by Sir David Brewster, "Astronomy," chap. i. sec. x. "Plan. and Stellar Worlds," Lecture 7th. "Outlines," p. 297—Prof. Alexander, "Asteroids and Comets." Astron. Journal, No. 23. Dr. B. A. Gould, in Silliman's Journal, 2d Series, vol. vi. p. 28-36.

† In regard to the doubts which have been recently expressed, respecting the common origin of the asteroids—doubts founded on the want of coincidence between the nodes of Iris and Hygeia, and those of the other asteroids—we are permitted to insert the following extract from a letter, written to a common friend, by a gentleman of the greatest eminence, as a mathematician and a physical philosopher, in one of our eastern Institutions.

"*August* 1*st*, 1851.

"MY DEAR SIR,

"I have long since learned to attach to scientific theories only the value of *means to attain ends—ideas to suggest, and guide research*, the scaffolding to erect a building, rather than the building itself. And therefore do I hold my faith in them, free to vary, *ad infinitum*.

"Yet it must be admitted that the coincidences, or analogies, amongst the asteroids establish *a very great probability* of their common origin.

"They *all* (Irene and Hygeia included) APPROXIMATE to a common point of intersection in orbits; and what is *strange, this region of condensation* is also intersected by the orbit of Halley's comet! The orbit of Hygeia does not vary so much from *the near position* of the orbits of the asteroids (*especially at their point of nearest approach*) as some of them vary from each other, or as in my opinion, to require the abandonment of the hypothesis of Olbers."

Indeed, the objection, in its greatest force, seems to involve its own refutation; *for the thing objected against, as fatal to the theory, is in reality, essential to its truth;* viz "If these bodies are fragments of a larger planet, this explosion must have taken place at a very remote epoch." ("*Hist. Astr.*" p. 69.)

Surely, if such an occurrence did take place, it was at a period *indefinitely remote;* at an early stage of its development as a planet. But what would be thought of an objection against any terrestrial revolution (say, the close of the Silurian era), "that such a result could not have taken place WITHIN A MILLION OF YEARS." "*A million of years*," may bewilder unthinking minds; but, unless all our astronomy

Here then we have *two fragments* of a cometary world, a comet divided into "two distinct and separate comets," and "the two parts bound together, by some inscrutable bond, continuing their swift journey through space" in orbits precisely parallel, and with constant changes in their luminous condition. Similar changes—only on a scale more magnificent, and with far greater rapidity—have been witnessed in Halley's comet, which is seen to undergo "singular and capricious changes, with great rapidity;" pouring forth vast volumes of flame suddenly, beneath the gaze of the telescope, of which Struve says, recording such a phenomenon—"THE FLAME WAS WONDERFUL. *It resembled* A RAY OF FIRE *shot out from the nucleus, as from some engine of artillery!*" One hundred and thirty years before the birth of Christ, a comet (the same perhaps) was seen to blaze up in the sky, and SURPASS THE SUN IN BRIGHTNESS. ("*Pl. and Stel. Worlds*," p. 227.) We might hesitate to believe these extraordinary accounts of changes in the celestial worlds—*the birth of a new star* of extraordinary brilliancy, recorded by the Greek astronomer, Hipparchus, and others still more wonderful in the Chinese records, had not modern observation swept completely, and conclusively away, the fabled "immutability of the starry spheres;" and proven that *all above, around, beneath*, to the remotest parts of the visible creation, is motion—progress—incessant change; new suns bursting with sudden and startling brilliancy upon our skies; suns, long observed, fading utterly away, and other suns, passing (as Sirius, for instance, from the "Red Dog star," of ancient times, to the beautiful white orb of our day) through astonishing revolutions, in the quantity and the color of their light. When the astronomer beholds these astounding changes;—comets dividing into separate fragments, and kindling into vivid conflagration beneath the very gaze of his telescope;—one star robbed, in the period of a few passing weeks, of half its former radiance;—another growing gradually into five-fold brightness;—another bursting instantaneously forth with surpassing lustre, and shining on for months with declining light, until it

and geology be the idlest illusions (and if so, the whole argument is abandoned), MILLIONS, whether applied to our estimates of distance, in time or space, are not very overpowering numbers to the modern astronomer, or geologist. *One period* of our sun's revolution around its central sun, has been estimated at *eighteen hundred million* of years (*Maedler*). One million would bear to this, the relation of a single year, to the whole Christian era! And this single revolution of our sun, what proportion does it bear to eternity? The eternity past; or the eternity to come? And who shall say, that he has not already made one, or many such revolutions?

gradually fades away, having passed through all the "changes of a dying conflagration," he is forced to exclaim. "What mean these mighty revolutions, where all had appeared so permanent and stable?" He has proposed his theory, and we believe it to be extremely probable. But whatever be the theory, the fact remains indisputable.

"*Mutability*," is written on *all created things*, GOD ONLY IS THE ETERNAL AND UNCHANGING ONE! And the voice which comes to us from those worlds of light, as they kindle and fade away, is but the deep chorus to the majestic and solemn melody of that old Hebrew poet, as he sang of old, "Thou, Lord, in the beginning, hast laid the foundation of the earth; and the heavens are the works of thine hands. They shall perish, but thou remainest; and they *shall all wax old as doth a garment, and as a vesture shalt thou fold them up; and they shall be changed;* but thou art the same, and thy years shall not fail." (See *especially*, "*Humboldt's Cosmos*," vol. iii. p. 151–182. On "New Stars.")

II.

THE FIRST CHAPTER OF GENESIS.

LET us now approach the first chapter of Genesis, against which so many and such contradictory objections have been urged; and here, if I mistake not, we shall find, "instead of a conflict," the same surprising, and "corroborative harmony," between the discoveries of modern science and the revelations of the Bible, which we have already met in the preceding part of this discussion.

VERSE 1.—The first verse is now universally admitted to contain the simple annunciation of God as THE CREATOR OF THE UNIVERSE. The second describes the condition of the earth when God began to prepare it immediately for the abode of man. The third records the first of those successive acts of Almighty Power by which this chaotic mass was reduced to order, and made a fit habitation for its destined inhabitants.

That the initial act recorded in the third verse is subsequent to that chaotic condition of the globe, of which the second speaks, will be readily and universally conceded. That the second is subsequent in the order of time, as well as of the narrative, to that act of creation recorded in the first, is equally apparent. That the earth was not a chaos until after its first creation, it surely requires no argument to prove. That this chaos existed before it was reduced to order, is palpably self-evident. The first verse then stands apart—a simple and sublime record, in general terms, of the creation of the heavens and the earth. WITH THE SECOND COMMENCES THE SPECIFIC HISTORY of our globe at the period immediately antecedent to the creation of man. This is no new interpretation forced upon us by the recent discoveries of geology, but is naturally suggested, nay, imperatively demanded by the whole analogy of Scripture; which always presupposes, and

often asserts, the existence of other intelligences, in other worlds, when "the morning stars sang together, and all the sons of God shouted for joy," on witnessing the birth-day of this new creation. It is the *earliest interpretation*, based upon this analogy, and adopted by Justin Martyr, Basil, Origen, Theodoret, and Augustine. It is implied, in the words of Calvin, and Bishop Patrick; and is distinctly asserted by Buckland, Chalmers, Wardlaw, and other distinguished orthodox divines of modern times.

"Neither the first verse, nor the first half of the second," says Chalmers (*Nat. Theol.* vol. i. p. 251), "forms any part of the narrative of the first day's operations—the whole forming a preparatory sentence, disclosing to us the initial act of creation at some remote and undefined period, and the chaotic state of the world at the commencement of those successive acts of creative power, by which, out of rude and undigested materials, the present harmony of nature was ushered into being. Between the initial act and the details of Genesis, the world, for aught we know, might have been the theatre of many revolutions, the traces of which geology may still investigate." (See *Buckland*, p. 25.) In the first verse, then, we have simply the assertion of one omnipotent, intelligent First Cause; in opposition to atheism, pantheism, and polytheism. And in this, the Bible history is sustained by the history recorded on the rocks. That there was a "beginning," and not an eternal series of beings, is proven by geology against the atheist. That the whole progress of the universe has been guided, in all its parts, by a supreme Intelligence, and not by the blind agency of natural law, is established by each new epoch in geologic history, which demanded the interference of a higher power amidst the sequences of nature. That this presiding intelligence is *One*, Dr. Buckland has conclusively established, from that unity of design, which pervades all the creations, and all the events of these successive geologic cycles.

Verse 2.—The first verse having asserted the original creation of all things by almighty power, the second describes the subsequent condition of our globe immediately antecedent to the introduction of man, and the preparation of the earth as an abode for himself and the contemporary species. It was a chaos—"emptiness and desolation"—demanding to be modified anew, and peopled with new inhabitants. Now, such precisely is the doctrine of geology. She tells us of four great geologic epochs (with their subordinate divisions) each distinguished by its own peculiar fossil animals; separated

by impassable barriers; and terminated by terrific catastrophes, which buried the myriads of living beings in one common sepulchre, and left the earth a chaos.

So terrible and so universal has been this destruction of animated beings, and so wide their diffusion over the earth, that one of our most recent writers, distinguished alike for accuracy of knowledge and sobriety of judgment, has asserted, "that, probably not a particle of matter exists on the surface of the earth that has not at some time formed part of a living being." (*Mrs. Somerville, Phys. Geography*, p. 31.) The strata containing similar fossils, are called "a Formation;" and each "Formation" indicates a decisive crisis, "an entirely new era in the earth's history." (*Agazziz*, p. 185.) Between these formations, there are sometimes huge chasms in geologic history, where the records of creation are, for indefinite ages, a blank. "An immense geologic cycle elapsed between the secondary strata and the tertiary. The old creation (in the secondary strata) had *nothing* in common with the existing order of things. Amidst the myriad of beings that inhabited the earth and the ocean during the secondary fossiliferous epochs, *scarcely one* (Agazziz says "*none*") is to be found in the tertiary. Two planets could hardly differ more in their natural productions." (*Mrs. S.*, p. 24.) "Upwards of eight hundred extinct species of animals have been described as belonging to the *earliest*, or protozoic and silurian period; and of these only about one hundred are found in the overlying (*Devonian*) series, while but fifteen are common to the whole palæozoic period; AND NOT ONE EXTENDS BEYOND IT." (*M. de Verneuil, Ansted, and H. Miller. Old Red Sandstone*, p. 216.) *All—all obliterated!* Describing one of these scenes of death and desolation, one of our most celebrated geologists says: "The fish bed of the upper Ludlow rock abounds more in osseous remains than an ancient burying-ground. The stratum, over wide areas, seems an almost continuous layer of matted bones, jaws, teeth, spines, scales, palatal plates, and shagreen-like prickles, all massed together, so that the bed when 'first discovered, conveyed the impression,' says Mr. Murchison, 'that it contained a triturated heap of black beetles.' Thus, ere *our history begins* (the history of the old red sandstone), the existences of two great systems, the Cambrian and Silurian, had passed into extinction, with the exception of what *seem* a few connecting links, exclusively molluscs. The exuviæ of at least four platforms lay entombed, furlong below

furlong, amid the gray, mouldering mudstones, the consolidated clays, and the concretionary limestones, that underlay the ancient ocean of the old red sandstone. The earth had already become a vast sepulchre, to a depth beneath the bed of the sea, equal to at least twice the height of Ben Nevis, over its surface." (*O. Red Sandstone*, p. 216, 217.)

Passing on towards our own era, we find that of all the fossil fishes from the silurian to *the end of the tertiary* period, only a solitary species has been preserved or re-created. Nay, the highest living zoological authority asserts, that during all this period, covering the whole range of fossiliferous strata, and fossil remains there "are no incontestable traces of any species of animals now living." (*Agaz.* p. 204.)

This total and universal destruction of successive races—burying them by myriads in the same strata—piling them high above each other, hundreds of feet in thickness—and often amidst the contortions and writhings of the death-agony—has been attributed by the great majority of geologists to some sudden and terrible catastrophe, occasioned by some inexplicable revolution in the economy of our planet—extinguishing former races, and preparing an abode for those who should succeed them, and ULTIMATELY FOR MAN. Such is the general doctrine of our most eminent geologists; assumed as a geological axiom, in all their writings, or deduced as an immediate and irresistible conclusion from all the facts, indeed from the fundamental principles of the science.

"The first scene in the tempest," writes Hugh Miller, "opens amidst the confusion and turmoil of the hurricane; amid thunders and lightnings—the shouts of the seamen, and the wild dash of the billows. The history of the period represented by the old red sandstone, *seems to have opened in a similar manner.*"

"At this period of our history, some terrible catastrophe involved in sudden destruction the fish of an area, at least a hundred miles from boundary to boundary, perhaps much more ("10,000 square miles in extent," next page). The same platform in Orkney, as at Cromarty, is strewed thick with remains, which exhibit, unequivocally, the marks of violent death. The figures are contorted, contracted, curved; the tail, in many instances, is bent round to the head; the spines stick out, the fins are spread to the full, as in fish that die in convulsions. The attitudes of all the Ichthyolites on this platform are attitudes of fear, anger, and pain. The remains, too, seem to have suffered

nothing from the after attacks of predaceous fishes. None such seem to have survived. The record is one of destruction, at once widely spread, and total." (*O. R. Sandstone*, p. 221, 222.)

There is, indeed, a theory which denies ALL CATASTROPHES in general, and, of course, the particular catastrophe that wrapped a former world in chaotic ruin; which asserts an absolute uniformity of the course of nature; the operation of the same causes, in the same combination, and with the same intensity of action, through all geologic eras, and in the human period; the gradual and quiet extinction of animated species to be succeeded by other species, formed by successively repeated acts of creative power. We shall not arrest the course of our argument to consider this theory in all its contradictions; but remark, in passing, first, while seeking to avoid occasional catastrophes in the destruction of extinct species, it demands a perpetuated miracle in the ever-recurring act of creating new species to occupy their places. Second, it is contradicted by all those examples of contemporaneous races simultaneously destroyed, buried hundreds of species together, deep in the same formation, never to reappear. Of the 800 species belonging to the palæozoic period, why did not *one* extend beyond it? Of all the fossil inhabitants of a former world, through all its successive eras, why has not one survived? Why this total change in the species that inhabit our globe since the deposit of our most recent strata? Is it that Infinite wisdom has adapted the new inhabitants to the altered condition of the earth? Then is that condition TRULY ALTERED. Altered! and yet all that constitutes the condition of a globe—the powers that operate upon its surface, and in its bosom, in their character, their combination, and their intensity—unchanged!

This leads us, indeed, to the true and very obvious conclusion: "Every radical revolution in the condition of a globe demands a correspondent change in the species that inhabit it; and CONVERSELY, every decisive change in the character of its species, indicates some attendant change in the condition of a globe."

Man could not have lived in that *former world*. He was not adapted to it. It was not prepared for him.

"A partially consolidated planet, tempested by frequent earthquakes of such terrible potency, that those of the historic ages would be but mere ripples on the earth's surface in comparison, could be no proper home for a creature so constituted. Fishes and reptiles were the proper inhabitants of our planet during

the earth-tempests. That prolonged ages of these tempests did exist, and that they gradually settled down until the state of things became comparatively fixed and stable, few geologists will be disposed to deny. The evidence which supports this special theory of the development of our planet in its capabilities as a scene of organized and sentient being, seems palpable at every step. Look, first, at those graywacke rocks, and after marking how, in one place, the strata have been upturned on their edges for miles together; and how, in another, the plutonic rock has risen molten from below—pass on to the old red sandstone, and examine its significant platforms of violent death, its faults, displacements, and dislocations; see, next, in the coal-measures, those evidences of sinking and ever-sinking strata, for thousands of feet together; mark, in the oolite, those vast overlying masses of trap, stretching athwart the landscape far as the eye can reach; observe carefully how the signs of convulsion and catastrophe gradually lessen as we descend to the times of the tertiary, though even in these ages of the mammiferous quadruped, the earth must have had its oft-recurring ague-fits of frightful intensity; and then, on closing the survey, consider how exceedingly partial and unfrequent these earth-tempests have become in the recent periods. There is a tract of country in Hindostan that contains nearly as many square miles as all Great Britain, *covered to the depth of hundreds of feet by one vast overflow of trap*. A tract similarly overflown, which exceeds in area all England, occurs in Southern Africa. THE EARTH'S SURFACE IS ROUGHENED WITH SUCH, MOTTLED AS THICKLY BY THE PLUTONIC MASSES AS THE SKIN OF THE LEOPARD BY ITS SPOTS. What could man have done on the globe at a time when such outbursts were comparatively common occurrences? What could he have done, where Edinburgh now stands, during that overflow of trap porphyry, of which the Pentland range forms but a fragment—or that outburst of greenstone, of which but a portion remains in the dark, ponderous coping of Salisbury craigs—or when the thick floor of rock, on which the city stands, was broken up, like the ice of an arctic sea, during a tempest in spring; and laid on edge, from where it leans against the Castle Hill, to beyond the quarries at Joppa? When the earth became a fit habitat for reptiles and birds, reptiles and birds were produced; with the dawn of a more stable and mature state of things, the sagacious quadruped was ushered in; and last of all, when man's house was fully prepared for him—when the data

on which it is his nature to reason and calculate, had become fixed and certain, the reasoning and calculating brain was moulded by the creative finger—and man became a living soul. Such seems to be the reading of the wondrous inscription, chiselled deep in the rocks." (*Foot-Prints*, p. 212, 213.) In perfect harmony with this, is the language of Agazziz, when, having traced the series of animated beings from the earliest palæozoic period to the age of man, he rejects the development hypothesis, and says: "The link by which they are connected, is of a higher and immaterial nature; and their connection is to be sought in the view of the Creator himself, whose aim in forming the earth, in allowing it to undergo the successive changes which geology has pointed out, and in creating successively the different orders of animals, was to introduce man upon the surface of our globe. Man is the end towards which all the animal creation has tended, from the first appearance of the first palæozoic fishes." (*Zoology*, p. 206.) Such, then, were the terrific agencies, and such the universal desolation, which preceded and introduced the fourth and last great geologic epoch, called by Agazziz, "THE REIGN OF MAN." "The present epoch succeeds to, BUT IS NOT A CONTINUATION OF THE TERTIARY. These two epochs are separated by a great geological event, traces of which we see everywhere around us." (P. 201.) This great geological event, we are told, destroyed all species of animals, marine and terrestrial; and left the earth and sea *a total desolation, to be repeopled by a new creative act.*

And here our argument would seem to be conclusive; all geological eras, and the eternal counsels of Omnipotence have prepared the earth, at length, for the appearance of man. The last great catastrophe has swept away all former species, has introduced a new economy, and adapted the globe to man and his contemporary species. And now, shall this lord of the new creation enter immediately upon his predestined inheritance, along with the inferior animals that are to be his contemporaries? The Bible says, they were created *simultaneously;* or with a brief interval, of which human science can take no cognizance. And precisely here, infidelity joins issue with the Mosaic history, and denies the truth of the record. "We have no evidence," it is objected, "of the existence of man along with any extinct species of animals. But there is evidence, that many species—now his contemporaries—have lived, and are buried along with species now extinct; therefore, these animals must have existed before the

human era, and cannot have been created, as Moses asserts, along with man."

The answer is threefold; and is perfectly conclusive. 1st. The evidence *asserted, is purely negative;* and it is, at once, dangerous, and extremely unphilosophical, to array the want of evidence in one department, against positive, and overwhelming testimony in another. May not future discoveries supply this want of evidence?

2d. The objection is founded on an assumption, now refuted, and generally abandoned, that NO EXTINCT ANIMAL HAS EVER BEEN *contemporary with man.* The bird dodo is of a species now extinct, yet, during the earlier voyages of the Dutch navigators to the East Indies, existed in great numbers; and Humboldt speaks of it as, "a species of large animals (now extinct) of which thousands existed but three centuries ago." (*Cosmos*, p. 362.) The bones of the mammoth are found mingled with those of the horse, deer, &c., and never with those of man; and yet, it is generally admitted to have been contemporaneous with man. And, almost at the very period when we write, geology has furnished the positive testimony, which was suggested above, as the possible result of farther investigation. "At the meeting of the American Association (in 1850) Prof. Chase, of Brown University, exhibited some huge bones of the Dinornis;" and "intimated that these gigantic birds (ten or twelve feet high, and attributed by Prof. Owen, to the age of the New Red Sandstone) had probably *become extinct through the agency of man.*" In answer to an objection raised by Prof. Agazziz, "*That we have no geological evidence of the existence of man with extinct species of animals,*" Mr. Mantell replied, "THAT SUCH EVIDENCE HAD BEEN RECENTLY DISCOVERED. Bones of this character had been recently found, by his brother, in the bed of a stream, in some loose sand, where evidently was once the channel of a river. Digging down, he found evidence of extinct fires; and in these charred places were found bones of this character, *together with human bones;* those of a dog; the remains of shell-fish, and fragments of egg-shells, curved in the contrary direction, by the actior of fire. *The reason for believing the animal to have been contemporaneous with man, was, that the bones presented a white appearance, which can only be produced by burning the bones while they contain animal matter.*" ("*Annual of Scientific Discovery*," 1850, p. 279, 280. See for a

fuller account, and the same conclusion, Humboldt's *Cosmos*, vol. i. p. 361, 362.)

3d. In regard to the earlier formations, the primary, secondary, and tertiary, down to the close of the Pliocene era, which immediately preceded the present geographical distribution of our seas, continents and rivers, and prepared for the introduction of man, there is, and can be, no diversity of opinion. *No animal now in being, existed during that immense period antecedent to the creation of man.* The question, therefore, concerns only the so-called Pleistocene, or Newer Pliocene era; during which (it is contended) and before the creation of man, these extinct animals existed *along with some of our present species.* Here, however, it must be admitted by every candid geologist, and felt by every intelligent student of the science, that all our reasonings become extremely vague and uncertain, and partake the nature of the "*vicious circle.*" They prove the age of the formation, from the bones which it contains; and the age of the bones from the era of the formation. "Thus, at Puzzuoli, near Naples," says Mr. Lyell, "marine strata are seen containing fragments of sculpture, pottery, and remains of buildings, together with innumerable shells of the same species, as those now inhabiting the Mediterranean. Their emergence can be proven to have taken place *since the beginning of the sixteenth century.*" Of course they belong to the human era; "But the hills," he proceeds, "at the feet of which these strata have been deposited, are formed of horizontal strata of the Newer Pliocene era." Why? "Because the marine shells are of living species, and *yet are not accompanied by any remains of man.*" ("*Elements of Geology*," p. 170.) Again, "Near Stockholm when the canal was dug, horizontal beds of sand, loam, and marl were passed through, in some of which the same peculiar assemblage of testacea which now live in the Baltic, were found. Mingled with these, at various depths, were detected various works of art, and some vessels, built before the introduction of iron." These, of course, are of the historic era. "There are, however, in the neighborhood of these formations, others, *precisely similar, in mineral composition, and testaceous remains*, in which no vestige of human art has been seen. So that we must regard them as Newer Pliocene formations" (p. 171). "All conchologists are agreed, that the shells of the deposits above mentioned, are nearly all, perhaps all, absolutely identical with those now peopling the contiguous

ocean" (p. 171). Yet these shells themselves, belonging to species now existing in the contiguous ocean, and the bones of other existing animals, found with them, are decided to belong to the Pleistocene era; because the formation itself is previously assumed to have been Pleistocene. Here, the age of the remains is decided by the age of the formation. But the same formation in the same immediate vicinity, with no other characteristic distinction, "in mineral composition and testaceous remains, absolutely the same," is decided to belong to the human era, because they contain human remains. Here, the age of the formation is decided by the known age of the (human) remains. Having thus ascertained the age of these strata, from the presence of man and his coexisting species, marine and terrestrial, would it not be more rational, to retain this position, once reached from *certain data;* and to draw the conclusion, that the remains of animals, whose era is otherwise unknown, but which are found in strata, in all respects similar to those which are certainly contemporary with man, have been likewise contemporary with the same strata, and thus contemporary with man? Here we proceed on *certain data*, and positive evidence. In the other process, the evidence is wholly negative ("If we may depend on negative evidence," says Mr. L., in drawing his conclusions), and the assumed fact extremely doubtful.

Leaving these doubtful speculations, and returning to established truth. It is acknowledged that the catastrophe which terminated the Pliocene era, and prepared the way for man, and his contemporary species, destroyed all previously existing beings; and *then*, the question simply is, "Whether the earth thus prepared for new inhabitants, was peopled AT ONCE, WITH ITS DESTINED POPULATION?" Or, "Whether the creation of man was delayed, for indefinite centuries, after the completion of the abode, which all geological cycles had been preparing for him?" It is, in fact, only another form of the question, "Whether the various contemporary species have been created TOGETHER, after the extinction of their predecessors?" Or, according to Mr. Lyell's hypothesis, "There has been a continuous process, from day to day, and year to year, of gradual extinction of old species, throughout all geologic eras; and, moving on parallel with it, side by side, the continuous exercise of creative power in the production of new species?" That is, "Whether we shall acknowledge A SINGLE MIRACULOUS CREATION, at the commencement of each new era;

or, perpetually recurring miracles through the whole range of time?" To adopt the latter proposition is, either to ANNIHILATE "A COURSE OF NATURE," by supposing another *course of miraculous agency*, moving on contemporaneously with it, and superior to it; or, to destroy all miraculous creation by reducing extraordinary interpositions to ordinary events; or, rather, it is, in attempting to reconcile the two (*a course* of nature, and a course of supernatural miracles), to annihilate both; to assert a "course of nature," which is not "the course of nature;" and, "an extraordinary agency," which, after all, is "ordinary."*

* The whole three volumes of "The Principles of Geology," by Mr. Lyell, are, but the defence, the illustration, and the varied application, of the doctrine of "the absolute uniformity of the course of nature, through all geologic epochs." Preface, page 9th, he gives it, as the express design of the "Preliminary essay," in the first book, to prove, "That the forces, now operating upon, and beneath the earth's surface, may be THE SAME *both in kind and in degree*, with those, which at remote epochs, have worked out geological revolutions; the ancient and present fluctuations in the ORGANIC and INORGANIC WORLD, belonging TO ONE CONTINUOUS AND UNIFORM SERIES OF EVENTS." Let us remark, "the forces are THE SAME IN KIND AND DEGREE," and include "*the organic and inorganic world.*" Again, vol. i. p. 116, "During the ages contemplated in geology, *there has never been any interruption* to the *same uniform laws of change.*" On page 130, he denies and derides "any *extraordinary deviations from the known 'course of nature.'*" And on p. 118, with great simplicity, argues against any increase of the frequency, or intensity of earthquakes; that if such increase should ever occur, or ever have occurred, it must inevitably produce that very chaotic condition which the Bible asserts—as the result of the "earth-tempests" of H. Miller, and "the turbulent conditions of our planet whilst stratification was in progress, and the activity of volcanic agents, then frequent and intense," described by Buckland (p. 103).

"Now should one or two only of these convulsions happen in a century, it would be consistent with the order of events experienced by the Chilians from the earliest times. But," proceeds the writer, with imperturbable gravity, "but, if the whole of them were to occur within the next hundred years, the entire district must be depopulated, scarcely any plants or animals could survive; and the surface would be ONE CONFUSED HEAP OF RUIN AND DESOLATION!" That is, would present precisely that scene of "ruin and desolation," which all ancient strata exhibit, and which the Bible expressly asserts!

But, if there be this "uniform and continuous series, without any interruption, in the *organic* as well as *inorganic world*," then, what shall we say of man? Is he one term in this "uniform and continuous series," this established "course of nature?" To this, Mr. Lyell replies (p. 256), "The course of nature remains evidently unchanged," "with the exception only of man's presence." "It is not, however, intended that a real departure from the antecedent course of physical events cannot be traced in the introduction of man," or "that the agency of man did not constitute an ANOMALOUS DEVIATION FROM THE PREVIOUSLY ESTABLISHED ORDER OF THINGS" (p. 257, 258).

Here then, we have "one continuous and uniform series of events," in which "there never has been any interruption;" and yet, "a departure from the antecedent course of physical events." "An anomalous deviation from the previously established order of things;" and yet, again, no "extraordinary deviation from the known course of nature;" and still farther (p. 259), "Had he previously presumed to dogmatize, respecting the *absolute uniformity of the order of nature*, he would undoubtedly be checked, by witnessing this new and unexpected event," "this peculiar and unprecedented agency," "this anomalous deviation from the established order," which "affords ground for concluding that *the experience*, DURING THOUSANDS OF AGES, OF ALL THE EVENTS which may happen on this globe, would not enable a philosopher

Let us now proceed to consider the history of this new creation.

VERSES 3, and 4.—These contain the first day's work, in connection with the fourth day's work, recorded in the passage, from the 14th verse to the 18th, both included.

The difficulty which spontaneously presents itself to every mind in connection with these verses, is briefly and clearly expressed by the German rationalist, in his commentary on the passage. "When God," says Rosenmüller, "began to arrange this

to speculate with confidence concerning future contingencies." A continuous series, from which there is a departure! A uniformity, which is not uniform! An established order, from which there is an anomalous deviation! Such is the system. First, it asserts an uninterrupted uniformity in the course of nature, through all geological epochs. Then, it acknowledges the intervention of a peculiar, and "moral source of temporary derangement," a supernatural agency, in the creation of man and other animals. Then reasserts the abandoned, and interrupted uniformity, once more.

How shall we reconcile these *apparent contradictions?* By including *both*, says Mr. Lyell, *the creation of species* by supernatural power; and their extinction by the ordinary agencies of nature, in the same "economy of nature." Let us "imagine the *successive creation of species* to constitute, like their gradual extinction, a REGULAR PART OF THE ECONOMY OF NATURE." (*Principles*, vol. iii. p. 234.)

Now, the "creation of species," as here employed, means the exercise of an extraordinary power, different from, and superior to the course of nature;—for Mr. Lyell denies the transmutation of species, and rejects the development hypothesis in all its forms. Besides that ordinary course of nature, then, which extinguishes existing species, there is, in "the economy of nature," another agency, superior to it, yet moving on parallel with it, through all geologic eras, and even now, calling successive species into existence, by creative power, from day to day, or as he hypothetically suggests, from year to year (page 238). To the objection, "that no one has ever ascertained the existence of any new species created, during all the centuries of our epoch," he replies that "the objection may seem plausible;" and proceeds to show that these new species may come into being by "annual birth," and depart by "annual death," and yet be unobserved by men. (Vol. iii. p. 235–239.) Here then, is one "course of nature," to destroy, and another, in the "same economy," to create. Which is 'THE COURSE OF NATURE?'

Here is a power called creative—in other words, supernatural, or miraculous; yet in perpetual *ordinary operation*. A perpetual miracle ceases to be a miracle at all. The extraordinary agency, is, after all, ordinary. Again, it is worth the observation, that this creative power belongs, STRANGELY ENOUGH, TO THE "SAME ECONOMY OF NATURE," with any other power; and its agency is sustained by the same subterfuge which was employed by the older atheists, and modern pantheists, and advocates of the development hypothesis. "To the natural objection that the earth does not now produce men, lions, &c. (or any new species), Epicurus answers, We are backward in admitting it, for the reason, that it happens in retired places, and never falls under our view," &c. "It is far from being certain," says the author of the Vestiges, "that the primitive imparting of life and form to inorganic elements, is not a *fact of our times*." (*See Foot-Prints*, p. 282, 283.) "Periods of much greater duration" (says Mr. L.), "must elapse before it would be possible to authenticate the first appearance of one of the larger plants, and animals, assuming the annual birth and death of one species" (p. 239).

Such is the the theory, then, with its manifold contradictions, its atheistic tendencies, and its appeal to the same undiscovered facts, upon which, the advocates of atheistic and pantheistic views have always fallen back;—that is, arrayed against the simple statement of the Bible, concerning the simultaneous creation, by Almighty power, of ALL THE CONTEMPORARY SPECIES, AT THE COMMENCEMENT OF OUR ERA. See a total annihilation of this theory of gradual extinction of species, in Sir R. Murchison's recent address—"*Proc. Royal Soc.*, March 7th, 1851." Between the youngest of the primary, and the oldest of the secondary strata, there *is not one species in common*. "An entirely new creation had succeeded to universal decay and death."

formless matter, it seemed first of all necessary, that the light of day should dispel the ancient darkness, in which all things had been enveloped. Men, in the early ages of the world, could easily believe that light did not proceed from the sun; but was of a FLUID NATURE, since, even when the sun was obscured with clouds, they could perceive all things, brightened with light." That there should be different methods of reconciling this brief narrative of events, so distant in time, and so obscurely revealed, to the different scientific views of men, is not more astonishing than are the various theories devised for the purpose of harmonizing the complicated, and apparently contradictory facts in any department of human science. The defect is not in nature, or in revelation, but in man. Dr. Buckland has proposed the following method. "The interpretation here proposed seems to solve the difficulty, which would otherwise attend the statement of the appearance of light upon the first day, while the sun, moon and stars are not made to appear until the fourth. If we suppose all the heavenly bodies and the earth to have been *created* at the indefinitely distant time, designated by the word 'beginning;' and that the darkness described on the evening of the first day, was temporary darkness, produced by the accumulation of vapors "on the face of the deep;" an incipient dispersion of these vapors may have readmitted light to the earth on the first day, whilst the exciting cause of light was still obscured; and the further purification of the atmosphere on the fourth day, may have caused the sun, and moon and stars to reappear in the firmament of heaven, to assume their new relations to the newly-modified earth, and to the human race." (*Geol.* p. 33, 34.) This theory is not only ingenious, but natural and obvious; and must have suggested itself to any scientific mind as one of the possible solutions of a difficulty which lies patent to the most superficial reader. It has been adopted by, perhaps, the major part of apologists for the Bible; and may be found more or less ably developed with various modifications, additions, verbal alterations, and learned criticisms in many modern treatises and commentaries, of which that by Bush is probably (on this subject) the best, and most generally accessible. So that it lies within the reach of every candid inquirer, and need not delay us here with its prolonged consideration. In its defence, thus much at least may be confidently affirmed. It must, in all fairness, be acknowledged that the inspired narrative neither expressly asserts nor necessarily implies that the darkness of chaos was eternal. Neither

does the phrase, "Let there be light," nor the immediately subsequent appearance of light amidst the chaotic darkness deny its antecedent existence, more than the bursting of light upon the midnight darkness now at the divine command, or even the dawn of day in the ordinary course of nature could be supposed to disprove the reality of the previous day. In one case, as in the other, the darkness may have been temporary. The geologist may well assert the existence of light during that long period which PRECEDED the chaotic condition of our planet on the same principle which asserts the antecedent existence of animated beings, for these animated beings have organs of vision constructed on the same optical principles with our own. (*Buckland*, vol. i. p. 134–136.) BUT DURING THAT CHAOTIC CONDITION THE EVIDENCE WHOLLY FAILS, AND ALONG WITH IT THE ARGUMENT, for there is then neither animal nor organ; and may not the same mysterious circumstances in the early economy of our planet, which led to the destruction of all animated beings by causes inscrutable to us, have so affected the condition of our atmosphere by causes not more inexplicable, as to overload it with vapors impenetrable by light, or alter its chemical constitution, or otherwise modify those unknown circumstances which are necessary to the evolution and the manifestation of that still mysterious influence, to which, though ignorant of its nature, we give the name of light? Similar reasoning may be legitimately applied to the words, "Let there be lights," or "luminaries," or "light-bearers," in the 14th verse.

The principal difficulty in this interpretation will be found by many minds in the words of the 16th verse, "GOD MADE two great luminaries." "The text may imply," says Dr. Buckland, "that these bodies were then PREPARED AND APPOINTED to certain offices of high importance to mankind, 'to give light upon the earth;' 'to be for signs, and for seasons, and for days, and for years.'"

"The original word for 'MADE,'" says another advocate of this interpretation, Mr. Bush, "is not the same as that which is rendered 'CREATED.' It is a term frequently employed to signify CONSTITUTED, APPOINTED, set for a particular purpose or use. And these luminaries though actually called into existence previously, were henceforth, by their rising and setting, to be the VISIBLE MEANS of producing this separation, or succession," viz., of light and darkness, day and night. But here the DIFFICULTY

WILL RECUR: "There is a difference, clearly, between the mere appointment to an office and the PHYSICAL ADAPTATION to that especial service." Here it is perfectly manifest that the writer speaks not of mere official appointment, but of physical adaptation. The sun and moon had ceased to be "the visible" lights of heaven. They now became such; whether by a change in their own physical condition, or in the constitution of our atmosphere, is not asserted in the text. Again, the same Hebrew word which, in this interpretation, is rendered "appointed" or "constituted," is employed, in its ordinary sense, in the same narration, verse 7th, "And God made the firmament," where it is surely applied to a remodification, at least, of pre-existing materials, and their physical adaptation to new purposes. To assume that the same word is used in different senses in the same narrative, on the same general subject, and in a similar connection, can only be justified by the most stringent necessity. Yet even this difficulty is by no means greater than those which attend many physical hypotheses now generally adopted; AND THIS MAY BE HELD, AS THEY ARE, CONDITIONALLY—as a possible solution, until one more satisfactory may be providentially suggested.

But what if the solution so laboriously sought lies palpably on the surface? What if the objection contains its own confutation, and suggests, nay, employs the very words of that modern theory of light which is now generally adopted by philosophers?

What if the temporary darkness and subsequent reillumination of our sun be (according to our profoundest astronomers) not only a possible, but an extremely probable event, rendered probable by MANY SIMILAR OCCURRENCES in the heavens, recorded within the last three hundred years, and by some even now transpiring under the scrutiny of our telescopes! What if the great names of La Place and Argelander, of Herschell and Humboldt, are arrayed, on astronomical principles, decisively in favor of this view?

What if the greatest physical philosophers of our day have advanced still farther, and not only announced this *variability* of our sun's light, but ITS ACTUAL VARIATION IN PAST TIME AS EXTREMELY PROBABLE? And finally, what if they have from geological phenomena identified one period of its obscuration with that great geological event which terminated the tertiary epoch, and immediately preceded the present distribution of our land and water—our oceans, rivers, and continents?

NOW THE ASSERTIONS IMPLIED IN THESE SUCCESSIVE QUESTIONS CONTAIN THE SIMPLE STATEMENT OF HISTORIC FACTS. The evidence we proceed immediately to adduce; and it will appear, that every proposition which can be fairly educed from the most literal interpretation of the Mosaic record, is in perfect, and indeed surprising harmony, with the latest and even the boldest theories of modern science. According to the most literal interpretation, the following three propositions may be considered as involved in the sacred narrative:—

First. That light is wholly independent of the sun. According to the objection, its phenomena result from the movements of a "SUBTLE FLUID."

Second. The sun is not self-luminous, but is a "lightbearer" only; φωσηήρ in the Greek translation, "Maor" in the original Hebrew; the place or body where the light is concentrated, as clearly distinguished in the original from the light itself, as the lamp, or the lamp-post, from the light which they "bear."

Third. The sun has not always been thus a "great luminary" or "lightbearer," but at the period of the last re-organization of our system from the ruins of chaos, experienced (whether, for the first time, or after a temporary obscuration, is not asserted) that physical change in the constitution of his mass, on which depends the evolution of light and heat—the photiferous, or light-giving power.

1st. Light is wholly independent of the sun. Whatever may be our theory of light, the "molecular," or the "undulatory," or whether we have any theory at all, the same great facts are indisputably true. The unknown cause of our visual sensations, to which we give the name of light, as if it were some separate material substance, is, within all known distances, *universally diffused.* It is not confined to the sun, or the direct radiation, or the reflection of his rays, but is developed almost illimitably from all the objects around us, through human instrumentality, by mechanical friction, by chemical combination. It is present in the most distant nebulæ of the farther heavens; it bursts from the bowels of the earth in volcanic eruptions; it pervades the profoundest depths of the ocean, where flowers of variegated and brilliant hues are known to grow, and fish to dwell amidst circumstances that would be as midnight darkness to our eyes. It appears highly probable from recent discoveries," says Dr. Buckland, "that light is not a material substance, but only an effect of un-

dulations of ether; that this infinitely subtle and elastic ether pervades all space, and even the interior of all bodies; so long as it remains at rest, there is total darkness; when it is put into a peculiar state of vibration, the sensation of light is produced; this vibration may be excited by various causes, by the sun, by the stars, by electricity, combustion, &c. If, then, light be not a substance, but only a series of vibrations of ether, that is, an effect produced on a subtle fluid by the excitement of one or many extraneous causes, it can hardly be said, nor is it said in Gen. i. 3, to have been *created*, though it may be literally said to be called into action." (P. 35.)

It is apparent, then, that the philosophy of Moses is infinitely superior to that of his German assailant in regard to the true nature of light, and its relation to the sun.

Is THIS COINCIDENCE WHOLLY FORTUITOUS between the teachings of our latest philosophy and those of an author who wrote more than three thousand years ago, and upon a point where the doctrines of both are in direct antagonism to the natural conclusions of the learned and unlearned, derived from all the ordinary phenomena? Or is it a "corroborative harmony?"

2d. The body of the sun is not self-luminous, but a "light-bearer;" not itself intrinsically light, but illuminated by a luminous atmosphere, or strata of luminous matter, by which this dark body is surrounded.

Since the observations of Dr. Wilson and the elder Herschell upon the sun's spots, this is generally conceded. The idea of dark bodies revolving around the sun, is long since exploded. "But what are the spots?" asks Sir John Herschell. "Many fanciful notions have been broached upon this subject, *but only one seems to have any degree of physical probability*, viz., that they are the dark, or, at least, comparatively dark, solid body of the sun itself, laid bare to our view by those immense fluctuations in the luminous regions of its atmosphere, to which it appears to be subject." ("*Outlines of Astronomy*," p. 223.)

"The sun," says Nicholl, the gifted professor of astronomy in Glasgow University, "the sun consists mainly of a dark mass, like the body of the earth and other planetary globes; which is surrounded by two atmospheres, of enormous depths, the one nearest him being, like our own, cloudy and dense; while the loftier stratum consists of those dazzling, phosphorescent zephyrs, that bestow

light and heat on so many surrounding spheres." ("*Planetary System*," p. 325, new Ed.)

3d. That the sun has not been uniformly thus a great "light-bearer," but after a *temporary obscuration* probably, was re-illumined at the commencement of our present economy. "No more is light inherent in the sun," says Nicholl, "than in Tycho's vanished star; and as with it and other orbs, the time may come when he shall cease to be required to shine." (P. 341.) Sir J. Herschell having discovered that a large and brilliant star, called ALPHA ORIONIS, had sustained in the course of six weeks a loss of nearly half its light, remarks, "This phenomenon cannot fail to awaken attention, and revive those speculations which were first put forth by my father, Sir W. Herschell, respecting the possibility of a CHANGE IN THE LUSTRE OF OUR SUN ITSELF. If there be really a community of nature between the sun and the fixed stars, every proof that we obtain of the extensive prevalence of such periodical changes in those remote bodies, adds to the probability of finding something of the kind nearer home." ("*Proceedings Royal Ast. Soc.*" *Jan.* 1840.) "The question cannot fail to suggest itself here," says Nicholl, "WHETHER THE SUN IS NOW as he ever will be, or only IN ONE STATE OR EPOCH OF HIS EFFICACY, as the radiant source of light and heat? The *new star* in Cassiopeia, seen by Tycho, for instance, indicated some great *change* in the light and heat of an orb. *That star never moved from its place;* and during its course, from extreme brilliancy to apparent extinction, the color of its light altered, *passing through the hues of a dying conflagration.* Many other stars have altered slowly in magnitude, also preserving rigorous inviolability of place; and some, as Sirius, have changed color; this star having turned from the fixed Dog-star of old times, red and fiery as Mars, into the brilliantly white orb now adorning our skies. Is it not likely, then, that the intrinsic energies to whose development these phenomena must be owing, ACT ALSO IN OUR SUN, *that he also* may pass through phases, filling up myriads of centuries, once, perhaps, shining upon Uranus, with a lustre as burning as that which now dazzles Mercury?" ("*Solar System*," p. 130, 131.) It would be difficult to present within the limited space assigned to this discussion, even a small portion of that evidence upon which these suggestions have been based. They bring us, at once, amidst the sublimest and most startling discoveries of our modern astronomy, to the contemplation of stupendous changes, past, present, and

future, which have occurred, which are occurring, which may be legitimately anticipated in the remoter heavens. They link together in harmonious union those two great sciences, astronomy and geology, as complemental portions of one, still sublimer and more comprehensive science; and show us, that, while this earth has been the theatre of many revolutions in its progressive preparation for its destined occupants, the same great law of change and progress pervades the universe around, and revolutions still more magnificent by agencies equally terrific and irresistible, have marked the history of those upper worlds.

For the sake of simplicity and distinctness, we shall present all that our limits will allow, in the form of separate and successive propositions.

1st. Many suns once shining in our heavens, have since, within the knowledge and the memory of man, become, at least for an uncalculated period, apparently extinct; HAVE WHOLLY CEASED TO SHINE. Others have varied greatly in their light, in its intensity, and color; gradually or suddenly increased, diminished, or totally suspended. And these startling revolutions, once derided as the exaggerations of ignorance or superstition, are now amongst the established facts of astronomical science, and the familiar objects of contemporary observation.*

* "THERE ARE MANY WELL-AUTHENTICATED CASES of the disappearance of old stars, whose places had been fixed with a degree of certainty not to be doubted. In October, 1781, Sir William Herschell observed a star, No. 55, in Flamsted's Catalogue, in the Constellation Hercules. In 1790, the same star was observed by the same astronomer, but since that time, no search has been able to detect it. The stars named 80 and 81, in the same constellation, both of the fourth magnitude, have likewise disappeared. In May, 1828, Sir John Herschell missed the star numbered 42, in the Constellation Virgo, which has never since been seen. Examples might be multiplied, but it is unnecessary. In these cases, the stars have been lost entirely —no return has ever been marked." (*Mitchell's "Planetary and Stellar Worlds,"* p. 294, 295.) The variable star, in the neck of the whale, called "Mira Ceti," changes from the second magnitude to the eleventh, and *sometimes* VANISHES ALTOGETHER. In the 173 years, during which we have reports of the magnitude of the beautiful star, "*Eta of Argo*," it has undergone from eight to nine oscillations, in the augmentation and diminution of its light. It has increased from the fourth to the first magnitude, and from 1838 to 1850, has remained equal in brilliancy to Canopus—probably superior—and almost equal to Sirius. (*See Humboldt's "Cosmos,"* vol. iii. p. 151–182.) For a complete list of new and of "variable stars," and most important conclusions (derived from these astonishing phenomena) regarding THE CHANGES PAST AND FUTURE, IN THE CONDITION OF OUR OWN SUN AND THE OTHER *fixed stars*. Especially, p. 164 and 181.

"The star Eta of Argus," says Sir J. Herschell, "has always hitherto been regarded as a star of the second magnitude; and I never had reason to suppose it variable. In November of 1837, *I saw it as usual.* Judge of my surprise to find, on the 16th of December, that it had SUDDENLY become a star of the first magnitude, and almost equal to Rigel. It continued to increase. Rigel is now not to be compared with it; it exceeds Arcturus, and is very near equal to Alpha Centauri, being at the moment I write, the fourth star in the heavens, in the order of brightness."

2d. Many suns, once obscured for longer or shorter periods—for days, or centuries—have been re-illumined; while others, which once shone with a faint and feeble light, have been kindled up into ten-fold brilliancy, which they still retain.

3d. The period of obscuration is decided by causes, whose agency is sometimes regular; sometimes totally incalculable; varying from the duration of a few hours, in calculated cases, to one hundred years in some, to three hundred years, *probably*, in others; and in others again (unless the obscuration be final), extending over many centuries; or (to use the strong language of Humboldt, "*Cosmos*," vol. iii. p. 164) "IN THE GREAT MAJORITY," over "*extremely long, and therefore unmeasured, and* PROBABLY UNDETERMINABLE PERIODS."*

For conclusions similar to those of Humboldt, derived from the same phenomena, see "*Outlines of Astron.*," p. 527, and "*Astron. Observations*," p. 351; by Sir J. Herschell, as quoted under "Propos." 6th and 7th, hereafter.

* More than two thousand years ago, the celebrated Greek astronomer Hipparchus was astonished by the *sudden* bursting forth of a brilliant star in a region on the heavens where none, before, existed. In 1572, 1604, 1607, and recently in 1848, similar occurrences took place, the latter being less remarkable than the preceding, for the exceeding brilliancy of the star. Twenty-one instances are enumerated by Humboldt ("*Cosmos*," vol. iii. p. 155–160) of a correspondent character. That of 1572, called "Tycho's Star," because observed by the great Danish astronomer, was the most remarkable. It burst forth instantaneously in the full blaze of its brightness. The very peasants paused to gaze with astonishment upon the wonderful stranger in the skies. It surpassed Jupiter in brilliancy, and was visible in the broad light of day. It gradually changed from white to yellow-reddish, became faintly blue, then disappeared from the heavens, and has never since been seen. Herschell supposes that it may be identical with the stars seen in 945 and 1264, and thus that the period of its obscuration is a little more than three hundred years. (See Tycho Brache's own account of its sudden discovery, and *variations*. "*Cosmos*," vol. iii. p. 152, 153.) The period of variability in the star χ Cygni, is about 100 years. In the great majority of these cases, the stars have disappeared, during a period, varying from 250 to 1600 years, and are either finally extinguished, as La Place supposes, or have vast and incalculable periods of alternate darkness, and reillumination, according to the theory of Humboldt. This latter writer supposes with Herschell, *in his* "*Astron. Observations*," that VARIABILITY, and not UNIFORMITY, in the quantity of light, is the COMMON CHARACTER OF SUNS. "We are led," says he, "by analogy, to infer that, as THE FIXED STARS UNIVERSALLY have not merely an apparent but a real motion of their own, so their surfaces or luminous atmospheres are generally subject to those changes (*in their 'light process'*), which recur, in the *great majority, in extremely long, and therefore unmeasured, and probably undeterminable* periods; or which, IN A FEW, recur without being periodical, as it were by a sudden revolution, either for a shorter or a longer time." (Vol. iii. p. 164.) That all this is equally true of *our sun*, as *one of the fixed stars*, see p. 180. In regard to a subsequent re-illumination of a sun whose light has thus disappeared, he says: "What we no longer see is not necessarily annihilated. It is merely the transition of matter into new forms—into combinations which are subject to new processes. DARK COSMICAL BODIES MAY, BY A RENEWED PROCESS OF LIGHT, *again become luminous*." That such a body, which had lost its light for centuries, and perhaps myriads of years, may be re-illumined (as was our sun), and shine on again as it did before, is practically proven by a star now shining in our sky, called 34 Cygnus. It appeared, for the first time since the commencement of astronomical records, in the year 1600, and still remains a star of the sixth magnitude. Was it first created in 1600? Or was it only invisible till then? Had it been always invisible? Or like the stars of

4th. These changes, whether partial or entire, cannot be rationally attributed; ARE NOT, BY OUR GREAT PHILOSOPHERS LA PLACE, HERSCHELL, HUMBOLDT, OR ANY OF THAT CLASS OF THINKERS, EVER ATTRIBUTED, to gradual change of position, nearer, or more remote. They remain uniformly stationary, and in almost every case (*with only three exceptions*) these new stars blazed forth at once with unequalled brilliancy, as stars of the first magnitude. "The appearance of the star of 1572 was so sudden, that Tycho Brache, the celebrated Danish astronomer, returning one evening from his laboratory to his dwelling-house, was surprised to find a group of country people gazing at a star, *which he was sure did not* EXIST (VISIBLY) HALF AN HOUR BEFORE." ("*Outlines of Astronomy*," p. 526, by Sir J. Herschell.)*

5th. OUR SUN IS ONE OF THESE FIXED STARS; and whatever is ascertained as certainly true of them as to their constitution and general history, may be assumed *à priori* as probable in regard to him. The phenomena upon his surface; the vast extent and probable origin of his spots—fifty thousand miles in diameter, and generated by "the play of sudden and tremendous forces within his atmospheres;" "the surging and bursting of those atmospheres"† themselves; the certainty of these changes in his state, and their "undoubted and intimate connection with the supply of light and heat to our globe,"‡ indicate the presence of agencies which identify him in character and destiny with the great central suns of other systems. Again, those extraordinary changes in the climate of our globe, so great that the fossil remains of the remotest north are said to indicate a tropical atmosphere; so sudden, that the animals of an earlier era have been arrested where they stood, and embalmed in perpetual ice;—these indubitable changes have directed the attention of our most emi-

Flamsted's Catalogue, observed by the Herschell's, had it disappeared for a season, to reappear in its appointed time? If the latter be the reasonable supposition, THEN IT FURNISHES, "MUTATO NOMINE," THE HISTORY OF OUR SUN.

* "Those stars," says La Place, "that have become invisible, after having surpassed the brilliancy of Jupiter, have not changed their place during the time of their being visible." "The luminous process in them has simply ceased," adds Humboldt, and in confirmation of this view, further urges (page 161). "The circumstance, that almost all these new stars burst forth *at once* with extreme brilliancy, as stars of the first magnitude, and even with STILL STRONGER SCINTILLATION, and that they do not appear, at least to the naked eye, to INCREASE GRADUALLY in brightness." The theory of "cosmical clouds," intercepting for centuries, the light of these distant bodies, is now abandoned, and Herschell unites with La Place, and Humboldt, and Nicholl, and his own distinguished father, in recognizing an actual change in the light and heat of the fixed stars.

† Nicholl's *Plan. Sys.*, p. 326. ‡ Herschell's *Astron.*, p. 228.

nent astronomers to a cause connected with *variations in the light and heat of our sun.* Speaking of the "singular and surprising alterations of brightness in the southern star," called Eta of Argos, Sir John Herschell says, "All at once, in the beginning of 1838, it suddenly increased in lustre, so as to surpass all the stars of the first class in magnitude, except Sirius and Canopus, and Alpha Centauri, which last star it nearly equalled. Thence it again diminished (but this time not below the first magnitude) until April, 1843, when it had again increased so as to surpass Canopus, and nearly equal Sirius in splendor." "Here we have," he proceeds, "a star fitfully variable to an astonishing extent, and whose fluctuations (previously noticed by him) are spread over centuries, apparently in no settled period, and with no regularity of progression. What origin can we ascribe to these sudden flashes and relapses? What conclusions are we to draw as to the comfort and habitability of a system, depending for its supply of light and heat on so uncertain a source? Speculations of this kind can hardly be termed visionary, when we consider that we are compelled to admit a community of nature between the fixed stars and our own sun; and when we reflect that geology testifies to the fact of extensive changes having taken place at epochs of the most remote antiquity in the climate and temperature of our globe—changes difficult to reconcile with the operation of secondary causes, such as a different distribution of sea and land, but which would find an easy and natural explanation in a slow variation of the supply of light and heat afforded primarily by the sun himself." ("*Outlines*," p. 527, 528.) Here, then, we find that the greatest astronomer of this age asserts the indisputable "community of nature between our own sun and the fixed stars;" and from the "surprising and singular" changes in even one of them, deduces the strong probability of analogous changes in the sun. Then turning to the surface of our earth, and the organic remains beneath the surface, he finds in the geologic monuments a practical confirmation of the views to which astronomy had led him. The conclusion thus attained from two independent sciences, and doubly confirmed by their harmonious combination in one astonishing result, gives direct and important confirmation to the Mosaic record. It tells us that our sun is, in astronomic phrase, "a variable star," and as such, liable to all those changes which have been noticed amongst them; and if the Bible says "this variable star once lost for a season its light-giving power," As-

tronomy replies, "It is extremely probable that such an event may have occurred; for every degree and kind of variation, from a slight diminution of light to total extinction, from a slow and gradual increase to a sudden outburst of unparalleled magnificence, has been witnessed already within the brief space, and with the imperfect instruments, of three short centuries of observation. Such a change, moreover, in the light and heat of our sun would '*naturally and easily explain*' the otherwise inexplicable phenomena which Geology has recorded, but in vain attempted to elucidate." (See to the same purpose, "*Cosmos*," vol. iii. p. 181. *Mrs. Somerville's* "*Connection of the Physical Sciences*," p. 407. *Nicholl's* "*Planetary System*," p. 341, *Note.*)

6th. Astronomy has gone farther still in confirmation of the Bible; and not only asserted the possibility and probability of such an obscuration of our sun, but combining these phenomena in the sun and the fixed stars with those observed upon the earth, has asserted such an event as an actual occurrence; and proceeding to ascertain its geologic epoch, has identified it with that great geologic event which (according to Mr. Agazziz) terminated the tertiary period—destroyed all previously existing animated beings, and introduced the FOURTH GREAT ERA—THE REIGN OF MAN. It is to this era of darkness, and consequently universal ice, when the light and heat of our sun were together withdrawn, that Mr. Herschell alludes in the following decisive passage:—"I cannot otherwise understand" (*without a general* "*change of climate*") alternations of heat and cold so extensive as at one period to have clothed high northern latitudes with a more than tropical luxuriance of vegetation, at another to have buried vast tracts of Middle Europe, now enjoying a genial climate, and smiling with fertility, under a glacier crust of enormous thickness. Such changes seem to point to causes more powerful than the mere local distribution of land and water (according to Mr. Lyell's views) can well be supposed to have been. In the slow secular variations of our supply of light and heat from the sun, WHICH, IN THE IMMENSITY OF TIME PAST, MAY HAVE GONE TO ANY EXTENT, AND SUCCEEDED EACH OTHER IN ANY ORDER, without violating the analogy of sidereal phenomena which we know to have taken place, we have A CAUSE, not indeed established as a fact, but readily admissible as something beyond a bare possibility, *fully adequate to the utmost requirements of geology.* A change of half a magnitude in the lustre of the sun regarded as a fixed star, spread over successive

geological epochs, now progressive—now receding—now stationary—*is what no astronomer would now hesitate to admit as a perfectly reasonable, and not improbable supposition.*" (*"Astronomical Observations,"* p. 351. 1847.) These views, suggested first by La Place and Herschell (Sir William), and thus developed and applied by Sir John in 1847, have entered since into the general mind, and received the approbation of the most eminent men of science. "The probably great physical similarity in the process of light in all self-luminous stars (in the central body of our own planetary system, and in the distant suns or fixed stars), has long and justly directed attention to the importance and significance which attach to the periodical or non-periodical variation in the light of the stars in reference to the varying temperature which our earth has derived in the course of thousands of years from the radiation of the sun. Supposing that our sun has passed through only a very few of those variations in intensity of light and heat, either in an increasing or decreasing ratio (AND WHY SHOULD IT DIFFER FROM OTHER SUNS?), such a change—such a weakening or augmentation of its light-process, may account for far greater and more fearful results for our own planet than any required for the explanation of all geognostic relations and ancient telluric revolutions." (*"Cosmos,"* vol. iii. p. 181, 182.) It will here be seen, that both Herschell and Humboldt connect the explanation of these geological facts with changes in the light and heat of the sun;—that these changes may have been "TO ANY EXTENT, AND IN ANY ORDER," for, exclaims Humboldt, "*Why should it differ from other suns?*"—that HERE IS "A CAUSE," not *otherwise* "*established as a fact,*" but the only cause known, and "*fully adequate*" to the effect; and the supposition of which, every astronomer must admit to be both "reasonable and not improbable." The era of the change, or last obscuration, is the glacier period of Agazziz—the chaotic period of Moses. "A PERIOD OF UNIVERSAL DARKNESS AND UNIVERSAL DEATH," says the one; "A PERIOD OF UNIVERSAL DEATH, AND UNIVERSAL COLD, AND ICE ALMOST UNIVERSAL," responds the other. "A temporary cessation of the sun's radiant light and heat *considered as a fixed star*," says Moses. "THEIR LUMINOUS SURFACES ARE GENERALLY subject to those changes at extremely long, probably undeterminable periods;" and "Why should he differ from other suns?" replies Humboldt. "From 'Tycho's star,' which has not shone during almost three hundred years? From Kepler's star

of 1604, for two centuries and a half totally obscured? From the star 34 Cygnus, which, after being obscured since the earliest records of astronomy, 'through unmeasured periods,' was re-illumined two hundred and fifty years ago, and still shines on a star of the sixth magnitude in the heavens; an indisputable instance of a sun for centuries, totally extinguished, and already entered, once more, on a new career of light?"

7th. Should any one doubt the certainty of the conclusion (in regard to the supposed connection between these geological and astronomical phenomena), derived by these distinguished philosophers from the facts and the principles above adduced; let it be remarked, that this does not even impair, much less can it neutralize, the force of our reasoning. For the doubt affects, not the general facts and principles (THESE ARE ASSUMED AS INDISPUTABLE), BUT THEIR APPLICATION; viz. to explain phenomena which some may suppose to be capable of a plausible explanation (though none can say it is completely satisfactory) on other grounds. But if there be the slightest probability in their hypothesis, then it all enures to the advantage of the Christian argument; and is another instance of corroborative harmony, where ignorance had asserted absolute contradiction.

Is it said, "These are but the bold conjectures of adventurous and daring minds, pushing their speculations into a region where all is uncertainty, at best." The objection proceeds from ignorance, but we answer—1st. What is it that has thus become so suddenly uncertain? Is it, "that our sun is one of the fixed stars, and the fixed stars are suns? That these suns are subject to prodigious changes—vast in extent and duration—passing from dazzling brilliancy to dimness, and ultimate invisibility, now fading utterly away, after being seen for centuries; now blazing up instantaneously, and continuing to shine for ages? That these changes are sometimes regular, at others irregular; some observed and known to return after calculated intervals; others, extending over periods so vast as to elude human observation and baffle human scrutiny, and that *this is the common character of suns?*" Now if all this be uncertain, then astronomy is all an illusion, and the telescope an instrument of falsehood and of folly. But how can such an illusion shake the firm foundations of our faith?

2d. When science has spent her centuries of laborious investi gation, and at last comes forth with the highest speculations of

her highest minds, and religion accepts her theory as probable and appropriates her speculation, shall she then recoil from her own conclusions, and renounce her sublimest theories of nature, because they are found to coincide with the revelations of the God of nature? Is not their harmony a mutual confirmation?

3d. Is it an argument against the credibility of Moses, that, after three thousand years of physical inquiry, and with all the improved instruments of modern times; the theory, the speculation, THE CONJECTURE, IF YOU PLEASE, which is most probable, which appears most consistent with all the ascertained phenomena, is precisely that which furnishes, if true, the most instructive commentary on his ancient narrative?

Let us briefly review the argument. The objection has been taken not from the ribald ignorance of Paine, but from the calm, cool, contemptuous irony of German learning, as it smiles from its sublime and serene elevation, upon the simple credulity of "THE EARLY AGES." It objects,

1st. That according to Moses, light appears to be "OF A FLUID NATURE." We have shown that the "undulatory" or "wave-theory" of light, sustained as it is, by the experiments of Prof. Airy, and the reasoning of Herschell, and confirmed by the investigations of our own Prof. Henry, is now the accepted theory amongst scientific men. That "light is produced by a series of vibrations of a *subtle fluid*."

2d. That, originally, "it does not proceed from the sun." We have shown that it is wholly independent of the sun, that it "pervades all space, and even the interior of all bodies;" and wherever any of the various circumstances exist, which are capable of producing these "*peculiar vibrations*," there *light exists*.

3d. We have shown that the sun is not light, but "a light-bearer." Himself a dark body, receiving light from the same "luminous atmosphere" which illuminates our earth.

4th. That the unknown agencies necessary to the development of light in our own sun, and the other fixed stars, are variable, indefinitely, both in intensity and duration; their light alternately increasing and diminishing; suspended altogether and afterwards revived; and these changes extended over periods of calculable, and others of uncalculated length.

5th. The Bible records one of these, which occurred six thousand years ago. Astronomy, *many precisely similar*, within the last three hundred years.

6th. Astronomy sees, even now, in the "luminous atmospheres" of the sun, traces of the agency of tremendous forces, which lay bare its dark surface for many hundred thousand square miles in extent, and operate upon a scale of magnificence, to which terrestrial phenomena present no parallel. "The play of sudden, tremendous, and evanescent forces, either connected with the solid body of the sun, or generated within his atmospheres, and made apparent by the surging and bursting of those atmospheres, has become," says Nicholl, "AN ABSOLUTE FACT."

7th. The earth, too, is one of those astronomic worlds; and geology has discovered evidences of variations in her climate, precisely corresponding to these supposed variations in the sun, that is, just such a change in her temperature, as those changes in the sun's light and heat would naturally and necessarily produce; and the last great change thus asserted by geology, is said to have terminated the former geologic era, and prepared the earth for man. It corresponds of course with the Mosaic chaos; and we need hardly say, that such a revolution in the condition of the sun, would necessarily involve the most terrific consequences to our world.

Thus have we passed in rapid review many of the most wonderful discoveries, and loftiest speculations of modern science, and have everywhere found that the progress of knowledge has converted the infidel objection into a real harmony. Did our limits permit, it would be easy to point out other coincidences equally remarkable, and to answer other plausible objections. But, if these greater difficulties (by many supposed to be insuperable) have been really removed, then the subordinate objections will spontaneously disappear. We cannot more appropriately conclude this prolonged discussion than by quoting the following striking and just remarks of an eloquent contemporary writer: "There is, then, no physical error in the Scriptures, and this great fact becomes always more admirable in proportion as it is more closely contemplated. Never will you find a single sentence in opposition to the just notions which science has imparted to us, concerning the form of our globe, its magnitude, and its geology, upon the void, and upon space, upon the planets and their masses, their courses, their dimensions, or their influences, upon the suns which people the depths of space, upon their number, their nature, their immensity. You shall not find one

of the authors of the Bible, who has in speaking of the visible world, let fall from his pen one only of those sentences which in other books contradict the reality of facts; none who makes the heavens a firmament, as do the Seventy—St. Jerome, and all the Fathers of the church; none who makes the world, as Plato did, an intelligent animal; none who reduces everything below to the four physical elements of the ancients; not one who has spoken of the mountains as Mahomet did, of the cosmogony as Buffon, of the antipodes as Lucretius, as Plutarch, as Pliny, as Lactantius, as St. Augustine, as the Pope Zachary. When the Scriptures speak of the form of the earth they make it A GLOBE. When they speak of the position of this globe in the bosom of the universe, THEY SUSPEND IT UPON NOTHING. When they speak of its age, not only do they put its creation as well as that of the heavens, in the "beginning," that is, before the ages which they cannot or will not number; but they are also careful to place it before the breaking up of chaos and the creation of man, the creation of angels, of archangels, of principalities and powers; their trial; the fall of some, and their ruin, the perseverance of others, and their glory. When they speak of the heavens, they employ to designate and to define them the most philosophic and the most elegant expression, an expression which the Greeks, in the Septuagint translation, the Latin Vulgate, and *all* the Christian Fathers in their discourses, have pretended to improve, and which they have distorted, because it seemed to them, *opposed to the science of their day.* The heavens in the Bible are "THE EXPANSE," they are the vacant space, or ether, or immensity, and not the "FIRMAMENTUM," of Jerome, nor the "στερέωμα," of the Alexandrian interpreters, nor the *eighth heaven, firm, solid, crystalline and incorruptible*, of Aristotle and of all the ancients. And although the Hebrew term so remarkable, recurs seventeen times in the Old Testament, and the Seventy have rendered it seventeen times, by "στερέωμα" (firmament), never have the Scriptures in the New Testament used this expression of the Greek interpreters in this sense. When they speak of the *air, the gravity of which* was unknown before Galileo, they tell us that at the creation "God gave to the AIR ITS WEIGHT, and to the waters, their just measure" (Job xxviii. 25). When they speak of the light, they present it to us as an element independent of the sun, and as anterior by three epochs, to the period in which that luminary was formed. When they speak of the interior state of our globe,

they teach us that while its surface gives us bread, BENEATH, IT IS ON FIRE (Job xxvili. 5). When they speak of the mountains, they distinguish them as primary and secondary, they represent them as *being born*, they make them *rise*, they make them melt like wax; they abase the valleys; they speak as a geological poet of our day would do. "The mountains were lifted up (elevated), O Lord; the valleys were abased (*Hebrew*, "*descended*"), in the place which though hadst assigned them." (Ps. civ. 8.) ("*Gaussen, Theopneusty*," p. 144, 148.) Let the Christian, therefore, never fear the scrutiny of science. The word and the works of God must ever be in harmony. True theology is the interpretation of his word: real science is the interpretation of his works. In both the divine record is unerring truth. *In both, alike, the human interpretation not only is liable to error*, BUT MUST OFTEN BE DEFECTIVE.

Let these considerations check, at once, the audacity of skeptical philosophy, and the intolerance of religious bigotry. Let religion continue, as she has ever been, the patroness of science, and science will remain the handmaid of religion. The edicts of the Pope have not stopped the revolutions of the earth in its orbit, nor the philosophy of Hume erased from our geological strata their innumerable miracles. Geology will still date the termination of her old formations from the *extinct species* they contain, and the commencement of the newer from the period, when "a creation entirely new had succeeded universal decay and death;" though some modern Epicurus should dream of new species springing into life "in retired places." The earth will still be heaved by its volcanic fires, the moon still present her ragged edges and her shattered front, to human observation; stars will still blaze into sudden brightness, and pass away into invisibility; THE MIGHTY REVOLUTIONS, ABOVE, AROUND, BENEATH US, will still move on in their sublime and mysterious progress, towards their destined consummation, though man in his ignorance should still exclaim, "Since the Fathers fell asleep all things remain as they were from the beginning of the creation." Nature will still remain with her unfathomable mysteries, and God with his infinite and incomprehensible perfections, and man with his boundless aspirations, his deathless hopes, his inextinguishable conscience, his rational and immortal nature. The transient theories of a day,

time will destroy: BUT TRUTH AND RIGHT ARE IMPERISHABLE AND ETERNAL.

NOTE.—In preparing these discourses for the press, the author nas been under the necessity of choosing between the total omission of one topic, and such an abbreviation of the whole, as would have been injurious to each portion separately, and marred the *combined impression of them all.* He has, with some hesitation, chosen the latter alternative, and omitted the discussion in regard to the "Mosaic DELUGE." This is the less regretted, as the belief of *other deluges past and to come*, is now a part of the settled geologic creed, and therefore leaves that particular historical deluge within its own appropriate sphere of historical evidence. How *complete, decisive*, UNIVERSAL, is that historical testimony, no well-informed man, needs, at this day, to learn.