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## ARTICLE I.

NATURAL HISTORY AS A BRANCH OF SCHOOL  
EDUCATION; AND THE SCHOOL, THE COLLEGE,  
AND THE UNIVERSITY, IN RELATION TO ONE  
ANOTHER AND TO ACTIVE LIFE.

In our article on the Principles of a Liberal Education, (Vol. XII., p. 310,) as also in an Inaugural Address delivered by us, we endeavored to show the importance of *organic science* as a means of mental culture. In our article on Morphology, (Vol. XII., p. 83,) we undertook to point out the philosophic connection of that branch of organic science with fine art. Finally, in our article on the Relation of Organic Science to Sociology, (Vol. XIII., p. 39,) we attempted to explain the philosophic connection of the same science with the most important concerns of life. If there is any truth in any of these views, (and we are perfectly confident there is,) the great importance of a full introduction of organic science into our courses of liberal education becomes evident at once. Our college curriculum, therefore, requires modification in this respect. It is in vain to contend that other equally or more

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## ARTICLE III.

## GEOLOGY AND THE BIBLE.

The subject to which we invoke our readers' attention has been much debated. But our purpose is not to weary them with a repetition of those discussions concerning a Pre-Adamite earth, the length of the creative days, or the best way to reconcile geology with Moses, which have often been conducted within a few years past; with deficient knowledge and temper in some cases, and often with slight utility. In the progress of natural science, relations between it and theology become apparent from time to time; and frequently in very unexpected ways. Both parties are usually at fault in defining those relations in the beginning; and thus there occurs a season of somewhat confused contest, arising from the oversight of the proper "metes and bounds" of the two sciences. As the discussion proceeds, the facts are at length set forth, which enable all reasonable men to adjust the relations satisfactorily, and to appropriate to each its legitimate field of authority. All will agree that it is time such an adjustment were, if possible, begun, between the geologist and the divine. Our humble attempt will be to make such a beginning. We have no geologic theory to advance or to impugn, and no particular facts to advance, either new or old. But, looking back over the general course of the discussion on the structure of our globe, only as those may profess to do who keep up with general literature, without assuming to be professional geologists, we would endeavor to fix some principles of discussion, by which the application of natural science and its inferences, may be defined, and limited to their proper territory, and the claims of theology established along the points of contact. It would, perhaps, have been better for the divines if they had confined their efforts to these defen-

sive views, instead of entering, without being always adequately prepared, into the technical discussions of geology.

1. But, while making this admission at the outset, we would firmly protest against the arrogant and offensive spirit in which geologists have often, we may almost say, usually, met clerical criticisms of their reasonings. To the objections advanced by theologians, the answer has usually been a contemptuous assertion that they were incompetent to sit in judgment, or to object, when geology was in question, because they were not professional masters of the science. Their reasonings have been pronounced foolish, ignorant, mistaken: and slightly dismissed or rejected without fair examination, because they came from "parsons." Now, we freely grant, that it is a very naughty thing for a parson, or a geologist, to profess to know what he does not know, as well as a very foolish: that some of the "*genus irritabile vatum*" have doubtless been betrayed into this folly by their zeal against infidel science (as they supposed it), and that geologists have not been at all behind them (as some instances will show before we have done), in the mortifying displays of ignorance and sophistry they have made, in their attempts to use the weapons of the theologian and expositor. But, we would remark, while the specialities on which inductions are founded, in any particular branch of natural science, are, of course, better known to the professor of the speciality, the man of general intelligence may judge the deductions made from the general facts just as well as the other. Any inductive logic is the same in principle with all other inductive logic, and all deductive logic also is similar. Yea, conclusions from facts may some times be drawn more correctly by the man of general science than by the plodding collector of them; because the former applies to them the appropriate logic with a more correct and expansive view, and, perhaps, with less of the prejudice of hypothesis. The man who defined the inductive logic was not a naturalist by special

profession—was not practically skilled in any one department of natural history—but was a great philosopher and logician.

If, then, after geologists have described and generalized their facts, and have explained their conclusions therefrom, a class so well educated as the clergy must be pronounced unfitted to form an opinion upon them, the fault must be in the geologist or his science. If demonstration is there, it ought surely to be visible to the intelligent eye. How absurd is it for the advocates of the science to recalcitrate against the opinions of an educated class of *men*, when they virtually offer their systems to the comprehension of *boys*, by making them a subject of collegiate instruction; and one (who has, perhaps, more scornfully than any other, derided the criticisms of clerical opponents,) to popular assemblages of clerks and mechanics? Surely, if Mr. Hugh Miller thought that he could convince a crowd of London mechanics intelligently, in one night's lecture, of his theory of the seven geologic ages, it is absurd to claim that the science is too recondite for the unholy inspection of parsons' eyes.

There must always be a peculiar reason for the meddling of theologians in this subject. It is, that it is virtually a theory of cosmogony; and cosmogony is intimately connected with the doctrine of creation, which is one of the modes by which God reveals himself to man, and one of the prime articles of every theology. The inevitable connection of the two might be inferred from this fact, that all the cosmogonies of the Ancients were natural theologies: there is no philosopher of whom we know any thing, among the Greeks and Romans, who has treated the one without treating the other. It must, therefore, be always expected that theologians will claim an interest in geologic speculations, and will require them to be conformed to sound principles of logic and exposition.

2. On the other hand, the attitude and temper of many of the eager defenders of inspiration, towards the new science, have been most unwise. By many, a jealousy and uneasiness have been displayed, which were really derogatory to the dignity of our cause. The Bible is so firmly established upon its impregnable evidences, it has passed safely through so many assaults, has witnessed the saucy advance of so many pretended demonstrations of its errors, which were afterwards covered with ridicule by the learned, that its friends can well afford to be calm, patient, and dignified. They should be neither too eager to repel and denounce, nor too ready to recede from established expositions of the text at the supposed demand of scientific discoveries. They should assume the calm assurance, which regards all true science, and every genuine discovery, as destined inevitably to become the handmaids, instead of the assailants, of revelation. Especially to be deprecated is that shallow and fickle policy, which has been so often seen among the professed defenders of the Bible, in hastily adopting some newly coined exposition of its words, made to suit some supposed exigency of new scientific discovery, and as hastily abandoning it for some still newer meaning. They have not even waited to ascertain whether the supposed necessity for relinquishing the old exposition has been really created by a well-established discovery; but, as prurient and shallow in science as in theology, they have adopted on half evidence some new-fangled hypothesis of scientific facts, and then invented, on grounds equally insecure, some new-fangled explanations to twist God's Word into seeming agreement with the hypothesis. It would be well for us to ascertain whether our position is really stormed, before we retreat to search for another. But, several times within a generation, the world has seen a certain class of theologians saying, that the old popular understanding of the Bible upon a given subject must be relinquished; that science had proved it untenable, but that

they had at last found the true and undoubted one. And this they proceeded to sustain with marvellous ingenuity and zeal. But, after a few years, the natural philosophers relinquish, of their own accord, the hypothesis which had put these expositors to so much trouble, and introduce with great confidence a different one. And now, the divines tell us, they were mistaken a second time as to what the Bible intended to teach about it: but they are certain they have it right at last. So a third exposition is advanced. It has been this short-sighted folly, more than any real collision between the Bible and science, which has caused thinking men to doubt the authority of inspiration, and to despise its professed expounders. If they are to be believed, then the Word of God is but a sort of clay, which may be moulded into any shape required by the purposes of priest-craft. Clergymen ought to know enough of the history of human knowledge to be aware that true science advances slowly and cautiously, that great and revolutionizing discoveries in physical laws are not established every day; that a multitude of hypotheses have been mistaken, before our times, for demonstrations, and afterwards relinquished; and that even true inductions are always, to a certain extent, tentative, and require to be partially corrected after the science has been pushed to farther advances, from which fuller light is reflected back upon them. It will be time enough, therefore, for us, as professional expositors of the Mosaic history, to settle and proclaim a plan for expounding it in harmony with geology, when geology has settled itself. Our wisdom would be to commit the credit and authority of God's Word to no theory except such as is absolutely established by the laws of sound exegesis; and when we have thus taken a well considered position, to maintain it firmly against all mere appearances.

3. It should, in the third place, be clearly decided what is the degree of authority which we are to claim for the Bible upon those questions of physics which lie along the

path of its topics. Many claim for geology a license here, which comes very near to the deceitful distinction of the Schoolmen, between the philosophical and theological truth. When their daring speculations clearly contravened the teachings of Scripture, they said that these opinions were true in philosophy, though false in theology. In a somewhat similar spirit, it is now pleaded for geology, that it has its domain in a different field of investigation and evidence from that of the Bible. Each kind of evidence is valid in its own sphere, it is said; and, therefore, the teachings of each science are to be held true, independently of each other. But all truths are harmonious *inter se*. If one proposition contradicts another, no matter from what field of human knowledge it may be brought, manifestly, both can not be true. If, then, the Bible, properly understood, affirms what geology denies, the difference is irreconcilable; it can not be evaded by any easy expedient like that described above; it can only be composed by the overthrow of the authority of one or the other of the parties.

To determine how the Bible should be understood in its allusions to physical facts, we must bear in mind the object of God in giving it. His purpose was not to teach us philosophical knowledge, but theological. Nothing seems plainer than that God acts on the scheme of leaving men to find out, by their own researches, all those facts and laws of nature, the knowledge of which may minister to curiosity or to material well-being; while He limits Himself to giving us those divine facts and laws which man's research could not discover, or could not adequately establish, necessary for our attaining our proper theological end. Philosophy is our teacher for the body and for time; revelation, for the soul and for eternity. When revelation says any thing concerning material nature, it is only what is made necessary to the comprehension of some theological fact or doctrine. And in its observance of this distinction the Bible is eminently a practical book, saying nothing

whatever for mere curiosity, and stopping at just what is essential to religious truth. Hence, we ought to understand that when the Scriptures use popular language to describe physical occurrences or facts, all they mean is, to state the apparent phenomena, as they would seem to the popular eye to occur. They never intended to give us the non-apparent, scientific mechanism of those facts or occurrences; for this is not essential to their practical object, and is left to the philosopher. Hence, when natural science comes, and teaches us that the true *rationale* of apparent phenomena is different from that which seems to be suggested by the terms of the Scripture, and of popular language, there is no real contradiction between science and the Bible, or between science and the popular phraseology. For instance, the exposition of such passages, which led the doctors of Salamanca to condemn Columbus' geography as unscriptural, and the Inquisition and Turretin to argue against the astronomy of Galileo, as infidel, was mistaken. The former argued against Columbus, that the Psalms speak of the heavens as spread out like a canopy, and the earth as immovable and extended. Turretin argues most methodically that the Copernican scheme of the heavens can not be true, because the Scriptures speak of the earth as "established that it can not be moved;" of the sun as "going forth to his circuit in the heavens;" and of sun and moon as "setting," "rising," "standing still" at Joshua's command. We now clearly see that all this was an exegetical folly. And, now that we know it is the earth that moves, and not the sun, we no more dream of charging the Bible with error of language, than we do the astronomer himself, when he says, perhaps on the very pages of his almanac, "sun rises," "sun sets," "sun enters Capricorn," etc. For such really are the apparent motions of those bodies, and had the Bible departed from the established popular phraseology in mentioning them, to use terms of scientific accuracy, it would have been gratuitous



pedantry, aggravated by the fact that it would have been unintelligible and absurd to all nations which had not yet developed the Copernican astronomy.

Now, so far as the demands of modern geology upon our understanding of the Mosaic record are analagous to the concessions made above, we cheerfully yield them. It was with a view to the illustration of this new application that the familiar principle was again stated by us. And we find this principle, which we thus concede, claimed by the Christian geologists, as Hugh Miller, to cover all possible liberties which they find it convenient to take with the sacred text. This, then, is another point which requires careful adjustment. When Moses seems to say that God brought our world out of nothing into an organized state, about six thousand years ago, and in the space of six days, are his words to be classed along with those passages which denote physical occurrences according to their popular appearance, and which are to be interpreted, as we do the popular language about them, in obedience to the discoveries of natural science? Or, does this class of passages belong to a different category? We are compelled to take the latter answer as the proper affirmative. In the first place, the reference to physical facts in the record of creation is not merely subsidiary to the narrative or statement of some theological truth, but is introduced for its own sake. For, creation is not only a physical fact; it is a theological doctrine. The statement of it is fundamental to the unfolding of the whole doctrine of the creature's relation to his Creator. It is not one of those things which revelation treats as being intrinsically outside its scope, and which it, therefore, only introduces allusively. It is the first of those "things of God," which it was the proper and direct object of revelation to teach authoritatively. Second: the fact of creation had no apparent phase, different from its true scientific one, like the seeming dome of the skies, the rising sun, the stable earth; for the simple reason, that it had no

human spectators. Hence, there could be no popular mode of representation, different from the true scientific *rationale*, as there was no people to observe the apparent phenomena and describe them. But we have seen that the popular language of the Bible about the rising sun, and such like apparent phenomena, receives its explanation purely from the fact that it is conformed to the apparent and obvious occurrences, and to the established popular language founded thereon. Instead, therefore, of requiring these passages to stand waiting until they receive their proper construction from the hand of natural science, they are to be construed, like the remainder of the doctrinal teachings of the Scriptures, according to their own independent laws of exegesis, honestly applied.

Farther: when the proper rights of revelation, as related to natural science, are defined, it is most important that we assert their independence of it. Most geologists speak as though, on any subject which the researches of human science may happen to touch, the Bible must say only what their deductions permit it to say. The position to which they consign God's Word is that of a handmaid, dependent, for the validity of the construction to be put upon its words, upon their permission. Now this, we boldly assert, is intrinsic rationalism; it is the very same principle of baptized infidelity which reappears from so many different points of view, from Socinianism, Neologism, Abolitionism, exalting the conclusions of the human understanding over the sure word of prophecy. Let us fully concede that the Bible has been often misinterpreted, and thus its infallibility has been cited to sustain what God never meant it to sustain; that its correct exposition may, especially in certain parts of it, require great patience, caution, and modesty; and that it is wrong to claim its teachings as authoritative on any point, unless we have ascertained the true meaning of the text, beyond a peradventure, by the just application of its own laws of exposition. But still, the

Bible must be held to have its own ascertainable and valid laws of exposition; and its teachings, when duly ascertained, must be absolutely authoritative in all their parts, without waiting on or deferring to any conclusions of human science whatsoever: otherwise, it is practically no Bible; it is no "rule of faith" for a human soul. For, to say nothing of the uncertainties and fallibility of human reasonings, of the numerous mistakes of science once held to be demonstrated, how preposterous is the idea that our Bible held out to all the generations of men before Cuvier what professed to be an infallible cosmogony, while they had no possible means (the science which was to interpret it being undeveloped) to attain the true meaning, or to discover, by the laws of exposition of the language itself, their misunderstanding of it? Such a revelation would be a mere trap. But, worse than this; just as all our forefathers, when reading the first chapter of Genesis, supposed they were reading a plain story, which they were invited and permitted to comprehend, but were, all the while, deceived; so we may now be unconsciously accepting a number of Bible propositions as authoritative, and staking our souls upon them, which are destined to receive, several hundred years hence, a totally different interpretation—an interpretation impossible for us to attain—from the light of some science as yet undeveloped, either geological, or astronomical, or ethical, or ethnological. And who can guess in what part of the Bible these quick-sands are? All seems like solid ground to us now: but so did Genesis seem to our honest forefathers. We repeat, if they sinned against the Bible's own independent laws of exegesis, in venturing to put a sense on the first of Genesis, if there was any thing in those laws of exegesis themselves which, properly observed, would have sufficed to warn them off from their unwarranted interpretations, they were wholly to blame for their mistake. But if not, if the Bible was dependent for a fair understanding on a science as yet wholly undevel-

oped, then in those places it really means nothing in itself; and in seeming to mean some thing it is a mere trap for honest people. And so, we repeat, until human science shall have made its last advance in every circle of knowledge which can ever inosculate with theology, we must remain in suspense, whether there are not other hollow places in this Bible, which are betraying us. Obviously, such a book is not authoritative to a rational soul. And obviously, he who holds the authority of the Bible only in the sense described, is but a rationalist in spirit, whatever may be his Christian or his clerical profession. But, it may be objected: "Does not every enlightened Christian hold that it is the glory of the Bible to receive illustration from every light of human science?" We reply: It is its glory to have all human science ancillary to it, not dominant over it; to have its meaning illustrated, *but not created*, by all the discoveries of true science.

4. An equally important adjustment is to be made, as to the party which is bound to assume the burden of proof in this discussion between the Mosaic and the Geologic records. We consider that the theologian, who asserts the infallibility of the Bible, and the independency and sufficiency of its own laws of interpretation, is entitled to the preliminary presumption; and, therefore, the burden of proof rests upon the geologist, who asserts a hostile hypothesis. The authority of the Bible, as our rule of faith, is demonstrated by its own separate and independent evidences, literary, historical, moral, internal, prophetic. It is found by the geologist in possession of the field, and he must assume the aggressive, and positively dislodge it from its position. The defender of the Bible need only stand on the defensive. That is, the geologist may not content himself with saying that his hypothesis (which is opposed to Bible teachings) is plausible, that it can not be scientifically refuted, that it may adequately satisfy the requirements of all the physical phenomena to be accounted

for. All this is naught, as a successful assault on us. We are not bound to retreat until he has constructed an absolutely exclusive demonstration of his hypothesis; until he has shown, by strict scientific proofs, not only that his hypothesis *may be* the true one, but that *it alone can be* the true one; that it is impossible any other can exclude it. And we, in order to retain our position, are not at all bound to construct any physical argument to demonstrate geologically that Moses' statement of the case is the true one; for, if the Bible is true, what it teaches on this subject is proved true by the biblical evidences, in the absence of all geologic proof. Nor are we under any forensic obligation to refute the opposing hypothesis of the geologist by geologic arguments, farther than this; that we shall show geologically that his argument is not a perfect and exclusive demonstration. If we merely show, by any flaw in his conclusion, by the citation of any phenomenon irreducible to the terms of his hypothesis, that his demonstration is incomplete, we have successfully maintained the defensive: we hold the victory.

Now, have geologists always remembered this? Nay, is it not notoriously otherwise? It would seem as though this interesting young science had a sort of fatality for infecting its votaries with a forgetfulness of these logical responsibilities. Perhaps this would be found equally true of every other physical science of wide extent, of complex phenomena, and of fascinating character, while in its forming state. But every acute reader of the deductions of geologists perceives numerous instances where they quietly substitute the "may be" for the "must be," and step unconsciously from the undisputed probability of an hypothesis to its undisputed certainty. And one's observation of nature need proceed but a small way, to light upon instances in which phenomena exist which would receive a given solution just as plausibly as certain others; while the geologists imagine a reason for withholding that solu-

tion in the cases which would thus spoil their hypothesis. That they can not yet claim that exclusive and perfect demonstration of their hypothesis which is required of their position, as holding the aggressive, seems very plain from familiar facts. One is, the radical differences of hypothesis to which leading geologists are committed, up to this very day. Sir Charles Lyell makes it almost the key-note of his system, that all geologic changes were produced by such causes as are now at work, and operating, in the main, with no greater speed than they now exhibit. Hugh Miller, and others, are equally sure that those changes were produced by successive convulsions and earth-tempests, revolutionizing in a short time the state of ages. Some reconcile the "stony record" with that of Moses, upon the scheme advocated by Dr. Chalmers, which pushes back all the mighty changes to that interval ending, in Gen. 1 : 2, when "the earth was without form, and void." Others, with Miller, and Professor Tayler Lewis, adopt the very different theory of the six creative days extending to vast periods of time. Mr. Miller is certain that the fossil *flora* and *fauna* indicate just the order, in the main, as to the succession which their chief developments had in the geologic ages, which is set down in Genesis as the work of the several days. Many others, equally great, declare just the opposite.

A reasonable mistrust of the perfectness of geological demonstrations is excited, again, by instances of obvious haste and inconclusiveness in their inferences from supposed facts. Of this, one or two illustrations must suffice. Few of their writers rank higher than Sir Charles Lyell. In the London edition of his "Principles of Geology," 1850, page 205, we have an attempt to make an estimate of the age of the earth's present crust, from the character of the deep gorge, or great rocky gully, in which the Niagara river flows from the falls towards Lake Ontario. The deep part of this channel is said to be about seven miles

long. The author first satisfies himself, on grounds which might, perhaps, amount to probability, that this whole gorge may have been excavated by the torrent itself. This is the first element of the calculation. Through the rest of the argument this probability is tacitly turned into a certainty. The next element to be ascertained is, the rate at which the river now digs out its channel, and the edge of the cataract recedes. A previous intelligent inquirer concluded, upon the best testimony he could collect upon the spot, that the falls receded a yard each year; but Sir Charles assumes an average of a foot per year as the more correct rate, on grounds which he does not state. This second source of uncertainty is, also, quietly ignored. Then it is calculated that the Niagara has been flowing thirty-five thousand years. While the author does not venture to vouch for this positively, he concludes by indicating to his reader that his private opinion is, the time was more likely longer than shorter. Now, even the unscientific visitor of Niagara can not fail to observe, what Sir Charles himself correctly states, that the perpendicular face of the gorge, of the cataract, and of the lower edge of Goat Island, reveals this structure:—on the top there is a vast layer or stratum of hard grey limestone, nearly horizontal, and, at the falls, nearly ninety feet thick; while all below it, to the bottom of the precipice, is a soft shale. The real obstruction to the very rapid cutting away of the precipice by the tremendous torrent, is the solidity of the limestone layer, whose surface forms the bottom of the river above the falls. When that once gives way, the rest is speedily removed. Any person can easily understand that the permanency with which this limestone layer withstands the water depends chiefly on its thickness, and also on its dip, or inclination, and on the frequent occurrence or absence of fissures or seams, destroying the cohesion of its masses to each other. Now, will not the reader be surprised to learn that, even in the two miles which ex-

tend from the cataract down to the Suspension Bridge, this all-important stratum of limestone is diminished more than half in its thickness, the soft and yielding shale forming the remainder of the cliffs? So that, to say nothing of the high probability of the occurrence of the two other causes within the seven miles, we have here a cause for the recession of the cataract greatly more rapid than that which now obtains. Sir Charles Lyell concludes with these words: "At some points it may have receded much faster than at present, but its general progress was probably slower, because the cataract, when it began to recede, must have had nearly twice its present height." Did not the waters then have more than twice their present momentum? So that common sense would say that if there was more earth to be worn and dug away, there was far more power to do it. Surely, such reasoning as the above does not make an exclusive and perfect demonstration!

Another instance shall be taken from the same author. On page 219 he presents us with an argument for the great age of the world, from the length of time the Mississippi has been employed in forming its alluvial delta. The elements of the calculation are, of course, the area and depth of the alluvial deposit, giving the whole number of cubic yards composing it, the quantity of water passed down the stream in one year, and the per-centage of solid matter contained in the water in its average state of muddiness. The *data* upon which the depth of the alluvium is fixed are only two, the average depth of the Gulf of Mexico, and a well or shaft sunk near lake Pontchartrain. Are either of these sufficient? Is it not customary for strata to dip towards seas and oceans? If the spot at which the well was dug happened to be one of those sunk far below the usual level by earthquake agencies (and Sir Charles himself saw that such agencies had produced just such results in the region of this same river, near New Madrid), would it not come, in the course of a few hundred years, to receive far



more than the average thickness of alluvial deposits? But let us come to the other element, the percentage of sediment in the water. From the observations of Dr. Riddell he learns that it is one three-thousandth part, in bulk, of the water. Two other observers, Messrs. Brown and Dickson, make it one five hundred and twenty-eighth part, and they make the volume of water one-third more! Sir Charles concedes that "so great a discrepancy shows the need of a new series of experiments." Did either of the observers take pains to ascertain whether the larger part of the sediment does not gravitate towards the bottom of the water, while flowing, and to go down any part of the one hundred and sixty-eight feet, which measures the depth of the river at New Orleans, to procure the water which they examined? We are not informed. The observations on the annual volume of water were made at New Orleans. Was any allowance made for the waters which flow off in such vast quantities through the delta, by the *bayous*, and during the gigantic freshets, leaving the main channel above New Orleans? We are not informed. Again, the total volume of the water passing New Orleans in a year depends on its velocity. Now, experienced pilots and boatmen of the Mississippi are generally of opinion that the lower strata of water in its channel run with far more velocity than the surface. Hence the calculators, in gauging the surface velocity, were probably entirely at fault as to the real volume of water. Last: it is universally known that the Mississippi is nearly twice as muddy, on the average, at the head of the delta as at New Orleans! How much is this notable calculation worth after all these deductions? But, for all that, he *chooses* to assume Dr. Riddell's estimate for his basis, and thus proves (!) that the Mississippi has been running one hundred thousand years.

Now, let the reader note, that we do not advance the inconclusiveness of these two calculations as sufficient proof, by itself, that the world *is not* thirty-five thousand, or

one hundred thousand years old. But we advance it upon the principle expressed in the adage, "*Ex pede Herculem.*" The detection of such hasty and shallow reasoning gives sufficient ground of mistrust as to their general conclusions.

Another specimen shall be drawn from Hugh Miller, ludicrous enough to relieve the tedium of this discussion. In the "Testimony of the Rocks," (Boston: 1857, p. 259,) he is arguing that the fossil animals were produced by natural law, vast ages ago, because they exhibit marks of creative design similar to those we now find in the living works of nature. One of his evidences is a little coral, the "*Smithia Pengellyi*," which constructed its bony cells such that the fracture of them presented a surface remarkably similar to a certain calico pattern, which had proved extremely popular among the ladies. The conclusion is, that as this calico must have been very pretty—(as though the better part of creation had never been known to exhibit their sweet caprices by admiring things for their very ugliness)—the Creator undoubtedly caused these coral insects to construct their cells in this way for their prettiness! To us duller mortals it is not apparent that the "final cause" of coral insects was to be ready to have their stony buildings cracked open by geologists' hammers; we thought they had been made for an existence where, in the main, no human eye could see them; especially as the species was Pre-Adamite by myriads of years. Mr. Miller's notion of the design of creation seems to be very much akin to that of the old Scotch crone, who, whenever she beheld a beautiful young girl, had no other appreciation of her graces than to conceive "what a lovely corpse she would make."

Once more: while the currently received theory of the cosmogony is ingenious, it is at least doubtful whether the adjustment of all the phenomena of so complex a case to the hypothesis, has been, or can be, accurately carried out.

But until this is done, it is not demonstrated. If that scheme is true, then all the material substances which make up the chemist's list of simple substances, must have been derived from the elements of the atmosphere, of water, and of the primitive rocks. For, if we go back to the beginning, we find, according to the current hypothesis of the geologists, nothing in existence, except a heated atmosphere, watery vapor, and a fluid globe of melted granite, basalt, etc. All the rest, secondary, tertiary, alluvial, is the result of cooling, crusting, depressions and upheavals of this crust, disintegration, and sedimentary deposits. But, is it certain that air, pure water, and primitive rocks, contain all the chemical substances? And a still harder question is this: Has it ever been ascertained whether the chemical conditions and combinations, in which the elements exist in the primary rocks, and then in those called secondary and tertiary, are such as are consistent with this hypothesis? Has it been ascertained that the small per-centage of silicate of lime found in some of the granites (only some) and other primitive rocks, within such a distance from their surface as could, by any possibility, be subjected to disintegration, can account for all the vast masses of *carbonate* of lime (no longer silicate) in all the limestones, marbles, chalks, coral, and calcareous clays of the newer strata? But the world is entitled to have these questions answered, before the geologists claim a demonstration of their hypothesis.

Recent events furnish us with another doubt. One of the main arguments by which the fossil animals of all but the most recent species are shown to be Pre-Adamite, as it is claimed, is, that no fossil human remains, or marks of human handiwork, have been found among them. And geologists have admitted (as they must) that the well-attested discovery of such remains among the earlier strata would demand a surrender and reconstruction of their theory. But lately the scientific world has been agitated by the report that, near *Amiens*, in France, arrow heads of

flint, and other works of human industry, have been found unquestionably in a *stratum*, and along with fossils, uniformly assigned by geologists to a Pre-Adamite period. And now, it is stated that a scholar of high qualifications, Rawlinson, has visited the spot, and is satisfied of the correctness of the assertion.

For these and many other reasons, we consider the geological hypothesis as not yet a demonstration; and, hence, we claim the right to stand upon the defensive, upon the impregnable bulwarks of Scripture evidences, until we are positively dislodged. We deny that any logical obligation rests upon us to present any scientific argument, or to establish any hypothesis, on the subject. We are not bound to show, by natural science, what is the true *rationale* of the earth's creation. Our defence is thoroughly accomplished when we show that any adverse theory is not yet exclusively demonstrated.

5. The most vital point in the relations between theology and geology, we have reserved for the last. It is one which has been summarily disposed of by geologists, without condescending to weigh its vast import. How far must the logical value of the inferences of natural science from natural appearances, be modified by the admitted fact of a *creation*? The character of these inferences is the following: "We see a given natural law produce a given structure: We find the remains of a similar structure which has been some how produced in the past: We infer that it must have been produced by a similar natural law." The just application of this kind of reasoning, within its proper limits, is fully admitted: it has been the main lever in the discoveries of natural science. But now, we ask, how far should its application be limited by the knowledge of the truth, that *some where* in the past some omnipotent creative act must have intervened? This is the question.

Unless geologists are willing candidly to take an atheistic view of cosmogony, the fact of an absolute act of creation

must be admitted some where in the past. We will not insult the intelligence and piety of our readers by supposing it necessary to recite the arguments which disprove an Atheistic origin of the present order of things, or the emphatic admissions of all the greatest teachers of natural science, that nature obviously discloses her own origin in the creative will of an eternal Intelligence. The short-lived theory of *development* has been already crushed beneath the combined arguments and ridicule of scientific geologists themselves. There is, however, one fact, peculiarly germane to this point, that the Christian geologists of Great Britain and America claim it as the peculiar glory of their science, that it presents an invincible and original argument for a creation. It is this: the stony records of successive *genera* of fossil plants and animals show that prior *genera* perished wholly, and *genera* entirely new appear on the stage of life. Now, as the development theory is repudiated, the entrance of each new *genus* evinces, beyond a doubt, a new and separate creative act. Let us grant this for argument's sake. It is agreed, then, that terrestrial structures began, some where in the past, in God's creative act.

But now, it is most obvious, that if a scientific observer had been present, just after that creative act, to observe the structures produced by it, any observations or inferences he might have drawn from the *seeming* marks of the working of natural laws upon them, would have been worthless to prove that those specimens originated in natural laws. We repeat: once admit that a creative act has intervened *any where* in the past, and we should have had there, if we had been present, one case, in which all deductions and inferences of the natural origin of things from their natural appearances, would have been worthless. Such analogical arguments would have been cut across and superseded utterly by the creative act. This is indisputable. We may illustrate it by the instances usually pre-

sented by the sound old writers of the class of Dick (instances which have far more significance than has usually been admitted). Suppose, for illustration's sake, that the popular apprehension of the Bible account of the creation of Adam's body, and of the trees of Paradise, is true. But now a naturalist of our modern school investigates affairs. He finds towering oaks with acorns on them! Acorns do not form by nature in a day—some species of oaks require two summers to mature them. But, worse than this. He has ascertained by natural history that one summer's growth forms only one of the concentric rings in the grain of the tree's stock. He cuts down one of the spreading monarchs of the garden, and discovers that it has a hundred rings. So he coolly rejects the story that this garden began last week, and insists on it that Adam has told a monstrous fib in saying so; that it is not less than a hundred years old. Yet Adam was right; for the creative act explained all. But let us suppose another naturalist returning after some nine or ten centuries. He visits the venerable tomb of the father of all the living, and learns from his heir, Seth, how that his father sprang, at the bidding of God, out of the dust, a full-formed, adult man. The naturalist takes up a leg-bone of Adam's skeleton: he remarks: "The person to whom this bone belonged at death was evidently an adult; for its length, size, solidity and density show this." He saws off a section, polishes it down to a translucent film of bone, and subjects it to his microscope and his chemical solvents. He remarks: "Here is the cellular structure of gelatinous matter, which once formed the incipient bone of the *fœtus*; and these cells I now find filled with the deposit of *proto-phosphate of lime*, giving it its stony strength and hardness. But I know that the introduction of this earth into the cells of the soft bone of the infant is just the process by which nature now forms the bones of adults, by gradual growth. Whence I learn that this individual, like his children, grew, during

the space of twenty-one years, from a *fœtus* to an adult; and the myth of his son Seth, concerning his instantaneous creation, is an attempt to impose on my credulity. This attempt I, as a philosopher, shall repudiate with contempt." Yet Seth was right, and the philosopher wrong. For, not to rely on the inspired testimony alone, this natural argument would prove that Adam was once an infant, and, therefore, had a father. The same argument, applied to the body of Adam's father, would equally prove that he, also, was once an infant, and had a father. And it would prove equally well an infinite series of finite human fathers, extending back to all eternity. But such a series, philosophy herself shows, is impossible!

But, second—and the remark is of prime importance—any creative act of God, producing a structure which was intended to subsist under the working of natural laws, must produce one presenting some of the *seeming* traces of the operation of such laws. We confidently challenge geologists who admit that there has ever been any creation at all, to imagine a product of it which could be different. For, note, all these Theistic geologists repudiate the theory of development of *genera* from different and lower *genera*. Whence it follows, that the first specimen of God's immediate handiwork, the very first moment it left his hand, must have stood forth *as truly natural* as any of its progeny which were destined to proceed from it by natural law. And the same thing must have been true, to some extent, of all inorganic structures. If they had no traits of the natural, as they came from God's hand, then they were incapable of becoming, thenceforth, the subjects of natural law.

Hence, third, it follows that, if once a creative act is admitted to have occurred some where in the past, it may have occurred any where in the past, so far as the deductions of natural science from the marks of natural law upon its products go. In other words, the value of all

these analogical inferences as to the date at which, and the mode by which, these objects of nature came into being, are worthless just so soon as they attempt to pass back of the earliest historical testimony. For the creative act, wherever it has intervened (and who can tell, when testimony fails, where it may not have intervened?) has utterly superseded and cut across all such inferences. Nor can these natural analogies prove that the creative act has not thus intervened at a given place in the past, because the whole validity of the analogies depends on the supposed absence of the creative act. Hence, all the reasonings of geologists seem to us utterly vitiated in their very source, when they attempt to fix, from natural analogies, the age and mode of production of the earth's structures.

This objection is usually dismissed by geologists with a sort of summary contempt, or with a grand outcry of opposition. It does, indeed, cut deep into the pride and pretence of their science; at one blow it sweeps off that whole domain of its pretended 'discoveries—the region of the infinite past prior to all history—in which the pride, conceit, and curiosity of man's fallen intellect must crave to expatiate. But let us see whether it is possible to impugn the simple premises on which our conclusion rests, or the inevitable result from them. Is there a single answer which can be presented, that is even of any scientific weight?

It is urged, in substance, by Hitchcock, that if the validity of their analogical reasonings from natural laws is denied in this case, the very foundations of all natural science are overthrown. But what is this, more than an appeal to our fears and prejudices? It is as though one said, when we refuse to accept a given species of evidence outside its proper range, that we thereby invalidate the force of all evidence. The question is: What is the proper domain of these inferences from the analogies of natural law? Within their own domain, true science accepts them as



valid; outside of it, true science herself will concur with theology in arresting them. Let these premises be granted, viz: Given the sufficient evidence that supernatural causes are all absent in a certain class of effects; and given the fact that just such effects have usually resulted from a certain natural law: Then the inference may be very valid, that these effects did result from the operation of this law. But this inference can not help us to determine the first premise, whether all supernatural causes were truly absent; for the very reason that it depends on that premise in part. This would be to reason in a circle, with a vengeance. The application of these inferences, upon which Hitchcock and the other geologists insist, is, in fact, precisely a case of that induction, from mere uniformity of antecedent and consequent, as far as observed, which Bacon condemned under the term "*Inductio per enumerationem simplicem*," and which it was one of his chief tasks to explode, as utterly worthless. He proves that it can never raise more than a meager probability of the correctness of its conclusions, where it is not supported by some better canon of induction. To explain: The shallow observer says—"I find that, so far as my observation has been enabled to test the matter, a given consequent phenomenon, named B, has always been preceded by a given antecedent, named A. Hence, I conclude that, in every other case where B appears, A was its cause." The obvious vice of this is, that it is wholly unproved that some other cause capable of producing B was not present, besides A, in the last cases. The induction is worthless until that is proved beyond a peradventure. To apply this: Our modern geologists argue, for instance, that wherever they have been able to examine the actual process by which the formation of *stratified rocks* takes place, the cause is *sedimentary action*. Therefore, wherever any other stratified rocks are seen, their producing cause must have been *sedimentary action*. Here we have precisely the worthless induction *per enumerationem*

*simplicem*; for, the possible presence of some other cause capable of producing stratified rocks, has not been excluded. And every one but the Atheist admits that another such cause may have been present, in the shape of *creative power*. Until the presence of that cause is excluded by some other evidence, the conclusion is not proved. The vice of argument is just like that in the famous sophism of Hume against miracles—it is only worthy of a Humist. And we conceive that there is no uncharitableness in declaring that the covert tendencies of all such philosophizings are to Hume's Atheism. Such reasonings can not be complete for such a result in all cases, unless the supernatural be wholly excluded; and the secret tendency to do so (which is virtual Atheism) is the true spring of all such reasonings in science. But it may be retorted: Are we, then, to surrender all dependence on inferences from natural law, as certain evidence, throughout the whole extent of natural sciences? We reply: No; wherever the inquirer into nature is certain that the facts he investigates are truly under the dominion of natural law, so far such reasonings are valid. As to the origin and history of nature in the past, they are valid no farther back than we can be assured of the absence of the supernatural; and we know not how such assurance can be gained by us, save by the testimony of human experience and history, or of inspiration. This conclusion does, indeed, curb the arrogance of human science, but it does not affect in the least any part of its legitimate dominions, or of its practical value to mankind. It does, indeed, disable us from determining the age, date, and origin of the structures nature presents us, but it does not prevent our discovering the laws of those structures; and the latter is the discovery to which the whole utility of science belongs.

Again: why should the Theistic philosopher desire to push back the creative act of God to the remotest possible age, and to reduce His agency to the smallest possible *mini-*

*mum*, as is continually done by these speculations? What is gained by it? Instead of granting that God created a world, a *κοσμος*, they continually strive to show that he only created the rude germs of a world, attributing the actual origin of the fewest possible elements to God's almighty act, and supposing the most possible to be the result of subsequent development under natural law. We repeat the question: What is truly gained by this, if once the lingerings of covert Atheism be expelled? Admit in good faith the facts of an actual Creator, an almighty and omniscient agent, and of an actual creation, any where in the past, and it will appear just as reasonable that God should have created the whole finished result as a part. To His infinite faculties there is nothing hard, as opposed to easy, nothing intricate, as opposed to simple, nothing great, as contrasted with the simple. It was just as easy for Him to speak into existence a finished universe, with all its beautiful order, "by the word of His power," as to produce the incipient elements out of which "laws of nature" were slowly and laboriously to evolve the result.

For, what are those laws of nature, and what their source? Do they not originate, after all, in the mere will and immediate power of God? None but the Atheist disputes this. And, although we cordially grant that the properties of bodies, by which they are constituted *forces* in the great system of causation under natural law, are actual properties, and not mere seeming blinds or *simulacra* of properties; though we grant that they are truly intrinsic in bodies, as constituted by God's creative will; yet who, except the Atheist, denies that their operation is sustained and regulated by the ever-present, special providence of God? Hence, if we say *natural law* does this or that, as opposed to supernatural creation, we have not in the least simplified, or relieved, the perpetual miracle of God's working. There is still a manifold and countless operation of infinite power and wisdom.

But, if the natural philosophers still persist in claiming the universal application of their principle, that wherever there is an analogy to the results of natural law, there we must conclude natural law alone has wrought, we can clearly evince that their position is utterly untenable and inconsistent, save for the thorough Atheist. For, as already intimated, push back the supernatural creative intervention as far as we may, it is impossible for us to conceive how it could produce any structure adapted to the subsequent dominion of natural law, without giving it the properties which such law gives to its similar products. To give the most complete proof of the justice of this remark, let us take that theory of the solar system which the unbelieving *La Place* is said to have doubtfully suggested as a possible one, and which our nominally Christian philosophers have so incontinently adopted, without demonstration, as demonstratively the true one. Suppose that the natural historian, coming from some older system, had begun his investigation of ours (on the principles of these philosophers) at that stage when nothing existed but a *nebula* of incandescent compound vapor, rotating from west to east around an axis of motion. (This is the stage, we understand, at which it is now most popular to suppose cooling, liquefying, and solidifying processes began, resulting in a sun and planets; when the only shadow of truly scientific evidence on which *La Place* grounded his doubtful surmise, has been dissipated by Lord Rosse, resolving the *nebulae* into clusters of well-defined stars.) How would this scientific observer have speculated on what was presented at that primitive stage? Had he used the confident logic of our geologists, he must have said to himself: "Motion in matter is always the result of impact; therefore, this rotary motion which I now behold must be the result of some mechanical force, developed by natural action, either mechanical or chemical. And again: *vapor* implies *evaporation*, and sensible heat suggests latent heat, rendered

sensible by chemical action. There must, therefore, have been a previous and different condition of this matter, now volatilized, heated, and moving. These conditions are the results of the working of natural laws; and that implies a previous material, in a different condition, to be the subject of that working." Now, this reasoning would be precisely as good as that of geologists. But what would it prove? It would make matter and the organism thereof eternal; for, after ascending by such reasonings one stage higher, we should be equally impelled to ascend still another, and another. Thus it would exclude a Creator totally from creation. Hence, it appears that the principles we have criticised are unsound and inconsistent, in any hands except those of the Atheist. Once admit a Creator and a creation, and the validity of all inferences from the seeming analogies of nature, as to origin of things, is vitiated the moment we pass back of the authentic light of historical testimony. Once admit a Creator and a creation, and nothing is gained, in logic, by attempting to push back the creative act.

In fine, if that account which theology gives of the origin of the universe is to be accepted at all, it appears to us that the most philosophical conception of a creation would be the following: That God, in producing a world which His purposes required should pass immediately under the dominion of natural laws, would produce it with just the properties which those laws were to develop. Thus God, intending to have trees perpetuated by a law of germination and growth, would most naturally create the first tree of the *genus* just such as germination and growth would produce. And so, the whole structure of His world would be made, at first, with an adaptation to the laws which were intended subsequently to regulate and modify it. And just here theology inosculates with cosmogony, and gives us a consideration which will strike every just mind with no little force, while it is one of that kind which

the man of narrow specialities is almost incompetent to estimate. What was God's true end in the creation of a material world? Reason and Scripture answer: It was to furnish a stage for the existence and action of reasonable moral beings. The world was made for MAN to inhabit. Without the presence of this its rational occupant and earthly master, all the manifestations of intelligent design and moral attributes, given in the order of nature, would be an aimless and senseless work. For, as light would be no light were there no *eye* in the universe, so God's declarative glory in the wisdom and goodness of His works is no glory till there is a *mind* to comprehend it. Now, such being God's end, it seems far more rational to suppose that God would produce at once the world which was needed for His purpose, rather than spend hundreds of thousands of years in growing it.

But, bearing in mind the object for which God created a world, we shall see that it becomes the most reasonable supposition that He should have made it, from the first, with some of those traits which geologists suppose have all resulted from the working of natural laws. For instance: God's purposes, as at present revealed, prompted Him to subject the surface of our globe to that class of agencies which are continually adding to its sedimentary *strata* of rocks and earths. Well, it is the most reasonable, the most philosophic, supposition that the same purposes prompted Him to create a globe which had, from the first, some *strata* of the same sort. That the surface of the globe should be from the first stratified was necessary, for instance, to produce springs and veins of water, and that whole economy of irrigation, which makes it a tenable home for sentient creatures.

*If, therefore, there is any authentic testimony that God did, from the first, create such an earth, no sound inference drawn from natural analogies is of any force to rebut that testimony.*