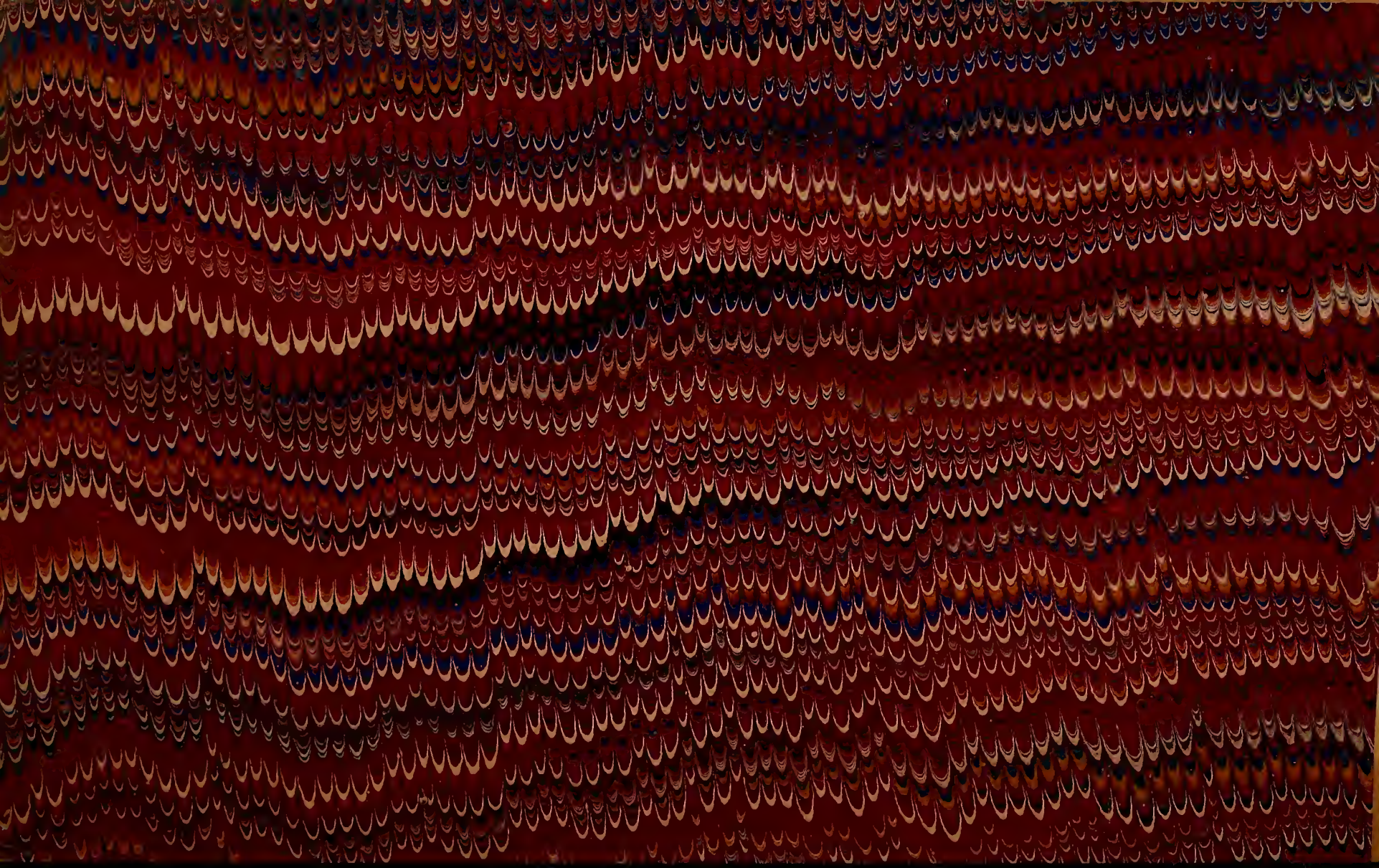

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THE

DEVELOPMENT HYPOTHESIS:

IS IT SUFFICIENT?

BY

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THE

DEVELOPMENT HYPOTHESIS.

PAPER I.

ARGUMENTS FOR AND AGAINST THE DEVELOPMENT HYPOTHESIS.[1]

IN these days every educated man and woman has heard of development, of evolution, and of Darwinism. Many are anxious to know what they are, whether they are established by scientific evidence, and what is their moral and religious tendency. In this paper, without entering into minute scientific details, I am to give a plain account of this new theory, addressed to those who have not leisure or opportunity to study the numerous and very complicated discussions on this subject.

It is evident that evolution runs through all nature: one thing comes out of another. Every object on the earth at this moment — say rain-drop, flake of snow, rock, crystal, jewel — has been formed out of pre-existing materials; and when it has fulfilled its purpose and disappeared, it is not annihilated: its elements still exist and have to appear in a new

[1] This paper is to a large extent a reprint from a portion of an article which I furnished, in 1874, to a valuable and interesting work, "Wood's Bible Animals" (Bradley, Garretson, & Co., Philadelphia).

form. It is believed by men of science that the sun, earth, and planets may have been fashioned out of an original floating matter or star dust. The plant proceeds from the seed, the oak is the development of the acorn. Animals are the offspring of parents, and proceed from a germ. This is known to all, and is acknowledged by all. Some are carrying the doctrine much farther. They are discovering development in national wealth and in national occurrences. The Reformation in the sixteenth century, the English Revolution of 1688, the American war of Independence, the French Revolution of 1790, all grew out of the circumstances in which the countries were placed, out of the abuses that existed, and the state of feeling abroad. There is evolution even in the advance of science: thus the discovery of the circulation of the blood revolutionized the whole of anatomy; and it is expected that this theory of development is to be followed by a whole host of scientific consequences. The doctrine shows that there is a continuity in nature, — that the present is the child of the past and the parent of the future.

The Scriptures teach a doctrine of evolution. "The earth was without form and void" (Gen. i. 2), and the forms of land, atmosphere, and sea came out of it. "And God said let the earth bring forth grass, and the herb yielding seed, and the fruit-tree yielding fruit after his kind, whose seed is in itself after his kind" (v. 11). So in regard to animals, "the waters brought forth abundantly after their kind, and every winged fowl after his kind;" and then "the living

creature after his kind, cattle and creeping thing and beast of the earth after his kind" (vs. 21, 24). Of man's body it is said, "The Lord God formed man of the dust of the ground" (ii. 7).

But is there nothing but development? Are objects produced in this way and in no other? That is the question for discussion. In answering it, we have to insist, in the first place, that development implies a previous matter out of which the thing is developed. This matter must have properties which make it to act and evolve things out of itself. All but atheists acknowledge that this matter has been created by God. The development proceeds in so orderly and in so beneficent a manner that it seems to give evidence of the existence of a wise and good God.

And may not the God who created matter at first, interpose to introduce new powers and new agents? In particular, must there not be a creative act when plants appear, and when animals appear? The ancients were not agreed on this point, and their opinions were not of any value on the one side or the other, as they made no scientific investigation. Augustine, one of the greatest of the Fathers of the Church, thought that animals might come out of the slime of the earth, without any parentage, — always, he would add, by the power of God. But among scientific men in modern times, the accepted doctrine was that all plants came from a seed, all animals from a parentage. They knew that varieties were produced by circumstances, but they held that species were fixed. They allowed that climate, modes of life, and training could produce

different breeds of horses; but they maintained that the horse, as a horse, could proceed only from the horse.

But there arose, from time to time, naturalists who denied the accepted doctrine. De Maillet, at the beginning of last century, maintained that animals originally formed in the waters which covered the world were transferred to the land when it emerged, and there suited themselves to their new positions and improved by external circumstances. Lamarck (A.D. 1801) started the theory that there was an inherent principle of improvement in plants and animals, and that external conditions working on this produced gradually variations of species, which gave rise to new species, genera, and orders. A great stir was made by the publication of "The Vestiges of the Natural History of Creation" (1844), in which it was ingeniously argued that creation, as the author called it, took place according to law; and, in particular, that a prolongation of the time of the development in the womb may give rise to a higher type. The work, not being scientific, did not meet with much acceptance with naturalists. But universal attention was called to the subject when, in 1858, Charles Darwin, a distinguished naturalist and a very careful observer, published his work, "Origin of Species by means of Natural Selection, or the Preservation of Favored Races in the Struggle for Life." The title indicates the nature of the process by which species are supposed to be generated. Certain individuals, by exertion or otherwise, get a peculiarity which suits them better to their

position. These survive, while others perish; and the peculiarity becomes hereditary, and goes down to their offspring. A struggle ensues, the strongest race prevails; and, as a result of the whole, there is an advance in the forms of plants and animals. Let this go on, by small augmentations at a time, for millions of years or ages, and it is able to produce all the species and all the genera now on the earth.

I would now state as clearly and as briefly as I can the arguments for and against the Development Theory.

1. Looking to the flora and fauna now upon the earth, we find them distinguished by a unity of plan. For instance: the fins of fishes, the wings of birds, the fore-feet of reptiles and of mammals, all correspond to each other, and this when they are made to fulfil very different functions. It can be shown that the venation of leaves, the branches of trees, and the whole tree, take very much the same form. There are affinities between the lichen covering the bare rock and the oak shooting up toward the sky; between the polyp confined to one spot in a pool and the lion ranging through the forest. Now, we are impelled to seek for a cause of this. It can be explained by supposing that the whole proceeded from a single germ or a few germs, which germ or germs may have risen under favorable conditions out of favorably disposed inorganic matter.

2. There has been a gradual advance in the geological ages from lower to higher forms. There have been breaks, as might have been expected, in the

series; still, upon the whole, there has been progress from the first animal discovered, the unshapely Eozoön Canadense, up to the highest mammal. We are impelled to seek for a cause; and, in doing so, we are obliged to suppose, either that there is a tendency in the very organism itself to rise to higher states, or that there is an elevation by a happy start or by a succession of immeasurably small additions, the gain being handed down from parent to child; and, as those who are without the advantage disappear, and those who have it multiply, a new and better race becomes settled. A hill, we may suppose, is covered with evergreens; a severe frost comes and destroys nine-tenths, and these the weaker of them; only the stronger live, and these spread and shed their seed; and in due time the whole hill is adorned with stronger and healthier trees. This may enable us to understand what has taken place in the geological ages. As new and trying circumstances arise, there is a struggle for existence; the unfit disappear, and the fit survive; and there is progress, upon the whole, through the long ages that have run their course.

3. We can experiment on this subject, and exhibit the changes produced both on plants and animals by artificial means. "It was the study of domesticated animals," says Professor Asa Gray of Cambridge, "that suggested the theory." Mr. Darwin has taken great pains to observe the variations produced on animals by domestication, and on some of the more important plants by cultivation, and has published a work in two volumes, "On the Variation of Animals

and Plants under Domestication." He shows that animated beings are affected by shelter, by protection from exposure, by climate, by food. He has been particularly successful in dealing with pigeons, showing that numerous and very diverse forms have all proceeded from one known source. His argument is that in these changes, produced by domestic care and made hereditary, we have an experimental exemplification of the way in which variations and new races have been produced in the geological ages.

4. There is a correspondence between the progress of animals in the geological ages and the growth of the individual, as revealed by embryology. "The chick in the egg assumes in succession the aspect of a fish, a snake, a bird of low degree, and finally the similitude of its parent. Even man possesses, at an early period, the branchial apertures of the fish, and assumes in succession the aspect of a seal, a quadruped, a monkey, and a human being."[1] All this seems to prove — it is not easy to tell how — that the higher animals have passed through the lower forms before they have reached their present organization.

5. It was seen, from the very starting of the theory, that it must, in the end, be applied to the genesis of man. Many persons otherwise favorable shrunk from this extension. But in 1870, Darwin, in his "Descent of Man," boldly declared that man was descended from some lower form; and has shown that the brutes and man have many common qualities, not only in their bodily structure, but in their mental instincts and

[1] Winchell on "The Doctrine of Evolution," p. 29.

faculties, such as their social attachments, curiosity, memory: and he reaches the conclusion, — "There can consequently hardly be a doubt that man is an offshoot from the old-world Simian stem, and that under a genealogical point of view he must be classed with the Catarrhine division." (Part I. c. vi.) As man agrees with anthropomorphous apes, "not only in those characters which he possesses in common with the whole Catarrhine group, but in other peculiar characters, such as the absence of a tail and of callosities and in general appearance, we may infer that some ancient member of the anthropomorphous sub-group gave birth to man." Mr. Darwin can carry our genealogy still farther back: "Man is descended from a hairy quadruped furnished with a tail and pointed ears, probably arboreal in its habits, and an inhabitant of the old world," and would be classed amongst the Quadrumana.[1] "The Quadrumana and all the higher mammals are probably derived from an ancient marsupial animal, and this through a long line of diversified forms, either from some reptile-like or some amphibian-like creature, and this again from some fish-like animal. In the dim obscurity of the past, we can see that the early progenitor of all the vertebrata must have been an aquatic animal with the two sexes united in the same individual, and with

[1] The Quadrumana or monkeys are subdivided into the Platyrhina, with nostrils placed far apart and prehensile tails; and Catarrhina, with nostrils close together and non-prehensile tails. The former are confined to South America; the latter are found extensively in the old world. The highest section of the monkeys, the anthropomorphous apes, belong to the Catarrhine division.

the most important organs of the body (such as the brain and heart) imperfectly developed. This animal seems to have been more like the larvæ of our existing marine Ascidians than any other form known."[1] (Part II. c. xii.)

To illustrate these points, we have had an immense number and variety of cases collected by Mr. Darwin and other naturalists, and detailed in books, in journals, and the reports of scientific societies. It may be stated generally that there is no dispute as to the facts, which are admitted on all hands. The discussion turns round the theory advanced to account for them. I am now to state the considerations urged on the other side.

1. It is admitted that there are no facts — that there is not even a single fact — directly proving the doctrine. We have no experience of one species being transmuted into another. We do not see it taking place before our eyes. There is no trace of it in the historical ages. The vines found depicted in the tombs of Egypt, and the animals on the monuments, are of the same species as those now on the earth. History goes back three or four thousand years, but gives no record of a new species of plant or animal appearing. If thousands of years cannot create a new creature, it may be doubted if millions can. The geological ages do show us new species appearing ever and anon, but disclose no evidence of

[1] The Ascidians are a low order of the "shell fishes" or molluscs. They are like two-necked leather flasks, and are fixed on rocks. They somewhat resemble the Amphioxus or lowest fish.

their being derived from the species previously existing. Mr. Darwin has ingeniously constructed a long chain of descent from the ascidian to man, but he has not been able to catch one species changing into another at any one point.

2. Darwinism is at best an hypothesis. Hypotheses are introduced in science to explain facts. They are to be propounded under very stringent restrictions. They are to be admitted only when they explain the facts. There must be no facts inconsistent with them. When an hypothesis explains the facts generally, it may be admitted that there is some truth in it: but even then it may not be the whole truth; it may require to be supplemented by some other considerations, and to take a form which entirely changes its bearing, scientific and religious. Tried by such tests, Darwinism is seen to be encompassed with many difficulties, and cannot be regarded as established. It certainly does not account for the whole phenomena, and there are facts inconsistent with it. There may be truth in it, and yet it may require to be greatly modified.

3. It does not account for the whole of the facts. It can offer no explanation of the origin of the matter out of which animated beings are formed. In order to start, Mr. Darwin is obliged to postulate three or four germs, or at least one germ, created by God; the admission is candid, and shows that in the last resort we have to call in something higher than evolution; in short, we have to call in God. The younger advocates of the theory are not satisfied with this ad-

mission. Dr. Tyndall, in his Belfast address, opposes as strongly the creation of a few forms as of a multitude. Professor Bastian imagines that he has been able to produce animated life out of inanimate; but scientific men, including Professor Huxley, set no value on his experiments. All our higher naturalists allow that there is no evidence at this present time of there being now, or of there ever having been, spontaneous generation. Some are cherishing the idea that there may have been life in the original matter, and continuing dormant for millions of years, till it came forth in animals under favorable conditions. We see to what far-fetches these scientific men are obliged to resort, to support an hypothesis of which it may be said that, instead of explaining things, it needs farther hypotheses to bear it up. Not satisfied with all this, Mr. Herbert Spencer and Dr. Tyndall are obliged to fall back on an "inscrutable power" to account for the whole; for the origination, the continuance, and the subsistence of all phenomena. Theists feel that they have a much stronger as well as a more comfortable ground when they rest all things on God, and reverently inquire into his mode of procedure, and what place natural selection may have in it.

4. Mr. Darwin seems quite aware that evolution cannot explain every thing. He is obliged to call in not only original germs created by God, but in his later works pangenesis, to continue the life. Every living creature is supposed by him to possess innumerable minute atoms, named "gemmules," which are generated in every

part of the body, are constantly moving, and have the power of reproduction, and, in particular, are collected in the generative organs, coming thither from every part of the body. "These almost infinitely numerous and minute gemmules must be included in each bud, ovule, spermatozoön, and pollen grain." ("Animals and Plants under Domestication," vol. ii. 366.) It is not pretended that there is any proof of this ; it is an hypothesis brought in to support an hypothesis. A structure which needs such abutments is not so simple and sufficient as it seems to superficial observers to be.

5. It is admitted that there is a common plan running through the whole vegetable and the whole animal kingdom ; but it does not follow that it is produced by natural selection, by the struggle for existence, and by heredity. The unity and the beneficence of the plan show that it is the product of intelligence : plan, adaptation, and harmony seem to be indications of mind. The unity of nature is a proof of the operation of a divine arrangement. In fulfilment of his purpose, it is conceivable that God may act in one or other of two ways. Even as he created matter at first, he may, when the fit time comes, create plants and animals, or new species of plants and animals ; or he may carry on the whole by a secondary agency. Man may be able by a long process of laborious investigation, to find out what this agency is in whole, or more probably only in part. Part of it may be the struggle for existence and the law of heredity ; but it does not follow that

this is the whole: "No man can find out the work that God maketh, from the beginning to the end."

6. There are many breaks in the succession. Geology, and it alone — not history — shows us new species appearing, but discloses no ancestors from whom they could have been derived. But then it is said that, as the geological record is very imperfect, we may yet discover the intermediate links. To this all I have to reply is that, should these cast up, we must provide a place for them. But for the present we must suit our hypothesis to the facts; and the facts show wide gaps in the succession. Hæckel would derive higher plants from algæ or sea-weeds. "Nothing," says Dr. Dawson, "could more curiously contradict actual facts. Algæ were apparently in the Silurian neither more nor less elevated than in the modern seas, and those forms of vegetable life which may seem to bridge over the space between them and the land plants in the modern period are wanting in the older geological periods, while land plants seem to start at once into being in the guise of club mosses, a group by no means of low standing. Our oldest land plants thus represent one of the highest types of that cryptogamous series to which they belong, and, moreover, are better developed examples of that type than those now existing. We may say, if we please, that all the connecting links have been lost; but this is begging the whole question, since nothing but the existence of such links could render the hypothesis of derivation possible." The same eminent palæontologist assures us that "there are forms of life in the Silurian which

cannot be traced to the Cambrian, and which relate to new and even prospective conditions which the unaided powers of the animals of the earlier period could not have provided for." [1] Some eminent American geologists favor the theory that, instead of an unbroken series, there is once and again the sudden and abrupt introduction of new species, — they cannot tell how, — the rapid elevation of them till they reach their highest capacity, when they remain stationary for a long period, and in the end decay and disappear.

7. No argument drawn from changes produced by domestication can admit of a legitimate explanatory application to cases in which every thing must be done by unaided natural agency. By artificial means, man may produce changes which would never take place spontaneously; and then it may be urged, and cannot be contradicted, that domestication has never produced a new species, either of plant or animal. The supposed new species thus originated have, when carefully investigated, turned out to be new varieties.

8. All artificially produced varieties tend to return to their original state. The garden flower, when neglected, always tends to go back to the condition in which it was in the meadow or on the mountain. Domestic animals, cast out from human habitations and allowed to run wild, will, as they consort together, become like what they were before they were brought under human care.

[1] Dawson's "The Story of the Earth and Man," pp. 77, 79. It is proper to mention that, in the geological history of the earth, the Silurian rocks succeed the Cambrian.

9. Species can be made to cross; but then the offspring is not prolific, — at least, does not continue to be so. The crossing of the horse and ass gives us a very useful animal, the mule; but mules do not propagate their kind, and so cannot give us a new race.

10. These two last circumstances seem to show that there is such a thing as fixed orders, genera, and species both in the animal and vegetable kingdoms. It is acknowledged that there are fixed species — if we may adopt the term — in the mineral kingdom, such as the sixty-four elementary bodies. No one has been able to transmute metals into each other, say to transmute iron into gold. So, from whatever cause, there seem to be impassable divisions in the animal kingdom, as the grand division vertebrate and invertebrate, and the subdivision of the lower animals, the Protozoa, the Radiata (Cœlenterata), the Mollusca, and the Annulosa. These fixed types give us the unity amid the variety, the stability amidst the mutability, by which our world is characterized.

11. Astronomy does not allow sufficient time to geologists to generate all vegetable and animal life by means of natural law. Evolutionists require an enormous time to perform their work: they talk of millions and hundreds of millions of years. They need it, in order, by small gradations, to bring protoplasm up to the mammal, the ascidian up to man. But our earth formed out of the primary matter has been thrown off at a date which can be approximately determined; and this, according to Sir W. Thomson,

can amount to only a few millions of years, — a period not sufficient for the evolutionist theory. I do not set much value on this argument, for I do not believe we can calculate the earth's age with any thing like accuracy ; but the calculation of Sir W. Thomson has more solid data to go on than the speculations of evolutionists, and we may allow the one to counteract the other.

12. If there be difficulties in showing how one species of plant or animal can be derived from another, these are immeasurably increased when we would produce man from the brutes. Mr. Alfred Russel Wallace, who started the theory of natural selection contemporaneously with Darwin, draws back at this point. He urges a number of very powerful objections. (See *Wallace's Natural Selection.*) There is the size of the skull. "We have seen that the average cranial capacity of the lowest savages is probably not less than five-sixths of that of the highest civilized races, while the brain of the anthropoid apes scarcely amounts to one-third of that of man, in both cases taking the average. Or the proportions may be more clearly represented by the following figures : anthropoid apes, ten ; savages, twenty-six ; civilized man, thirty-two." He emphatically urges that savages have a brain capacity not required by their wants, and which could not have been produced by their wants in the struggles of life. Mr. Wallace cannot understand how man if derived from the brutes should ever have lost the hairy covering on his back so necessary to protect from cold and expo-

sures of various kinds, till his higher intelligence enabled him to do so otherwise. This starts the general difficulty: in respect of his power of sheltering or defending himself from physical evil, man is helpless compared with the highest of the lower animals; and how did it come that he was able to continue while his mental powers were growing? Mr. Darwin is obliged to admit that there is not now on the face of the earth, and that there has not been found in the geological ages, an animal from which man could have directly sprung.

But the physiological differences are not after all the decisive dividing lines between man and the lower animals. His grand distinction is to be found in his mental and moral qualitities. There are such qualities to be found in all men, and in no brutes. You may detect them in the germ or in the norm, in the human infant and in the savage. The teacher draws them out in the child, and they are capable of indefinite growth. The missionary tries to rouse them in the savage, and partially succeeds. No one attempts to do this with even the noblest of the brute creatures, such as the elephant, the horse, or the dog. Man can perceive the essential distinction between truth and error, between good and evil. He can form lofty abstract and general ideas; carry on long processes of reasoning, as in mathematics; construct far-reaching sciences, such as arithmetic, geometry, physics, astronomy, geology, psychology, and ethics. He can look back into the past and forward into the future, gathering wisdom from experience; he

can devise plans which are fitted to accomplish very distant ends; he can construct governments and set up political institutions. He dwells on lofty ideas of space and time and infinity. He believes in God, he worships God, and hopes for an immortality. In his bodily organization, he may be connected with the lower animals; but in his spiritual nature he is formed in the very image of God.

Looking to these facts and arguments, the candid and judicious mind will be apt to conclude: first, that extreme positions have been taken up, and rash assertions have been made by evolutionists; but, secondly, that there is development in nature which can explain a vast body of phenomena, while it cannot explain every thing.

And here I may remark, that I attach no value to the objections urged by those who demand that in order to believe in development we should perceive it with our eyes, that we should actually see one species coming out of another. The fact is, no law of nature falls, properly speaking, under the senses; we can discern by the eye, ear, smell, taste, and touch, only individual phenomena, and we have to *infer* that they proceed from a law which is found to combine and in a sense explain them. Copernicus and Galileo could not furnish ocular demonstration of the movement of the earth; nor could Newton of the law of universal gravitation. These men simply set before their contemporaries a theory which they showed, by well-established facts and careful calculations, could account for the visible facts in a rational

and satisfactory manner. Evolutionists will have established their hypothesis, when they can show that it meets the observed facts ; and this they are far from being able to do at this present time. Before universal evolution can be accepted as a scientific truth, it must be explained, limited, and made coincident with observation. And, even when this is done, there are moral and religious truths which must be placed along side of it before we have a full view of our world and of man.

It may be urged by those who oppose these new doctrines that we are to refer all these phenomena on which evolutionists so fondly dwell to the will of God. The reply should be, So ought every man to do, so every religious man will do. But then God usually acts through secondary agents, these being all the while his own agents. That lily is undoubtedly the work of God ; but it has been developed from a seed, and that seed from a parent plant. In the last century, when special attention began to be called to shells and bones in the soil and rocks of the earth, there were persons who thought it enough to say that these were created as they are by God when he made all things. But surely the earlier geologists might not be less devout, and were acting in a more reasonable way when they showed that these had once belonged to animals enjoying life, and speaking of the wisdom and benevolence of Him who made them. So we may in this later age, when it has been shown that these animals, while they bear affinities to existing animals, are yet not the same, may inquire

into the means by which both the older and later forms have been produced. Some are telling us that they believe in successive and progressive creations. But, if so, there is some law or rule or method in the creations ; and, suppose we have evidence that this method is development of one thing which God makes out of another thing which he has also made, our idea of the Divine wisdom would not thereby be diminished.

There is an idea that these late discoveries in science may overthrow religion, natural or revealed. Some are glorying in this as relieving them from all religious restraints. Some are under deep apprehensions that they may thereby be deprived of their fixed faith and their encouraging hopes. What, it may be asked, is the feeling which the truth-loving Christian should cherish ? What the attitude he should take ? Let him accept the truths of science, so far as they are established ; let him not be captivated by theories which go far beyond the facts, and which may require to be modified and corrected before they are conformed to the reality of things. Let him not in the mean time give up his faith in God's Word, which has such strong evidence in its favor, historical, moral, and experimental, and which has stood firm amid so many revolutions of science, which gives us a glimpse of the progressive work of creation three thousand years before geology was thought of, and uttered general predictions, as for instance regarding the scattering of the Jews, the rise of popery and its fall, — predictions which are being fulfilled before our

eyes. There may be times when there seems to be a contradiction between science and religion, more frequently when we cannot see the reconciling link, just as there are times when we cannot see the consistency between two parts of a good man's conduct, or between the statements of two witnesses, both truthful. In these latter cases, we wait for further light; let us do the same when at any time there is a seeming incongruity between Genesis and geology, between God's word and God's works.

PAPER II.

IS THE DEVELOPMENT HYPOTHESIS SUFFICIENT?[1]

THIS Paper has been occasioned by the lectures of a distinguished Englishman who has visited this country; but I am to keep very much to my general subject, and not enter upon a minute criticism of Professor Huxley. In these lectures, he has abstained from entering on those exciting topics bearing on materialism and religion, which he has discussed so freely in Edinburgh and in Belfast, and in his published writings. So far the hopes of unbelievers in Scripture, and the fears of timid Christians, and the rising rage of polemic theologians, have been disappointed. But an interest has been excited in the subject of development. In the present state of the public mind, good may arise from showing that when the doctrine of development is properly explained and understood, and kept within its legitimate sphere, there is nothing in it inconsistent with natural or revealed religion; and that the scientific truths which Professor Huxley has expounded in these lectures do

[1] This Paper was written at the request of the editor of the "World" of New York, and appeared first in that paper and then in the "Popular Science Monthly."

not entitle him to draw the consequences which he has done in his "Lay Sermons" and other writings.

In his first lecture the professor had light work and an easy victory. He set up two targets and shot them down. He stated and overwhelmed two hypotheses: the first, that nature has been all along very much in the state in which it now is; and the second, the poetical account given by Milton in "Paradise Lost." It did not need an Englishman to come 3000 miles, it did not require a man of Professor Huxley's knowledge and dialectic skill, to demolish these fancies. I cannot remember a single man eminent in science, philosophy, or theology, defending either of these views during the last half-century. The first hypothesis was never held by religious men, though it has been defended by a few scientific men — who might have been kept from error by looking to Scripture — such as Hutton, Playfair, and Lyell in his earlier writings. The book of Genesis speaks of an order and a progression in the origination of things, and of a flood covering the then peopled earth. I should not expect any one but a Don Quixote to attack Milton's exposition of a popular belief. The view given in "Paradise Lost" was not the one entertained by several of the most eminent of the Christian fathers, such as Origen, and has not been entertained by any theologian of ability and scholarship for the last age or two. It must now be forty or fifty years since Chalmers and Pye Smith and certain well-known divines of the Church of England, and President Hitchcock of Amherst, adopted the discoveries of

geology and sought to reconcile them with Scripture. It is an instructive circumstance that, while Milton's account cannot stand a moment's investigation, the record in Genesis is believed by many of our highest men of science to be perfectly consistent with the latest science. I name only Professor Dana, Professor Guyot, and Principal Dawson, the highest authorities on this continent, and superior to Professor Huxley, not certainly in zoölogy, but in geology. I am quite ready to give up these two hypotheses to Professor Huxley, to hew and hack them (to use one of his own phrases) like Agag.

The second lecture is written in his best manner. There is scarcely any thing in it that I am inclined to object to. He is no longer killing hypotheses which died a natural death long ago. He is arranging his materials for the defence of the theory of Evolution. He has as yet only brought forward the cases which he acknowledges are not demonstrative of the truth of evolution, but are such as must exist if evolution be true, and which, therefore, are upon the whole strongly in favor of the doctrine of development. He makes a number of admissions. He allows that there are species which have continued unchanged, not only throughout all historical years, but all geological ages. Cuvier has shown that the ibises, dogs, and cats depicted 3000 years ago or more on the monuments of Egypt are the same as those found in that country in the present day. The professor tells us that, in examining the rocks even of the cretaceous epoch, we find the remains of some animals, such as

one of the lamp shells, the terebratula, the globigerina, which the closest scrutiny cannot show to be in any respect different from those which live at this present time. He thence argues that there is no intrinsic necessity in animal forms to change and to advance, as some sciolists assume. But he labors to prove that there are cases in which varieties have become species by reason of being suited to their surroundings. He gives credit to Mr. Darwin for bringing in two great factors in the process of evolution: "One of them is a tendency to vary, the existence of which may be proved by observation in all living forms; and the other is the influence of surroundiug conditions upon what I may call the parent form, and the variations which are thus evolved." He adds: "The production of variations is a matter *not at all properly understood at present.* Whether it depends on some secret machinery — if I may use the phrase — of the animal form itself, or whether it arose from the influence of conditions upon that form, is not certainly a matter for our present purpose." True, this may not be for the purpose of his lecture; but it must be cleared up before we can clear up the subject of development. The nature and laws of variations and the peculiar laws of heredity are at present shrouded in mystery. When we know more of them and of the forces at work, we shall be in a better position to determine whether varieties ever do become distinct species.

The professor acknowledges that geology does not furnish decisive evidence of one form of life passing

into another. But then he claims that the geological record is not complete ; that much of what is written in stone has been effaced ; and that if it were complete it would show us the missing links. To equal him in candor, I admit that transitional forms are ever casting up. My friend Hugh Miller, pointing to the specimens in his museum, admitted this so long ago as 1856 at the last interview I had with him a few months before his death. Prof. Huxley shows that in certain fields we have those transitions fully disclosed. He dwells on the resemblances and the affinities between reptiles and birds, and refers to animals which have some of the properties of both. Thus there are birds that have teeth, and reptiles that have wings and can stand on their two hind legs. True, there are naturalists who maintain that the teethed bird is still a bird, and the archeoptrix a reptile, a variety, and not a transitional form. Still, such cases indicate a tendency on the part of the reptile to rise to the bird, and of the bird to retain properties of the reptile ; and natural selection and development alone can explain this.

In his third lecture, he brings forward what he regards as a demonstration. In the case of *Equus*, embracing our horse, ass, and zebra, he is able, by means of the specimens gathered in the West by Professor Marsh, to discover the succession of horse-like forms which the hypothesis of evolution supplies. He goes back from the living horse through the like animals of the post-Tertiary in the Pliocene, middle, and earlier, on to the older Eocene formation, where he

finds the orohippus. "There you have four toes on the front-limb complete, three toes on the hind-limb, a complete and well-developed ulna, getting forward to an equality of size with the radius, a complete and well-developed fibula apparently, though it is not quite certain, and then teeth with their simple fangs. So that you are now able, thanks to these researches to show that, so far as our present knowledge extends, the history of the horse-type is exactly and precisely that which could have been predicted from a knowledge of the principles of evolution; and the knowledge we now possess justifies us completely in the anticipation that, when the still older Eocene deposits, and those which belong to the Cretaceous epoch, have yielded up their remains of equine animals, we shall find first an equine creature with four toes in front and a rudiment of the thumb, then probably a rudiment of the fifth behind, and so by gradual steps, until we come to that five-toed animal in which most assuredly the whole series took its origin. That is what I mean, ladies and gentlemen, by demonstrative evidence of evolution."

Suppose that we admit all that the lecturer claims on this subject: what then? Have we thereby set aside any doctrine of philosophy or religion? The Christian, even the Christian theologian, may say wisely: "Let naturalists dispute as they may about the derivation of plants and of the lower animals; their hypotheses, arguments, and conclusions do not interfere with our belief that God is to be seen everywhere in his works, and rules over all." It appears to

me that the whole doctrine of vegetable and animal species needs to be reviewed and readjusted, and religion need not fear the result. I have been convinced of this ever since I learned, when I was ardently studying botany, that the number of species of plants had risen to two millions! I was sure that all these are works of God; but I was not sure that each was a special creation.

When a new truth is discovered, especially when it is a reaction against an old theory, it is apt to bulk so largely in the view of those who hold it, that they carry it to extreme lengths, and it requires time and discussion to confine it to its own place. Thus, in old time, Thales, perceiving how much water could do, and Anaximenes how much air could accomplish, and Pythagoras how much numbers and forms could account for, hastened to the conclusion that the whole operations of nature could be derived from them and explained by them. I am old enough to remember that the brilliant discoveries of Sir Humphrey Davy led wandering lecturers, and all sorts of sciolists, to affirm that they could explain all things, matter and mind itself, by electricity. So, in these days, development, having furnished a key to open so many of the secrets of nature, has led some to imagine that it can solve all the mysteries of the universe. Some of us may be inclined to admit, and to use for scientific purposes, the doctrine of development, and yet be prepared to deny that it can explain every thing. The fact is, it overlooks a great many more things than it notices. There are signs of a reaction among scien-

tific men against its extreme positions; and it is the work of the age now present to show how much development can do, and how much it cannot do.

In the common apprehension of those who hold the development hypothesis, all that is necessary to account for the world in its present state is to suppose that, millions of years ago, there appeared — no one can tell how — a nebulous mass, with an inconceivably high temperature, but losing its heat, and ready to condense; that in the long lapse of time it took the shape of planets, satellites, and sun; and that on one of these planets — that on which we dwell — it formed into plants, animals, and, finally, man; all by its own power, according to natural law, or, rather, the necessity of things; without it being necessary to call in a God or a guiding providence, or to suppose that there has been a plan in a designing mind. All the defenders of the theory do not state this in express words, but it is the impression left by their expositions; though some of them, such as Herbert Spencer and Tyndall, would save themselves from the blank consequences by calling in an unknown and unknowable power beyond the visible phenomena, or by appealing to some religious feelings supposed to be deep in our nature, but which the theory would soon undermine, as being, in fact, unjustifiable and unreasonable. This is the view that I mean to meet. In examining this hypothesis, there are some things which I am willing to admit as being established truths:

1. I hold the doctrine of the Conservation of

Force; that is, that the sum of energy, real and potential, in the universe is always one and the same, and cannot be increased or diminished by human or mundane action. I was prepared for this doctrine when it was announced by Mayer, of Heilbronn, and by Joule, of Manchester, and expounded by Grove, of London. It seemed to me to follow from the doctrine which I had laid down in my first work — "The Method of Divine Government," published twenty-six years ago — as to the material universe being composed of substances with properties or powers of which it cannot be deprived, and which cannot be added to nor lessened. It is this that secures the permanence of nature, keeping it unchanged in its power or powers amid all changes of action. This energy, disappearing in one form, appears necessarily in another, and gives us what Spencer calls the "persistence of force." This ever-enduring force gives rise to development. Going out from one body, it is manifested in another. The fact is, all causation, all physical action, is evolution. The substances and powers in the agents acting as the cause are found, though in a modified form, in the effects. Proceeding on this very principle, Mayer says: "Forces are causes; accordingly, we may in relation to them make full application of the principle *causa equat effectum*;" and he thus elaborated the grand scientific truth, the most important discovered in our day, that the sum of energy in the universe is always the same.

2. I admit that this power becomes more and more Differentiated; that is, takes more and more diverse

forms, and thus imparts an ever-increasing multiplicity and variety to the universe, and will continue to do so till the diversity breaks it up, and "the heavens shall pass away with a great noise, and the elements shall melt with fervent heat, the earth also, and the works that are therein, shall be burned up." Mr. John S. Mill has been successful in showing that there is usually more than one antecedent or agent in a cause. "A man takes mercury, goes out-of-doors, and catches cold. We say, perhaps, that the cause of his taking cold was exposure to the air. It is clear, however, that his having taken mercury may have been a necessary condition of his catching cold; and, though it might consist with usage to say that the cause of his attack was exposure to the air, to be accurate we ought to say that the cause was exposure to the air while under the effect of mercury." He concludes, "The real cause is the whole of these antecedents." Now, I hold that in physical nature causes are not only usually, but invariably, of this dual or plural nature. I go a step farther, and have shown, I think, that the effects are also of the same dual or plural character. The effect, in fact, consists of the same agents or substances as the cause, but now in a new state. A picture falls from a wall and breaks a table; we say that the breaking of the table was the effect of the fall of the picture. But the true effect embraces both the picture and the table, the picture having lost its momentum, and the table being broken. It follows from all this that the new combination of agents, acting as the causes, must

produce more and more varied effects, as the effects joining with other effects become causes, and ramify into branches and branchlets. The sum of the powers is one and the same, but they appear in an ever-increasing number and diversity of forms. The conservation of force thus gives a unity to nature, while the mutual action and interaction give it its multiplicity. I remember how deeply I was interested in that paper (I read it when it appeared) of Von Baer, in which he shows that in the germs of animals, as in the history of the production of animated nature through long ages, there are first greater unity and simplicity, and then specific varieties more and more divergent.

3. I have never set myself, as too many religious men unwisely did, against the theory, first started, it would appear, by Kant, then elaborated by Sir William Herschel and Laplace, and perfected, I believe, by a professor in Princeton College, that the mundane system may have been formed out of original matter, evolved according to the mechanical laws with which it is endowed, — first the outer planets, then the inner, and finally the sun condensed into the centre. This never appeared to me to be an irreligious doctrine, though Laplace was unhappily a man without religion.

4. Once more: I have ever stood up for a doctrine of Development. There is a development of one form of matter from another; of one force from another. There is, as every one allows, a development of the plant and animal from the parent. I see noth-

ing irreligious in holding that the bird may have been evolved by numerous transitions from the reptile, and the living horse from the old horse of the Eocene formation. An accumulation of powers, new conditions and surroundings, may, it is acknowledged, produce a variety which may become hereditary. Let us suppose that they can also, in rare cases of combination, produce species: religion is not thereby undermined, either in its evidences or in its essential doctrines.

The question now arises and presses itself upon us: Can we by these acknowledged agencies explain the whole of the present state of the universe, with all its fitnesses, its harmonies, its beauty, its utility, its beneficence? The development theory, in the narrow and exclusive form which it commonly takes, overlooks vastly more than it notices. In particular, there are four grand truths kept out of sight. Without these, we cannot understand the Cosmos. When these are introduced, they bring God into his own universe, and fill it with life and love.

1. *God is present in all his Works, and acts in all their Actings.* This is the religious doctrine. "By him all things consist." Paul, addressing the men of Athens, said: "For in him we live, and move, and have our being; as certain also of your own poets have said, For we are also his offspring." This doctrine may be so stated as to make it pantheistic. It is the one grand truth contained in pantheism, giving it all its plausibility, and making it superior to that bald theism which makes God create the world at

first, and then stand by and see it go. The doctrine can be so stated as to free it from all such tendencies on the one side or the other, so as to make God distinct from all his works, and yet acting in them. This is, I believe, the philosophical doctrine. It has been held by the greatest thinkers which our world has produced, such as Descartes, Leibnitz, Berkeley, Herschel, Faraday, and multitudes of others. It seems to be required by that deep law of causation which not only prompts us to seek for a cause for every thing, but an adequate cause, to be found only in an intelligent mind. Our greatest American thinker, Jonathan Edwards (whom I can claim as my predecessor), maintains that, as an image in a mirror is kept up by a constant succession of rays of light, so nature is sustained by a constant forth-putting of the divine power. In this view, nature is a perpetual creation. God is to be seen not only in creation at first, but in the continuance of all things. "They continue to this day according to thine ordinances." He is to be acknowledged not only in the origination of matter, but in its developments; not only in the reptile and the bird, but it may be in the steps by which the one has been derived from the other; not only in the orohippus, but in the stages by which that animal has risen into the horse so useful to man.

2. *New Powers appearing in Nature.* — Let us suppose that there was an original matter. I regard it as most in accordance with the principles of our reason to ascribe that matter to God. What properties had that matter at first? Every man of ordi-

nary wisdom and modesty will be ready to answer, "I know not." If he does not know, he is not entitled to say that all things have proceeded from it. I suppose it will be allowed that it possessed gravitation. "This law of the inverse square," says a writer in the last number of the "Quarterly Review" (London), "is but the mathematical expression of a property which has been imposed on matter from the creation. It is no inherent quality, so far as we know. It is quite conceivable that the central law might have been different from what it is. There is no reason why the mathematical law should be what it is, except the will of the Being who imposed the law. Any other proportion would equally well be expressed mathematically and its results calculated. As an instance of what would occur if any other proportion than the inverse square were substituted as the attractive force of gravity, suppose at distances 1, 2, 3, the attractive force had varied as 1, 2, 3, instead of the squares of those numbers. Under such a law any number of planets might revolve in the most regular and orderly manner. But under this law the weight of bodies at the earth's surface would cease to exist; nothing would fall or weigh downward. The greater action of the distant sun and planets would exactly neutralize the attractive force of the earth. A ball thrown from the hand, however gently, would immediately become a satellite of the earth, and would for the future accompany its course, revolving about it for the space of one year. All terrestrial things would float about with no principle of coherence or stability; they

would obey the general law of the system, but would acknowledge no particular relation to the earth. It is obvious that such a change would be subversive of the entire structure and economy of the world."

Much the same might be said of the chemical, the electric, and magnetic properties of matter. If they were among the original powers, there is proof of design in their adaptation to one another and to the matter of the universe. If they were not, then we have traces of a new power being introduced ; and for this we must look for a cause. We are not able to say how many the properties possessed by the original matter ; whether they were few or many. But in either case there is evidence of contrivance in their harmonious action and results. We see that there is an end proposed in the music that comes from the violin, and this whether it is brought forth from one string, as was done by Paganini, or from four strings, as is done by the ordinary performer. So in the orderly and beneficent action of nature there is proof of adaptation, whether we suppose the original properties to be few or to be numerous.

Though preservation is in a sense a continued creation, yet preservation differs from creation. In looking back on the history of the world, it is often difficult to tell as to a certain work to which of these two kinds of divine acts it belongs. We may not be sure, for example, as to a new form of plant or animal, whether it is a creation or simply a development according to law ; and I am not sure that religion gains by our taking one side or another. We cannot, we

have seen, determine for certain what were the powers of nature that were working from the very beginning. But it is clear and sure that powers have appeared in nature from time to time which did not operate at first nor for long ages; nay, if geology speaks truly, nor for millions of years. There may be two suppositions in regard to these powers. The one is that they were all along in the original matter; that the star-dust had in it potentially not only gravitation and chemical affinity, but life, sensation, consciousness, intelligence, moral discernment, love. It is hard to believe that there was all this in that dull, heated, nebulous matter from which our world sprang. It is acknowledged that this mass must have existed for a long time — for hundreds of thousands, probably for millions of years — before life, and for a far longer time before intelligence, appeared. Whence did these new powers come? If they were in the original matter, how did it come that they were so long dormant, how that they at last appeared, it might be shown, at the appropriate time when surroundings were prepared for them? Science can say nothing on this subject, and may never be able to say any thing. It is passing altogether beyond its province, passing from inductive proof into speculation, when it pretends to know any thing one way or other. Philosophy feels itself staggered when it would solve the problem. It does say, indeed, that this new operation must have had a cause. It is one of the certain laws of intelligence, one of the universal laws of experience, that every thing that begins to be must have a cause.

This law of causation takes several forms; but every form will insist that these new operations must have come from a causal power. "Ex nihilo nihil fit" is a maxim going back farther than I am able to tell. The form given it by the great atheistic poet Lucretius is:—

"... Nihil posse creari.
De nihilo, neque quod, genitu est ad nihil revocari."

Persius puts it:—

"... Gigni
De nihilo nihil, in nihilum nil posse reverti."

Take either of these forms, or any form, and it insists that we seek a cause of the new kind of operation. It cannot discover that there was any thing in that heated, vaporous matter to produce life and sensation, when they appeared millions of years after the world had begun to be formed. I will not decide dogmatically whether the causal action was natural or supernatural. Perhaps we are here come to a place where the distinction between natural and supernatural is lost in the dim distance. The cause may have acted according to a law. But in that case I must hold it to be a divine law. Even in the supposition that it has been brought about by a conjuncture of circumstances, unknown for the indefinite period before, it must have been a providential juncture foreseen, nay, ordained by God.

Life appears ten thousand ages or more after the earth began to form. Whence this life? Professor Huxley seems to find it in some protoplasm or gelatinous substance. Was this one of the original ele-

ments of the nebulous matter? If so, how did it come through that terribly heated temperature? If it did not exist till after the temperature had cooled, how did it come in? Professor Huxley has been the most determined opponent in our day of the spontaneous generation of life, and is thereby left without a means of generating the life of plants and animals. Darwin feels himself obliged, in order to account for the phenomenon, to suppose that there were three or four germs created by God. Tyndall thinks that Darwin has at this point fallen into a weakness. But, meanwhile, Tyndall has no means whatever of accounting for the appearance of life. Mr. Darwin further calls in a *pangenesis* — which is just another name for the *vital force* of the older naturalists — in order to account for the generation of new animals. But he does not tell us, and evidently cannot tell us, whence this pangenesis, which cannot come from development, of which it is the source, and not the product. Herbert Spencer prefers to bring in *physiological units*.

Whence comes sensation? There was a moment when sensation pleasurable or painful was felt for the first time in the universe. Was this at the beginning? If so, one wonders how the sentient substance came through the heat, where, so far as we can judge, it must have been suffering intolerable anguish without the power of relieving itself by self-destruction.

Had this protoplasm self-consciousness? I rather think that neither Professor Huxley nor Professor

Tyndall would say that it had. The language of Tyndall must needs be quoted once and again till he brings his system into accordance with it: "The passage from the physics of the brain to the corresponding facts of consciousness is unthinkable." Mr. Fiske, the expounder of Spencerism in America, says (*Atlantic Monthly*, March, 1876): "Modern discovery, so far from bridging over the chasm between mind and matter, tends rather to exhibit the distinction between them as absolute." He asks, "Does the motion of nerve molecules produce a thought or state of consciousness?" He answers, "By no means. It simply produces some other motion of nerve molecules, and this in turn produces motion or contraction or expansion in some muscle, or becomes transformed into the chemical energy of some secreting gland. At no point in the whole circuit does a unit of motion disappear as motion, to reappear as a unit of consciousness." Animals from the very first have sensations, and also, at least the higher ones, ideas and very curious instincts, by which they make provision for coming evils of which they have no conception. Finally, in the last of the unnumbered ages we have man with his intelligence, his conscience and free-will, all attested by consciousness. Will evolutionists pretend that on any rational or inductive principle they can tell how these new powers came into being and into action? When the book of Genesis tells us how these agencies did come in, and in particular how man appeared, science has and can have no facts to lead us to discredit it.

3. *There is Final Cause in Nature.* — Laplace, a great mathematician, but not a great philosopher, imagined that, when we have discovered an efficient, it is not necessary to seek for a final, cause. Aristotle, with a much more enlarged conception of the nature of the universe, maintained that we are to seek for both these causes, — and for two others besides, the material and the formal. The fact is that final cause presupposes efficient causes ; and the efficient causes effect, by their co-operation, the final cause. We argue final cause, that is, design, from the collocation of efficient causes to promote an evident end, say the ear to hear and the eye to see. The doctrine of development does not undermine or in any way interfere with the argument from design. This was asserted by Hugh Miller when the "Vestiges of Creation" was published, is allowed by Professor Huxley, and has been gracefully illustrated and defended by Professor Asa Gray in his pleasant book, "Darwiniana." When we argue that a watch has had a maker, we do not suppose it necessary that the watch should have been made by an immediate fiat of the mechanic. We so infer, because we discover agents combined to produce a particular effect ; and the combination of these may have taken days or weeks of patient labor. So, the fact that the present adaptations and forms of the plant and animal may have been produced by a great number of antecedents, acting through ages, does not show that there is no design, but rather proves that there has been a bountiful end contemplated all along, and effected by a long

process. Professor Huxley, in the opening of his last lecture, has expressed his admiration — an admiration with which I thoroughly sympathize — of the structure of the horse: "The horse is in many ways a most remarkable animal, inasmuch as it presents us with an example of one of the most perfect pieces of machinery in the animal kingdom. In fact, among mammalia, it cannot be said that there is any locomotive so perfectly adapted to its purpose, doing so much work with so small a quantity of fuel, as this animal, the horse." He speaks of the beauty of the animal arising "from the perfect balance of his parts and the rhythm and perfection of their action. Its locomotive apparatus is, as you are aware, resident in its slender fore and hind legs, which are flexible and elastic levers, capable of being moved by very heavy muscles. And, in order to supply the engines that work these levers — the muscles — with the force they expend, the horse is provided with a very perfect feeding apparatus and very perfect digestive apparatus." In all these things being *provided*, — the phrase used by Huxley, though he has no right to use it, — there is evidence of purpose; and this is not diminished, but rather increased, by the fact that the animal has been thus perfected by a long descent from an ancient progenitor. The argument of Paley, and of the Bridgewater Treatises, derived from the bones and muscles of animals, and from the adjustments in every part of nature, is as valid and convincing as ever. I discover adaptation and contrivance, not only in the products but in the

very process of development. Viewed in this light, development may, in the hands of a new Paley, furnish further and very striking cases of design. For, in order to the success of the process, there is often need of co-ordinated structure, that is, of a structure in which a number of parts are adapted to each other. My friend Mr. Joseph J. Murphy has supplied us with an instance in the case of the two nervous connections of the iris of the eye: "One of its nerves has its root in the brain, and contracts the pupil under the stimulus of light; the other has its root in the sympathetic ganglia, and opens the pupil again when the intensity of light is diminished. It is obviously impossible that the efficiency of either of these two nerves could be increased separately; they will not be improved at all unless they are improved together; and this, on Darwin's principles, can only be done by means of accidental favorable circumstances occurring in both at once. But such coincidences are so improbable that they may be left out of account as if they were impossible." I do not agree with Mr. Murphy in thinking that such an instance tells against Darwin: but I think the coincidence shows a preordained arrangement; and such coincidences are found in nearly every case of development, thus showing the need of co-operation and contrivance in the very developing process. It is to be observed that evolution, vegetable and animal, and natural selection, are not simple properties of matter like gravitation and chemical affinity. They imply the concurrence of an immense number

of agents, mechanical, chemical, electric, galvanic; and Darwin adds pangenesis, and Spencer physiological units. In the concurrence and co-operation of all these to develop the plant and animal, I see proof of purpose; and, in the culmination of the whole in the perfect forms of the higher animated beings, I discover a guiding intelligence which designed the end from the beginning.

4. *There are Typical Forms in Nature.*— It is now twenty years since, in conjunction with Dr. Dickie, I wrote "Typical Forms and Special Ends in Creation," in which I showed that there was not only final cause, but a formal cause, a designed general order in nature. When I composed that work, I was filled with admiration of the discoveries made by Goethe and Oken, by Owen and Agassiz, as to the beautiful "forms" in nature. Some may think that the more recent doctrine of development has made that treatise, or rather the whole doctrine on which it proceeds, obsolete. I admit that these late discoveries might require me in some places to change my mode of expression; and the time has scarcely arrived for rewriting that book, and will not arrive till Darwin's doctrine and Owen's doctrine are more thoroughly adjusted. But, meanwhile, the argument is as valid as it ever was, and proves that there are designed order and beauty in nature; the design being not less evident because the order and beauty have been brought about by a process of development. This has been shown fully and satisfactorily by St. George Mivart, in a recent article (Nov. 1875) in the *Contemporary Review*,

entitled "Likenesses or Philosophical Anatomy," in which he writes in the same way as I did of homologies, and shows that many of these cannot be explained by development or by a descent from a common parentage. He shows that "there are likenesses between different animals and different parts of the same animal which a theory of common descent cannot explain." "A very obvious example of likeness, not explicable by descent, is the familiar one between our right hand and our left. This likeness is part of that general correspondence which exists between the right and left sides of most animals, and which is spoken of as 'bilateral symmetry,' or *lateral homology*. Another example is that likeness which sometimes exists between parts placed one above another, as between the upper and lower parts of the tail-fin of most fishes. Such likeness is an example of 'vertical symmetry,' or *vertical homology*. Another kind of likeness or homology is termed 'serial.' It is chiefly in our limbs that this kind of homology is manifested externally in us, but it is plainly enough to be seen in the human skeleton (or in that of any backboned animal), in the ribs, or in that series of generally similar bones, vertebræ, which make our vertical column or backbone. Our limbs, however, do present, even externally, a certain degree of similarity, — the thigh, leg, and foot of the lower limb evidently more or less repeating the upper-arm, arm, and hand of the upper limb." He traces like order in the lower creatures: "What can be more wonderful than the symmetry of those lowly but beautiful organisms the *Acanthometræ*, — a sym-

metry for which it is difficult to conceive any external cause. Hardly, if at all, less wonderful is the radial symmetry of the Echinoderms (the sea-stars, sea-eggs, and sea-urchins), with their multitudinous variety of component parts."

So I feel myself at liberty to dwell, as I used to do so fondly, on the correspondences among the parts of plants. We may still notice with admiration how the leaf, sepals, pistils, and stamens are all after the one type, variously modified. We may observe and measure the correspondence of the venation of the leaf, and the tree on which it grows; of the tree, as a whole, and its separate branches. It is interesting to discover that the tree which has an unbranched stalk for some distance above the ground, has a leaf with a bare leaf-stalk of the like relative length; and that trees branched from the root have no petiole or bared leaf-stalk.

All these are cases of correspondence not explicable by "descent." It seems that Professor Ray Lankester has introduced terms to distinguish between uninherited resemblance and resembling parts on the one hand, and inherited resemblance and resembling parts on the other: the former he designates "homoplasy" and "homoplast," and the latter "homogeny" and "homogens." Now I am inclined to go a step beyond Mr. Mivart, and to argue that there is design in homologies which may have been produced by descent, as where we see the pectoral limb of the horse, the whale, the bird, the fish; whether fore-leg, paddle, or wing, or fin,—formed on one type, though turned to

very different uses. All that Owen and Agassiz have said about the anticipations and prophecies in nature may be acknowledged as true, even by those who hold that they have been produced by development. Professor Huxley has been called the "Owen-crusher;" but he has not been able, and I believe never will be able, to crush the doctrine which Owen established about the homologies of the animal frame. Agassiz's pupils have abandoned him in the opposition which he offered to the development theory; but some of them may yet see that there was profound truth in what he said about the predictions in nature. I do believe that these old horse-like forms were preparations for the noble and useful horse now living, and this whether the process has been one of creation or development. The efficient cause may have been development, but the formal cause (to use Aristotle's phrase) is the perfected animal; and Bacon is right when he places the formal cause at the apex, and represents it as carrying us nearest to God. I am sure that the herb yields seed, and the fruit-tree yields fruit, and every living creature its young "after his kind."

Mr. Mivart seems to attribute the correspondences not produced by descent to "an internal force," "a single form or force." I am inclined to refer them to a disposition designed of forces to produce a contemplated end, operating everywhere, and co-operating. These combined agencies effect like results among very different objects. We see branchings in the old club-mosses and the sea-weeds, in anticipation of

the more perfect ramification in the tree. We notice flowers radiating like the shell-fish which come at a later date. Insects have wings, prophetical of the better wings of birds. In the reptilian ages, we have monsters standing upright, and foretelling the erect form of man. There are thus in nature not only material causes, but final; not only efficient, but formal. We cannot allow this evolution doctrine to shear nature of its grandeurs; nor, we may add, morality of its binding obligations, or the universe of its God. Mr. Mivart concludes: "The teaching of what we believe to be true philosophy is, that the types shadowed forth to our intellects by material existences are copies of divine originals, and correspond to prototypal ideas in God."

PAPER III.

GEOLOGY AND SCRIPTURE.

THE views presented in the Second Paper seem to me to bring nature and revelation, geology and Genesis, into harmony.

The Book of God begins at the beginning, with Genesis, the generation of all things. Science does not seem to tell us of a beginning. The Bible opens, "In the beginning God created the heavens and the earth." The account that follows is not to be regarded as a scientific one, in the nomenclature of biology and geology, — sciences which did not exist till within the last century or two, and the scientific distinctions of which could not have been understood by those who lived in Moses' day, nor by the great body of the Bible readers in our day. It may be looked on as an ocular description, such as might have been given by an intelligent observer as he witnessed the unfolding scenes. It declares that there was an order and a progression in the generation, and it expresses the epochs by the word "day." When that word is first used, it could not apply to a day regulated by the sun; for the sun had not appeared. In the very first unequivocal use of the phrase (Gen. ii. 4), it is used to denote an epoch, "These are the generations of the heavens and of the earth, *in the day* that

the Lord made the earth and the heavens," where there may be some significance in the circumstance that the earth is mentioned before the heavens. In some Books of Scripture the word is used almost as frequently to denote a period or an era as a day of twenty-four hours. Thus: Ps. xxxvii. 13, "for he seeth that his day is coming;" 2 Pet. iii. 12, "hastening to the coming of the day of God;" Rev. ix. 15, "which were prepared for an hour and a day." Creation which begins at the beginning goes on by days and epochs.

First Day. The earth is "without form," without the order which it subsequently assumed; and "void," that is, without inhabitant. Is not this the nebulous period of Laplace, and the azoic period of geologists? But the wind of God moves on the mass, light appears, the forming work has begun, and there is an alternation of light and darkness.

Second Day. There is now a separation of the lighter matter from the grosser, of the aerial and watery expanse from the earth proper; just what we might expect from natural law.

Third Day. There is a separation of the sea from the land. Life appears, and we have grass and trees. The earliest fossil known to us is an animal, the Eozoön Canadense. But it is acknowledged that animals presuppose vegetables; and Dr. Dawson finds traces of vegetable matter in the Laurentian rocks to which the Eozoön belongs.

Fourth Day. Hitherto, the sun and moon have not been seen as formed bodies. On the fourth day, our

observer notices them, and they become dividers of time and regulators of seasons. All this is in accordance with science, which tells us that the earth is older than the sun, and that there must have been light before the sun was condensed into its present form.

Fifth Day. Let us look here at the literal translation supplied, apart from any geological theory by a Hebrew scholar, Dr. Murphy, in his "Commentary on Genesis," chap. i. 20. "Then said God, Let the waters abound with the crawler that has breath and life, and let fowl fly above the earth upon the face of the expanse of the skies. Then God created the great fishes and every living breathing thing that creepeth, with which the waters abounded after their kind, and every bird of wing after its kind; then saw God that it was good. Then blessed them God, saying, Be fruitful and multiply, and fill the waters in the seas, and let the fowl multiply in the land. Then was evening, then was morning, day fifth." God here calls forth creatures that have breath, soul, — the psyche of Aristotle. He calls forth swarming crawling creatures in the waters, creatures with wings to fly above the earth. As this decree is executed, there come forth, as Dr. Murphy explains, "*long creatures*, a comprehensive genus, including vast fishes, serpents, dragons, crocodiles," the root of the word being *stretch.* There appear, also, "the breathing thing that creepeth," and creatures with wings.

Sixth Day. "Then said God, Let the land bring forth living breathing thing after its kind, cattle, and creeper, and beast of the land after its kind. Then

made God the beast of the land after its kind, and the cattle after their kind, and every creeper of the soil after its kind." Here three orders of animals are mentioned, — cattle for man's use, small animals (mammals), and beasts of the field.

Professor Huxley subjects the Bible account in the form of the Miltonic version to a captious criticism. According to Genesis, land animals appear on the sixth day, but in the coal-fields, which should be referred to the fifth day, there "are numerous insects allied to our cockroaches, and scorpions of large size." But I should think that the language employed regarding the productions of the fifth day, the "crawlers" and "long creatures," would cover these animals, all of which, like the other animated beings of that geological epoch, have strong affinities with water. In looking at the collections relating to the carboniferous formation, the most prominent figures are Dendrerpeton, the batrachian, and other amphibious creatures. I believe the account in Genesis to be a general description of the characteristics of the epoch ; and it would not be discredited, though some terrestrial animals were found in the coal-measures. It is acknowledged on all hands that no mammal comes so early.

He specially objects to birds appearing on the fifth day ; for, being terrestrial animals, they should have been deferred to the sixth day. "As a matter of fact, we know not the slightest evidence of the existence of birds before the jurassic and perhaps the triassic period." But let us carefully note the language employed by the inspired writer, it is "every fowl of

wing." My friend, Professor Hawkins, calls my attention to Lev. xi. 4, where like language is used, "All fowls that creep, going on all four, shall be an abomination unto you;" that is, shall be unclean, unfit for food and sacrifice. This language would not apply to birds proper (with feathers), which do not go on all four, but such creatures as the pterodactyles, which did appear at that time. Thus, Moses, though professing to give only a general description, specifies the very era, the fifth day, at which winged animals appear. These pterodactyles have many affinities with *birds*, properly so called, who came forth subsequently, by creation or development; both have hollow bones filled with air and not with marrow. Huxley talks sneeringly of the flexibility of the language of the first chapter of Genesis. That language has stood there unchanged for three thousand years, while geology has to modify its generalizations from age to age. I have noticed that when theological writers can be induced to stick to the literal account in Genesis, and scientists to the pure facts, that the two records have a very wonderful correspondence.

Our lecturer starts another difficulty: "Not one solitary species of fish now in existence is to be found in the carboniferous rocks; and hence you are introduced again to the difficulty, — the dilemma, that either the creatures which were created then, which came into existence the sixth day, were not those which are found at present, or are not the direct and immediate predecessors of those which now exist; but, in that case, you must have either had a fresh species, of

which nothing has been said, or else the whole story must be given as absolutely devoid of any circumstantial evidence." This difficulty may seem to press heavily upon those who affirm that one species of fish cannot be derived from another; but they extricate themselves from it by declaring that, while Genesis tells of the original creation of fishes, there may have been subsequent creations of which it gives no account. It does not seem even to bear on those who, while they trace all things to God, do not deny that the fishes now in the seas may have sprung from those originally created.

But we are most concerned with what, after all, is the most important to us, the creation of man. There is a twofold record, the parts not contradictory but complementary the one of the other. Gen. ii. 7: "And the Lord God formed man of the dust of the ground, and breathed into his nostrils the breath of life, and he became a living soul." This is expanded in a passage full of meaning, which those opposed to development in every form would do well to ponder: Psalm cxxxix. 15, "My substance was not hid from thee when I was made in secret and curiously wrought in the lowest parts of the earth," opening glimpses of a process and a preparation; "thine eyes did see my substance being yet imperfect, and in thy book all my members were written while yet there was none of them." Such is the one side, the animal side. But then we have the other side, chapter i. 26: "And God said, Let us make man in our image, after our image, after our likeness. So God created man in

his own image, in the image of God created he them." All this corresponds to our experience. We feel that we have an animal part cleaving to the dust, and allying us to the brutes. But we feel also that we have a divine nature, a power of distinguishing between good and evil, a longing for something higher, a seeking after God. The Bible tells, thirdly, that this image of God has been defaced. These truths have been combined in an eloquent passage by the profound Pascal: "The greatness and the misery of man being alike conspicuous, religion, in order to be true, must necessarily teach us that he has in himself some noble principles of greatness, and at the same time some profound source of misery. . . . The philosophers never furnish men with sentiments suitable to these two states. They inculcated a notion either of absolute grandeur or of hopeless degradation, neither of which is the true condition of man. . . . So manifest is it that we were once in a state of perfection from which we are now unhappily fallen. It is astonishing that the mystery which is farthest removed from our knowledge — I mean the transmission of original sin — should be that without which we can have no true knowledge of ourselves. It is in this abyss that the clew to our condition takes its turnings and windings, insomuch that man is more incomprehensible without this mystery than this mystery is incomprehensible to man."

Mr. Alfred Russel Wallace is still in great difficulties as to the application of development to the genesis of man, and has avowed this in his opening address

as President of the Biological section of the British Association for the Advancement of Science (1876). First, there is the size of the earliest discovered human brains, those of Engis and Cro-Magnon; the former, according to Huxley, being "a fair average human skull, which might have belonged to a philosopher;" and the latter described by Wallace as being unusually large and well formed. Secondly, there is the nature of the works of art found in even the oldest cave dwellings, such as "scrapers, awls, hammers, saws, and lances, implying a variety of purposes for which these were used, and a corresponding degree of mental activity and civilization." He refers to hundreds of stone images, found in the remote islands of the Pacific, often thirty or forty feet high, with crowns on their heads ten feet in diameter, and to the ancient mounds and earth-works of the North American continent, including camp enclosures, often of geometric forms, with roads and avenues miles in length, and with pottery and metallic articles. Every one has heard of the cyclopean walls of the old European nations, and of the ruins found in the cities of Central America, indicating that the existing race of Indians had been preceded by a distinct and more civilized people. He calls attention to that greatest of historical puzzles, the great pyramid of Egypt, whose form, dimensions, structure, and uses have been so elaborately examined by Professor Piazzi Smith, who has pointed out such measurings, angles, and levels, as imply, at a very old historical period, the highest science, architectural and geodet-

ical. "The vertical height of the pyramid bears the same proportion to its circumference at the base as the radius of a circle does to its circumference." We are not at the bottom of this well which has been opened. We are introduced to a kind of life earlier than the savage state into which so many nations subsequently fell. It is very much like that state of society which is described in the Book of Genesis as existing before the Flood and after the Flood, where we read of artificers in the metals, and of towers, such as that of Babel, rising to heaven. These well-formed brains have left behind works worthy of them. These very ancient facts seem to combine with Scripture in testifying that there was something very peculiar in the first appearance of man, who, while formed of the dust of the ground by a curiously wrought process, was all the while created in the image of God.

Two extreme views have been taken of the character of our world: —

One, that it is without wisdom or design or goodness, the sport of Chance, or bound in the grim grasp of Fate. Those who favor this view dwell with pain, or with pleasure, on the disorders which they see everywhere: on the elements warring with each other; on wind tossing wave, and the storms destroying the works of man and the useful products of the earth; on the cross-purposes, the mishaps, the disappointments, in our lot; on the cruel pains, separations, and calamities which befall us; on the infirmities, disease, and death, which attack our bodily frame; on the oppression of the weak, the helplessness of unpro-

tected orphans, and the wailings of widows; on the ingratitude for favors exhibited by mankind; on their deeds of deceit, betrayal, and vengeance; on the wicked prospering, and the good defeated, — and they affirm that a world so full of such scenes cannot have come from an all-mighty, an all-wise, or an all-good God. These were the facts persistently put in the front by the ancient sceptics; and, in modern times, they so impressed the two Mills, father and son, that they could discover no unequivocal proof of the existence of a God of infinite power, and were not disposed to believe in a Deity whose power is so limited that he cannot prevent the evil. Doubts arising from the same damps and vapors have so beclouded the vision of many not wishing to be sceptics, and not professing to be philosophers, that they have hid from their view the sun that shines in these heavens.

On the other hand, there are some who see nothing in our world but order and beneficence. They fondly dwell on the fitness seen in every part of the plant and animal, and especially in our bodily frame; on the revolving seasons, and abounding health and happiness; on the pleasures thrown open to us in our homes, — how dear the word! — in friendships and the social circle; and the means of instruction afforded by schools, colleges, and churches. Science has confirmed these views by establishing the universal reign of law; and those who are instructed in its harmonies delight to think and speak of the regular movement of sun, moon, and stars, of the formation and growth of worlds, and the development of vege-

table and animal. It is the theme illustrated in the many works written in our language on natural theology. Every grateful heart will think and speak and sing of the goodness which has followed us all our lives, and has been turning what was seemingly evil into a blessing.

But does either of these views, taken by itself, account for the whole facts? As against the one, we have beauty and bountifulness pressing themselves on us so that we have only to open our eyes to behold them in heaven and earth, in revolving seasons and unfolding providence. But our world certainly presents another and a very different aspect. Sin and pain are also in our world, and force themselves upon us whether we will or no. Whatever else is true, this is true also. How it may have become so we may not be able to tell. The *how* is a very difficult question on all subjects. The man of science is often telling us the fact is so and so, but has to add, "How it is so I am not able to say." The profound theologian, Augustine, has put the question, "Where is evil, and whence comes it, since God the Good hath created all things?" To this our Quaker poet answers, simply but wisely: —

> "No victory comes of all our strife;
> From all we grasp the meaning slips;
> The Sphinx sits at the gate of life,
> With the old question on her awful lips."

There is certainly evil in our world. This is a fact quite as sure as any fact that we can specify in science or in practical life. That there is evil is

quite as certain as that there is good. We have as clear and decided proof of the existence of the one as of the other. There is pain in our world, and this is certainly an evil, — pain often keen and long-continued, lasting for hours and days and years, without the possibility of alleviation; and the sufferer has to say in the evening, "When shall it be morning?" and, in the morning, "When shall it be evening?" There is the deeper evil of sin, of ingratitude, unfaithfulness, deceit, malignity. Whatever else is true, this is true also, — that we have sinned. We feel it in ourselves: we take guilt to ourselves, being convicted by our own consciences. We have to resist the evil in others. No explanation, no history of our world, is adequate, at first sight or at last sight, which does not look at and embrace both classes of facts.[1]

On the one hand, there are order and beneficence. These press themselves on the notice of every one, unlearned as well as learned. Science has succeeded in showing that beneficent law reigns in all knowable space and time: the same substances are found in sun and distant stars as in our earth; and the same forces of water and fire operated millions of years ago as they do now. But, then, sin and suffering are forcing themselves on our attention. From their very first appearance and all along, the lower animals have been liable to pain and death. The two — the good and evil — are strangely mixed with

[1] Often did I wonder in my youth, when reading works on Natural Theology, how the writers contrived to overlook the obvious evils in the world.

each other. These beautiful and bountiful laws are made to work mischief. Gravitation draws down a rock to crush us. Chemical affinity mixes poison to gender disease. On the other hand, there are skilful laws to bring good out of evil, alleviating disease, and purposely bringing it to an end. There is a singular fitness in the structure and arrangement of the internal organs of our body; but then, how liable are heart and brain to become deranged! — a point fixed upon and used for his purposes by Comte, the founder of the Positive school. Sir John Herschell dwelt with evident delight on the formation of the eye, as showing such indubitable traces of design; and no researches of science will ever be able to diminish the wonder excited by the adaptations of coats, humors, and muscles to the rays of light. On the other hand, Helmholtz alleges that there are defects in that organ which would not be allowed in the construction of an optic glass by a mechanic.

What are we to make of this double class of facts, so mixed up with each other? Two theories have been proposed, neither having much show of reason, — one, the Manichæan, that there is an Evil Spirit, independent of God and contending with God. This is inconsistent with the idea of God, — the One, the Self-existent, the Creator and Source of all things, — and of what we see of the unity of the world. Another supposition has been started, that, before man appeared, our earth was the scene of war between God and devils, who are seeking to regain their old ascendancy. No fact can be adduced in favor of this

theory, which is a mere fancy, with nothing to support it. So we may turn to the account which is given in the Word of God, to learn whether it is in accordance with the twofold phenomenon.

According to Scripture, moral and physical evil has intruded into our world. We have traces of it before man was created, in the fall of angelic beings who are ready to tempt Adam and Eve. From the very day when man fell, we have a contest going on in our world. I do not assert, with some of our older divines, that pain and death came upon the lower animals because Adam fell. But it is a noticeable fact that death has reigned all along since living beings appeared, even over those who have "not sinned after the similitude of Adam's transgression," on that earth on which man has sinned. Our world is thus of a piece in itself, and its history is consistent throughout. The science of these later years is ever speaking of the struggle for existence in ages past, and of the weaker races giving way before the stronger. Our world is still, as it has ever been, a scene of struggle and of warfare. All history and our whole experience testify to this effect. It is the account given throughout the Scriptures.

There are very staggering statements made by our *savans*, in the present day, as to the impressions left on the mind by scientific research. An age or two ago, they talked of the stability of nature; they dwelt on the calming effect produced by the study of its unvarying laws, and the evidence which these furnished of the pure benevolence of God. But all this is now

changed. Comte delighted to point to members of the body, such as the eye and the liver, so liable to become deranged, and which he affirmed could easily have substituted for them organs not exposed to disease. And now Helmholtz dwells remorsely on the imperfections found in the structure of the eye. Professor Tyndall, in his "Hours of Exercise in the High Alps," says that there is something chilling in the contemplation of those terrible forces whose integration throughout the ages pulls down the Matterhorn. He speaks of the saddening effect produced by the aspect of the mountain from its higher crags, "hacked and hurt by time." "Hitherto the impression that it made was that of savage strength, but here we have inexorable decay." His language is as fierce as that of the fanatical (so-called) divines, who used to magnify the unsatisfactory feeling produced by the contemplation of nature, in order to shut up men into revelation. Mr. Fiske follows in the same strain (in *Atlantic Monthly*, March, 1876): "There is little that is even intellectually satisfying in the awful picture which science shows us of giant worlds concentrating out of nebulous matter, developing, with prodigious waste of energy, into the theatres of all that is grand and sacred in spiritual endeavor, clashing and exploding again into dead vapor-balls, only to renew the same wilful process without end, and a senseless bubble play of Titan forces, without life, love, and aspiration, brought forth only to be extinguished."

But these same men shrink from the thought of being shut out from the aspirations which their sys-

tem seems to scatter into atoms. Comte had no deity, but he invented a worship; and Mr. Mill clings to the idea that there may be a religion without a God. Herbert Spencer finds it impossible to explain every thing, or even any thing, without calling in a great Unknown, represented by him as utterly inscrutable, but to which, notwithstanding, he is ever ascribing power, — which comes, in fact, to be power, as an hypothesis to help him out of his speculative difficulties. This Unknowable is in fact his God, and this Unknown is to him the region of religion, — a region, I should think, as dark as the darkest grove of Pagan worship. Huxley — trained, it is understood, in a religious home — wishes to retain a worship "chiefly of the silent sort." Tyndall follows the passage I have quoted, by expressing the hope that such yearnings and questionings are necessary "to the opening of a finer vision." In one of his prefaces to his Belfast Address, he says: "No atheistic reasoning can, I hold, dislodge religion from the heart of man: logic cannot deprive us of life, and religion is life to the religious: as an experience of consciousness, it is perfectly beyond the assaults of logic." Mr. Fiske must follow his masters, and so he ends the passage I have quoted by urging that the human mind, however "scientific its training, must often recoil from the conclusion that this is all; and there are moments when one feels that this cannot be all." And he tells us that there are moods in which a feeling, merely self-regarding, is lost sight of "in the feeling which associates a future life with some solution of the burdensome

problem of existence." I believe that these men are sincere in their yearnings after a supernatural power and an immortal existence; but the question arises, Can they hold to this belief in consistency with their scientific creed?

These hopes are liable to be, indeed must be, crushed in the vice of a terrible dilemma. The question must be answered, Are they or are they not the product of the atoms and material forces from which every thing is supposed to issue by evolution? If they are, as they must be on the supposition that the theory is well founded, then it cannot be shown that they have any objective value whatever. There will be a constant and a painful contest in the breasts, or rather between the heads and hearts, of those older men trained religiously, and who would hold both their scientific creed and their hereditary faith. But the younger men, grounded from the first in the scientific doctrine, will look upon the feelings to which their leaders cling as ghosts, which enlightened men no longer believe in, as apparitions which must vanish in the morning light. When these are gone, there is left only a void, felt to be dreary in the extreme, and with nothing to fill it. The pedigree of the feelings has been searched: they have been traced to mere fortuitous associations and heredity, and it is seen that their authority is gone.

But the other side of the alternative may be taken, and it may be allowed that these aspirations are not the result of the physical forces. But, if so, then we have a proof of the utter insufficiency of that grand

hypothesis which is supposed to explain every thing. We have got a residuum of which it can give no account. The very existence of these faiths, the way in which they cleave to us, the fact that they cannot be dislodged, the very clinging to them on the part of the materialist, is an evidence that in man there is a higher nature than can be derived from the protoplasm and the brutes, — a nature ever soaring upward to heaven, the place from which it came.

Throughout the geological ages, there are new powers coming in ever and anon, and manifesting themselves by their action: there are life, sensation, consciousness, thought, reasoning, conscience. These always appear at the fit time, being adapted to the surroundings. Animals are introduced when there are plants for them to feed on. Man comes forth when there are cereals and cattle suited to his necessities. Possibly we may account, by the introduction of these new powers, for the fact, noticed by some of our most eminent American palæontologists, that, on new orders of animals appearing, they assume a high form, — perhaps the very highest form of which they are capable, — and grow weaker instead of stronger, and finally disappear. It is a noteworthy circumstance that in the historical period we have an analogous introduction of new and higher life. We have the antediluvian, the patriarchal, the Mosaic (priestly), and prophetical (kingly) dispensations, all growing out of each other, and rising to higher levels. These are all anticipatory, and have faces looking forward to One expected and waited for, and who appears in the

fulness of time: the time which the prophecies had announced; when the Jews, carrying with them the Greek version of the Old Testament, were found in every leading city, and by the very opposition they offered to the gospel raising a conflagration which called the attention of the Gentiles; when the Greek literature and philosophy had stirred up thought and awakened a spirit of inquiry; when men, sick of abounding corruption, were everywhere yearning for a deliverer and a new state of things; and when the Roman empire had established a security which allowed the missionaries of the cross to travel with their gracious message. He comes from a sphere beyond our world, and is called the Logos, *ratio et oratio*, thought and expression, but becomes flesh; thus combining the divine and human, the spiritual and material, calling himself the Son of Man, but claiming to be the Son of God. As a body "curiously wrought" had been prepared for the first man with his human spirit, so a body had been prepared for the second man with his Divine Spirit ("a body hast thou prepared me," Heb. x. 5), and this Divine nature is as adapted to the human body as the soul of man is to his body. His office is not to destroy, but to save, — to remove the derangement, to remedy the evil by himself submitting to it and overcoming it. "Having made peace through the blood of his cross, by him to reconcile all things unto himself; by him, I say, whether they be things in earth or things in heaven." (Col. i. 20.)

Contemporaneously with this manifestation of God,

there is the introduction of a new and spiritual life. This, too, had been foretold by the prophets, and there had been anticipations of it in the spiritual character of the Old Testament saints. "And it shall come to pass that afterward I will pour my Spirit upon all flesh." Our Lord announced the coming of this blessed Agent. "Jesus stood and cried, saying, If any man thirst, let him come unto me, and drink. He that believeth on me, as the Scripture hath said, out of his belly shall flow rivers of living water. But this spake he of the Spirit, which they that believe on him should receive, for the Holy Ghost was not yet given; because that Jesus was not glorified." This gift proceeds on the completed work of Christ. It was realized when the day of Pentecost was fully come, and is so still in every revival of religion and the conversion of every sinner. This new life is a seed deposited, germinating, and bearing fruit, but a seed suited to the soil and drawing sustenance from it. It does not destroy or even supersede man's natural powers and appetences, but falls in among them, joins on to them, and purifies and elevates them. There is a continuance, an order, and a progression in all this. "Howbeit, that was not first which is spiritual (*πνευματικόν*), but that which is natural (*ψυχικόν*); and afterward that which is spiritual." "And so it is written the first Adam was made a living soul; the second Adam was made a quickening spirit," where we may mark the advancement from the merely living soul (*ψυχὴν ζῶσαν*) to the quickening spirit (*πνεῦμα ζωοποιοῦν*). (1 Cor. xv. 44–49.)

This heaven-descended stream will grow and expand till the Spirit is poured on all flesh. It thus appears that the whole method of God's procedure is of a piece in both worlds, the natural and the spiritual, and from the beginning to the end, a constant introduction of new life, and this rising higher and higher. I have sometimes thought that geology, instead of being the most atheistical of all the sciences, may turn out to be the most religious, as letting us far into the knowledge of the past, and giving us glimpses — we can find no more — of the work which God doeth from the beginning to the end.

In the days of Copernicus and Galileo, it was difficult for old men to believe that the new doctrines could be reconciled with Scripture or with common observation. Bacon never accepted them, and Milton in a still later age adhered to the old theory. When Newton published his demonstration of the law of gravitation, there were pious men who were repelled by it; and the religious aspect of the doctrine had to be expounded by the celebrated mathematician Maclaurin. In these ages, as in this, there were anxious struggles in the breasts of many between their religion and their science. But the young people who sprang up, got ideas suited to the new views, and found them to be quite as consistent with religion as the old. God could be adored as sincerely by those who believed that the earth runs round the sun, as by those who were sure that their senses told them that the sun went round the earth. Those who believe that the members of the body were "curiously

wrought" and "fashioned," when as yet there was none of them, can as readily and heartily admire them and praise their Maker, as those who assert that God made them without a process.

A great many young men, trained in Christian homes, and most anxious to retain their faith in the Bible, are convinced, on what they consider good evidence, that there is and must be a true doctrine of development. How are we to act towards them? The teacher who has to deal with such has a very delicate part to act, and will require to exercise much wisdom, and, above all, to be swayed by the highest Christian grace. They tell you they have seen the gradation of fossils, and can, by the help of Professor Marsh's collections, trace the steps by which the existing horse is derived from the old horse of the Eocene formation. How are those who are the guides of youth, but it may be not adepts in geology, to advise them? Are they to tell these youths that the Bible settles this question, and that our horse cannot have come from the fossil horse. Those so told will feel themselves in a most perplexing position, — obliged to abandon either their science or their religion. Perhaps their grave seniors go on to let them know that, though they themselves are not scientific men, they can point to eminent geologists who deny the hypotheses of evolution. The youths will reply on the instant that these men are advanced in life, and will remind you that when Harvey published his doctrine of the circulation of the blood not a man

under forty could be made to accept it; and will go on to tell you that there is no naturalist under thirty, perhaps none under forty, who does not believe in a doctrine of evolution; and that all, or nearly all, Agassiz' pupils, including his own son, have abandoned the position of their master. And what can you say in reply? If you denounce them, you will only harden them, and drive them away for ever from the Bible and from Christ. If young men have been made infidels by sceptical writers, they have also been made so by those who sit in Moses' seat, and have every quality recommended by the law — except charity.[1] I dare not take the responsibility of driving things to this pass. I have, right or wrong, proceeded in a different manner and spirit. I have tried to act as our Lord did towards the Sadducees, with whom He dealt more gently than He did with the self-righteous and scowling Pharisees. I have said to them, "Ye do err, not knowing the Scriptures nor the power of God." I have endeavored to act as my illustrious instructor, Dr. Chalmers, acted, when he sought to reconcile astronomy and religion, not by rejecting, but by accepting, all its truths sanctioned by

[1] President White has in his *Warfare of Science* brought forward an agglomeration (very undiscriminating and uncritical) of facts to show that religious men have opposed science, and been defeated. As no doubt he wishes to be impartial, I suggest that he gather a like body of facts to show that *savans* have used their science to put down religion, which stands as firm as ever. But all that would follow logically is, that there have been foolish defenders both of religion and of science.

induction. I have proceeded as I am doing in these papers. I have shown them that there is really no proof of a doctrine of evolution carried to the extreme positions to which some have brought it. I have proven that the facts actually established do not authorize the irreligious conclusions which some have drawn from them. I have explained that Scripture, properly interpreted, does not sanction all the dogmas which divines have drawn from it, — that, for example, it does not countenance the statements in the old books of divinity, that there was no death among the lower animals till sin was committed. I have given examples of a very common occurrence, of both scientists and theologians, mingling wrong speculations with the facts of nature or the simple declarations of the Word. I have taken particular pains to show that some late discoveries in science have confirmed the declarations of Scripture. I remember that, when I was a boy, I was greatly troubled with the objection pressed on me by an old infidel, to whom I had been sent with a business message. "Oh," said he, "you believe the Bible, and are about to become a minister to preach it. That Bible opens with an absurdity and a contradiction. It makes light shine the first day, and the sun appear the fourth day." I was not able to answer the objection. It might have been difficult for any man to answer it at that time. Now the difficulty can be removed by means of that very theory of Laplace which divines so abused, but which shows that there was light before the sun was condensed

into a mass. "He that believeth shall not make haste." "Unto the upright there ariseth light in the darkness."[1]

The picture given in the following Paper is something like that which would rise before the intelligent Christian as he looks to the acknowledged truths of science on the one hand, and the teachings of God's Word on the other; in which it will be observed that there is a wonderful correspondence between the two, as we gaze on which we find the microscopical differences disappear.

[1] I believe this method has been blessed. My friends think that it was so when I followed it in Queen's College, Belfast. It seems to be so in Princeton, where I have been so aided by my colleagues. My lot has been cast in an age in which there has been for the past twenty years in Great Britain, and for the last five years in America, more infidelity in our colleges than in any time since the French Revolution, — it should be added that religion is in a much livelier state now than it was then. Every one who has looked into the matter knows how apt young men in our colleges, distinguished for their intellectual life, are in these days to lose their faith. Yet, here in Princeton, while we have had students troubled with doubts and fears, I have heard of only two young men who have left us avowed unbelievers. With both I had dealings in kindness. One of them came back to our college publicly to defend the faith. The other, when I spoke of praying with him, told me that he did not believe in a God to whom he could pray. Thanks to Him who holdeth in his hands the hearts of all men, both of these are at present in theological seminaries preparing for the Christian ministry.

PAPER IV.

VIEW OF OUR WORLD GIVEN BY COMBINED SCIENCE AND RELIGION.[1]

I INVITE you into a temple in which are symbols and inscriptions fitted to instruct us as to the true character and history of our world. That temple is not made by human hands, but by Him who created the heavens and the earth. It is larger, grander, and yet simpler, than the rock-cut temples of India, than the columnar vistas of Egypt, than the cathedrals raised by the piety of the Middle Ages. Some of the great passes in the Alps, Andes, and Himalayas bear some likeness to it in length and height, but they are bare and sterile, whereas this is covered on both sides with figures full of meaning. At the grand entrance are two forms which arrest the attention. The one on the right consists of two tables of stone, representing law, — moral and natural. The one on the left is an altar, with flowers and fruit on it, and a bleeding lamb. Here the vista bursts on our view, and extends on till the sides are lost in the dim distance; but at the farthest end is an object which no distance can lessen — the Rock of ages,

[1] This is the Paper read by the author at the Meeting of the Evangelical Alliance in New York, 1873.

with a throne set on it which cannot be moved, and the Ancient of Days seated on it, and in the midst "a Lamb as it had been slain;" and midway between the entrance and the end is a cross lifted up and a meek sufferer stretched upon it, but with a halo round his head, and above him, spanning the arch, a rainbow formed by the refraction of the pure white light, which streams from Him who dwelleth in light that is inaccessible to mortal eyes and full of glory. On each side of this extended gallery are symbolic figures, and these grow out of each other, and carry on a continued history from the past into the future onward into eternity. The great limners of the world are busily employed in drawing the pictures in this palace of the great King. I am to engage you for a little while in looking at them and reading the inscriptions.

1. *The Religious Side.* They have been written "at sundry times and in divers parts" by holy men as they were moved by the Holy Ghost. The first inscription that meets our eye is "In the beginning" (ἐν ἀρχῇ), — the word used by the old Greek philosophers when they were inquiring after the origin and principle of all things. How far back into the remote this carries us we cannot tell, but then "God created the heavens and the earth." We then see a brooding darkness, but it is a cloud of seeds from which the worlds are formed. "The earth was without form and void," but the wind of the Spirit blows upon it, and a voice is heard, "Let there be light," and light appears, and henceforth there is systematic order:

there is development in order or order in development, and at the close of each day or period God declares "all things to be very good." As yet there is no sun or moon; but there is rotating evening and morning, and the evening and the morning constitute the first day, — we know not of what length, for the clock of time is not yet set up, and the word day often means epoch in Scripture. In the second day there is the rising of the aërial and the sinking of the fluid. In the third day the sea is divided from the land; on the same day life appears, and has a developing power in it, "for the earth brought forth grass, and herb yielding seed after his kind, whose seed is in itself after his kind." On the fourth two solid lights appear, and become the rulers and dividers of time. When the fifth day rises out of the night, we see the waters bringing forth the swarming creatures, and we have fishes, reptiles, and fowls; all with a power of evolution, for the waters bring forth after their kind, and every winged fowl after his kind, and they are enjoined to multiply and fill the waters in the sea and the earth. A sixth day dawns, and we see mammals, larger and smaller, and beasts, all after their kind; and in this epoch appears a nobler creature made after the image of God, and with the command to be fruitful and multiply and replenish the earth. This was the special work of Elohim, the one God with a plural nature, who, on finishing the creation, leaves the living creatures to develop by the powers with which he has endowed them.

Another vision joins on, and we have, not Elohim,

but the Lord Jehovah, the law-giver, the covenant-maker; and there is exhibited to us the relation in which man stands to him. Man is represented as formed out of the dust of the ground, but with a divine breath breathed into him; he is put under law, with a promise of life and a threatening of death. We now come to the most mysterious of all the records. A tempter, indicating an earlier fall, suddenly intrudes, and he uses the beast of the field and the lower passions as his instruments; and henceforth man exhibits devilish propensities of pride and rebellion, on the one hand, and animal propensities of appetite and lust on the other; and there is sin propagating itself, actual sin developing from original sin as a seed, and man driven into a world where are thorns and thistles; and the multiplication of the race is with sorrow, and man has to earn his bread with the sweat of his face, and his body has to return to the dust from which it was taken.

There now appears a figure with an inscription containing the whole history of mankind in epitome. You see a Being possessed evidently of superhuman power, but with a truly human nature, having his heel bitten by a serpent, on whose head he sets his foot and crushes it for ever. The attached writing is, "I will put enmity between thee and the woman, and between thy seed and her seed; it shall bruise thy head, and thou shalt bruise his heel." Henceforth there are two seeds, and each develops after its kind, and they contend, and must contend, till the good gains the victory. A seed — not seeds, as of many, but seed, as of

one — is developed from the woman, but by a heavenly power, the Holy Ghost, who brought form out of the formless at creation ; and this personage is represented as suffering, as having his heel bruised, and in his suffering destroying the power of evil. Henceforth our world is a scene of contest. Man is warring with the unwilling soil, with privation, disappointment, loss, disease, and death ; one man contending with another because of conflicting interests and passions ; one race and nation fighting with another ; and a large portion of human history is a history of war. To restrain excessive wickedness, the earth is visited with a flood, — as geologists tell us it had often been before, — but animal pairs are preserved to continue the races, and the rainbow is made to give assurance to the terrified fathers that waters will no more cover the earth. The purpose of God is fulfilled in the scattering of men ; but the people, wherever they go, propagate the evil, and change the incorruptible God into an image made like to corruptible man, and "to birds and four-footed beasts, and creeping things." To preserve a seed who may know the truth, a special man and a special race is set apart. Out of this seed comes the father both of history and poetry, who, in language of unsurpassed simplicity and grandeur, has described creation, and written the inflexible law in the granite of Sinai, and, himself a prophet, spoken of a greater Prophet to come. Their greatest poet, himself a great warrior, portrays the contest between the good and the evil going on in the world in warlike imagery ; and, feel-

ing that he himself is not the man to build the spiritual temple because his hands have been imbrued in blood, points ever to a King who "in his majesty rides prosperously because of truth, meekness, and righteousness." There follows a succession of prophets, each with his vision and his parable; and the grandest of them, whose sentences flow like a river descending from the heights of heaven to water the plains of earth, speaks of him as wounded, bruised, dying and in the grave, but seeing the fruit of the travail of his soul, and extending his dominion till it covers the whole earth as the waters do the channel of the sea. Contemporaneous with these, we have typical personages — prophets, priests, and kings, — with their faces shining with light as they look forward to the One suspended on the cross, and beyond to the throne of God. In the middle of the ages, that great Person appears, passing through suffering to conquest, fighting with sin and subduing it, connecting heaven and earth as by a ladder, and as a rainbow spanning the world.

Beyond the central figure a new life appears. God comes forth as creator the first time since he rested after creating the heavens and the earth. Just as in the prehistoric ages there had appeared a plant life, and an animal life, and an intellectual life, and a moral life, so now we have a spiritual life: it is the dispensation of the Spirit. Those who have sat for ages in darkness now see a great light. A new people come forth, not dwelling in a separate locality, but scattered among all people, like salt to preserve, like seed

to propagate, the life all over the world. With that spiritual life come other forms of good, such as art, and civilization, and widening comforts, and the cultivation of the intellect, and the refining of the feelings. But the soil has still to be ploughed and harrowed in order to yield seed and fruit; the spiritual forces have to meet and overcome obstacles; and every good cause before it succeeds has to produce a martyr, out of whose ashes a new life proceeds. Not only so, but there is a contest in every heart; "the flesh lusteth against the spirit, and the spirit against the flesh, and these are contrary the one to the other." The cause moves on, as the light comes from the sun in vibrations, as the tides come up upon the land, — advancing and receding, but on the whole advancing. In the last symbolic book, we hear a succession of trumpets sounding to call men to the battle, and see vials poured out to destroy the seeds of evil and purify the atmosphere. Many pass to and fro, and knowledge is increased; agencies for good are multiplied, and the kingdom extends till it spreads over the whole earth, which has rest for a thousand years, — we may suppose a day for a year. Beyond this the vision becomes dim from the distance, but we see the old adversary loosed for a little while, and the earth burned with fire, and the dazzling bright throne of judgment set up, and the God-man upon it, and every one giving an account of the deeds done in the body, whether they have been good or whether they have been evil; and then a separation, these descending by their own weight into their own place of

blackness, and those carried up to heaven by their attraction to God, where they join in the song, "Salvation to our God that sitteth on the throne, and to the Lamb."

2. *The Scientific Side.* Here, as on the other side, we have a body of men busily employed in drawing figures and carving inscriptions, all to throw light on the past and present of our world. They are left to their native powers, and have to work by observation; they are not kept from error by any special guidance, and much that they write is laid in colors which fade, or in false colors which require to be blotted out by those who come after. Still much remains, and shall remain for ever, chiselled in the rock and never to be effaced, and this is growing and accumulating.

We have, first, lawgivers, who, finding that men are prone to evil, have proclaimed laws more or less perfect to secure obedience. Then there are moralists, from Socrates downward, inscribing on that wall what they have found written on their hearts, and which they regard, if only they read it aright, as a transcript of the holy nature and the supreme will of God. Alongside of them you may notice the broad-browed philosophers, from Plato and Aristotle onward, speculating on fate and chance, and the relation of the universe to God, and demonstrating that man's soul has a conscious unity and personality of which it can never be deprived. The next group consists of historians who have given us lively narratives of the great deeds of our world, of the sacrifices which men have made for kindred and for country, but who

have also to record enormous crimes, political feuds and wars which have deluged the earth with blood. Next and more influential are those who express popular feeling, and have told what this world of men and women is, and have enshrined their thoughts in verse, that they may be caught more easily and remembered longer. Let us notice the topics of which they treat. The oldest of them, never surpassed for natural strength, has sung of the wrath of Achilles, and the evil thus wrought. Another, full of grace, has sung of arms, and of a hero fleeing from a burning city, and crossing a stormy sea to found an empire. In a later age we see one who, though blind, has seen farther than other men, and has painted demoniacal pride, Paradise Lost and Paradise Regained. Another hand has taken the lyre, and, with old Horace and modern songsters and satirists, has delineated the loves and hatreds, the hopes and disappointments, the joys and sorrows, the aspirations and foibles, which agitate men's bosoms. A third class, led by our high-browed dramatist, have exhibited on a stage what they believe to be the swaying motives of rich and poor, and have let us into the secrets of the working of ambition, passion, jealousy, pride, vanity, envy, revenge, caprice, fear, despair. The poet of the common people, in describing their joys, often sensual and mad, comes to the conclusion that " man is made to mourn." Romancers of these late years are taking up the same work, and are spinning tales which exhibit the strength and weakness of our nature — yearning affections, blighted

hopes, cruel betrayals — illustrated by seduction and murder. All of these artists describe this earth as a strangely mixed scene, with hills and hollows, with lakes sleeping in visible repose or rent by storms, with peaceful valleys and terrible gullies, with streams flowing gently and then pouring over fearful cataracts, with an ocean now inviting us to repose on its bosom, and anon tossing off men and vessels like seaweed.

But let us specially look at the grand truths inscribed by the expounders of science, as you see them there with their instruments for weighing and measuring, and their laborious calculations. On the religious side every thing was ascribed to God, proceeding orderly: "Thou hast established the earth and it abideth. They continue this day according to thine ordinances; for all are thy servants." A somewhat different but not inconsistent view is given of the same objects on the scientific side, where every thing is ascribed to what is called "law," which, however, when properly understood, implies a lawgiver. So these men, consciously or unconsciously, are unfolding to our view the plan of the great Creator. On this side of the hall of science, you see inscribed: first, mathematical figures, such as squares, triangles, circles, spirals, and other sections of the cone; and it turns out that these regulate the forms and movements of objects in the heavens and in the earth, and are made to do so by a God who, as Plato says, geometrizes. Then you see science investigating inanimate nature, and showing that all the physical forces are

modifications of one and the same force. Now it is seeking to discover the order and progression of animated beings, of plants and animals. It has shown that there are geological epochs: first, an azoic period; then plants, marine and terrestrial; then the lower creatures with animal life; then fishes, reptiles, fowls, quadrupeds; and, finally, man.

In looking at these phenomena, men discover everywhere development or evolution. It appears in inanimate nature, — in suns, planets, and moons being evolved out of an original matter, in a way which implies that the earth is older than the sun, and must have existed for ages, and had light shining upon it before the sun took his solid form. It is a characteristic of organized beings to produce others after their kind. Those who view development in the proper light see in it only a form or manifestation of law. Gravitation is a law of contemporaneous nature, extending over all bodies simultaneously, — over sun, moon, and stars the most remote. Development is a law of successive nature, and secures a connection between the past and the present, and I may add the future, securing a unity, and it may be a progression, from age to age. It is merely an exhibition of order running through successive ages, as the other is of order running through coexisting objects.

But at this point difficulties and disputes arise. Is development so restricted that the plant or animal produces an offspring only after its kind, the lichen producing only the lichen, and the lily only the lily, and the oak only the oak, and the worm only the

worm, and the bee only the bee, and the horse only the horse? Or may not development be so extended as to imply, in new circumstances and under new conditions, a modification of kinds — that is, new species — and an advance from age to age from lower to higher forms? Some maintain that there is no power in nature to change species, and that when a new species appears it must be by an immediate fiat of God acting independently of all natural agents. Others hold that there may be powers in nature — religious men say conferred by God — which gradually raise species into higher forms by aggregation and selection. I am not sure that religion has any interest in holding absolutely by the one side or other of this question, which it is for scientific men to settle. I am not sure that religion is entitled to insist that every species of insect has been created by a special fiat of God, with no secondary agent employed.

But in prosecuting these investigations science comes to walls of adamant, which will not fall down at its command, and which, if it tries to break through, will only prostrate it, and cause it to exhibit its weakness before the world. (1) It cannot develop without a matter to develop from, and it cannot tell where this original matter came from. This matter must have properties: what are these properties? and whence? The impression left by the statement of some is that if we only had this original matter, every thing else could be accounted for by evolution. But (2) we cannot, apart from a designing mind, account for that combination, that organization of

agencies — mechanical, electrical, chemical, vital — which produces development. (3) It cannot say how animal sensation or feeling came in. (4) It cannot tell when or how instinct came in, how or when intelligence appeared, and affection and pity and love, and the discernment of good and evil. (5) In particular, it cannot render any account of the production of man's higher endowments, his powers of abstracting, generalizing, and reasoning, from the individual objects presented to him, of discovering necessary truth, and the obligation of virtue. Science has not found these in the star-dust, nor were they in the ascidian, the fish, the monkey: how, then, did man get them, or rather, whence came man as possessed of them? Science, at all these places, comes to chasms which it cannot fill up. It has no facts whatever to support its theories, and is obliged to acknowledge that it has none; and as to the hypotheses which it calls in, they do not even seem to explain the essential facts, the appearance of new powers or agencies not known to be at work before.

But meanwhile, and as it is poring into these things, it is obliged to look at a set of phenomena unknown to or overlooked by the older physicists and naturalists — has, as it looks to animated beings, come in view of a conflict of which it can give no account, and of a manifest evil. It speaks of worlds coming out of star-dust, of worlds shattered into fragments and their materials scattered into space; and in regard to our earth, of upheavals, of sinking of land, and the submergence of all living beings on it; of floods,

of denudations, of volcanoes, of icebergs, and long periods of shivering cold. All these might not be evils, but then it speaks of what is and must be an evil, — of the existence of pain. When living beings appear, it cannot tell how, it is obliged to speak of a struggle for existence, the stronger devouring the weaker, and innumerable diseases preying on the animal frame, of individuals dying, and races perishing from want of sustenance or amid overwhelming convulsions. When man appears, it cannot tell how, but on a scene evidently prepared for him, he carries the seeds of disease in his very person, and he has to suffer pain of body and torture of mind. Around him are storms to destroy and disappointments crossing his path, and within are selfishness and craving lusts and repinings and passions, which war against each other, and war against the soul.

True, there are in all these objects law and order and beneficence, obvious, and pressing themselves on the notice. Forces, blind in themselves, are made by their combination to produce the most perfect mathematical figures. Beauty appears everywhere, — in sky and earth, in planet and plant. Every organ of the animal frame is good in itself, and liable to accomplish its evident purpose. There is order in star and sun and earth, but order coming out of disorder. It is beauty in flowers, in young man and maiden, coming out of dust and returning to dust; we see it in that foliage, so beautiful even when it is fading: does not the father feel it when he commits the body of his son to the grave, "dust to dust, ashes to ashes"? Man

has high aspirations, but it is only to feel how far he falls beneath them. All these are facts, — quite as much so as the movement of the planets in elliptic orbits, as the laws of development in the vegetable and animal kingdoms. The proudest thinkers, as they are brought face to face with these facts, are obliged to acknowledge that they cannot discover a final cause in many of the most common agents of nature; as, for instance, in the derangement to which every organ of the frame is liable, and in the parasites which dwell in and feed on the bodies of all our noblest animals. The microscope shows us how exquisitely they are formed, but all to inflict the more excruciating pain. We may apologize for some of these things, but we cannot explain them, — for instance, the existence of incurable sorrow and madness. Physiologists know that the organs of the body — the eye, the stomach, the liver, the brain — might have been so constructed as not to be liable to disease and pain, to which they are exposed, not by accident, but by their very nature and structure. Combined science, as it looks into the future, is obliged to tell us that the world, and all that is therein, shall first have its heat exhausted, and then, in the disintegration, shall be burned with fire; and what is to be the new order of things which is to issue out of this elemental fire it cannot tell.

Now this is, in fact, the sum of what science has been able to say about our world: Our cosmos rises out of dust, is formed into beautiful shapes by warring powers, becomes order and progressive order, and ends in dissolving heat. Our earth comes out of a

cloud and ends in a conflagration. The highest being, as he enters it, makes known his presence by a cry, and ends his march through it in the grave. Surely, in all this, while there is much in the evident order and beneficence to elevate, there is not a little to awe and to humble us. The profoundest thinkers feel that they have come here to an unknown power behind and beneath all; and are impelled, under a choking feeling, to cry out, like the dying Goethe, for light, and for windows to be opened to let it in.

Meanwhile, that other and higher law, the moral law — the law written on the heart — has something very important to utter, and it pronounces it in the name of God, the law-giver. It affirms of itself that it is unbending as stone, and yet finds that man has broken it. It points emphatically to a judgment to come, — it cannot say where or when, but certain to come, — as certain as that there is a law, an eternal law, and a God to guard it. The scene closes with each one placed before that bar to give an account of the deeds done in the body, whether they have been good, or whether they have been evil; and there it leaves him, in the midst of the conflagration of worlds, with undying matter taking new shapes, and a soul — certainly as undying as that matter — ready to be consigned to its own place of light or of darkness.

3. *The Reconciliation.* — Having taken a cursory glance at each of the sides of this rock-cut gallery, let us now look back upon the two. We see, in a general way that there is a correspondence be-

tween them. In both we have moral law set forth: in the one by the conscience; in the other by the commands and prohibitions in Eden, by the tables of stone on Mount Sinai, and by the Sermon on the Mount in the New Testament. But there is this important difference: the one tells us that the law has been broken, and in proof points to the wickedness in the world, and the guilty remorse which agitates men's bosoms, but reveals no way by which the sin can be forgiven; whereas the other, while it declares that sin has been committed, clearly makes known a way by which the sinner may be reconciled to God. Both reveal order in the world: the one as appointed by God; the other as discovered by man. In both we have progression in the divine workmanship, and the order, as Dr. Guyot has shown, is very much the same.[1] The Bible says that, after man was made, God rested from creation; and Dr. Dana assures us that since man appeared geology does not disclose a single new species of plant or animal. It is surely a curious circumstance that this picture of the formation of our earth was drawn upwards of three thousand years before geology started, and has continued unchanged amid the shiftings of science. The inspired record tells us, what anthropology confirms, that man has a twofold nature, — a body formed out of the dust of the ground, and a spirit after the image of God breathed into him. Nor is there any contradiction as to chronology. For, first, geology has no clock

[1] See Evangelical Alliance Conference, 1873, p. 276. See also Dawson's "Nature and the Bible," Lect. III.

to tell us the time, — what it reveals is not absolute, but relative. It tells us that a certain epoch must have been before another epoch; but its deductions are very uncertain as to how far back any one epoch — say the glacial epoch — carries us. These uncertainties have been increased by the discoveries lately made by Sir Wyville Thomson and Dr. Carpenter, of creatures now living in the deep seas, which geologists, if they had found them as fossils, would at once have ascribed to a much earlier epoch. And as to Scripture, it contains no inspired chronology of early history; what passes as such is drawn out of Bible genealogies by fallible men, and drawn out of imperfect data, for Jewish scholars tell us that these genealogies were never understood as being complete; and the genealogies, when summed up, give us, in the Hebrew text, 1656 years between the Creation and the Flood, whereas the Septuagint gives us 2262 years, and the Samaritan text only 1307 years.

At this stage, the scriptural record discloses a new and strange phenomenon to appear in the universe of God: it furnishes a glimpse of an early rebellion; for one comes on the scene to tempt the first human pair. At the corresponding period, science gives intimations of a struggle in which we see warring elements, and a gradual evolution of planets and satellites, the sun consolidated into a centre, and capable of being seen from the earth; and when living beings appear — science cannot tell how — we find animals devouring one another, the strong, with their terrible fangs and jaws, prevailing; the weak disappearing through dis-

ease and death, accompanied with brute passion and pain. History and biography come in to tell us how much of human activity has been spent in feuds among individuals, families, and nations. Poetry, and at a later date romance, take up the theme, and they delineate the hopes and fears and passions of our nature, and our bosoms beat responsive to their descriptions. We feel that the Scriptures speak profoundly and truly when they say: "For the earnest expectation of the creature (or creation) waiteth for the manifestation of the sons of God. For the creature was made subject to vanity, not willingly, but by reason of him who hath subjected the same in hope. Because the creature itself also shall be delivered from the bondage of corruption into the glorious liberty of the children of God, for we know that the whole creation (creature) groaneth in pain together until now" (Rom. viii. 19, 22). The same apostle describes the internal struggle (Rom. vii. 14–20): "To will is present with me; but how to perform that which is good I find not."

Our world is not what some describe it. It is not what the rationalist would have it, — a peaceful landscape, with nothing but order and beauty. It forces upon our observation scenes which the expounders of natural theology and your Unitarians, who, discarding inspiration, would fall back on natural religion, are unwilling to look at; and the opponents of religion, natural and revealed, are right, when they say that it is difficult or impossible to discover final cause in every thing, — in the liability of every member of the body to disease, in pain often amounting to anguish,

in sorrow which refuses to be comforted, in despair issuing in suicide. The last of the great series of German speculators, who began with Leibnitz and was continued by Kant and Hegel, terminated with Schopenhauer and Hartmann, who have dwelt on the natural evils of terrible power and prevalence found everywhere in the world; and the speculative philosophy which began with optimism has ended with pessimism, audaciously avowed, and gaining not a few followers. The great living speculator of England, belonging to a very different school, — to that of observation, — maintains that this world gives evidence of nothing beyond itself, except a great unknown out of which all things have come. Nor is our world what the sentimentalist dreams of, all sunshine and hope, all gratification and gayety. We live in a world where "day and night alternate;" where the evening and the morning constitute the first day, and the second day, and so on; where every man goes accompanied with his shadow, which he cannot leave behind nor overleap; and every one, sooner or later, will have to taste of bereavements, ingratitude, ill-usage; and carries within him a fire of fear, lust, and envy, ready to burst into a conflagration and burn up the soul, as fire is to burn up our world. Look now at this picture and now at that, and say whether they do not answer as face answereth to face in a glass, differing from each other only as one twin-brother differeth from another.

All that science has demonstrated, all that theism has argued, of the order, of the final cause and benev-

olent purpose in the world is true, and cannot be set aside. Every natural law — mechanical, chemical, and vital — is good. Every organ of the body, when free from disease, is good. There is certainly the most exquisite adaptation in the eye, however we may account for its formation, and for the numerous diseases which seize upon it. Agassiz has shown, by an induction of facts reaching over the whole history of the animal kingdom, that there is plan in the succession of organic life. "It has the correspondence of connected plan. It is just that kind of resemblance in the parts — so much and no more — as always characterizes intellectual work proceeding from the same source. It has that freedom of manifestation, that independence, which characterizes the work of mind, as compared with the work of law. Sometimes in looking at the epos of organic life in its totality, carried on with such care and variety, and even playfulness of expression, one is reminded of the great conception of the poet or musician, where the undertone of the fundamental harmony is heard beneath all the diversity of rhythm or song." All this is true, but all this is not all the truth. What the older scientific men did not see: what Newton did not see as he looked to the perfect order of the heavens; what Cuvier did not see, when he dwelt so fondly on the teleology seen in every part of the animal structure; what Paley did not see, when he pointed out the design in every bone, in every joint and muscle; what Chalmers did not see, when in his astronomical discourses he sought to reconcile the perfection of the

heavens with the need of God's providing a Saviour for men, — has been forced on our notice, as naturalists have been searching into animal life, with its struggles and its sufferings. There *is* order in our world, but it is order subordinating conflicting powers. There is goodness, but goodness overcoming evil. There is progression, but progression like that of the ship on the ocean, amid winds and waves. There is the certainty of peace, but after a battle and a victory. There may be seen everywhere an overruling power in bringing good out of evil; so that Schopenhauer, in noticing the evil, has noticed only a part, and this only a subordinate part, of the whole; and this to be ultimately swallowed up.

While they have seen the phenomenon, these men have not known what to make of it. It is useless to tell the younger naturalists that there is no truth in the doctrine of development; for they know that there is truth, which is not to be set aside by denunciation. Religious philosophers might be more profitably employed in showing them the religious aspects of the doctrine of development; and some would be grateful to any who would help them to keep their old faith in God and the Bible with their new faith in science. But we must at the same time point out the necessary limits of the doctrine, and rebuke those unwise because conceited men who, when they have made a few observations in one department of physical nature, being commonly profoundly ignorant of every other — particularly of mental and moral science — imagine that they can explain every thing by the

one law of evolution. But there is a large and important body of facts which these hypotheses cannot cover. Development implies an original matter with high endowments. Whence the original matter? It is acknowledged, by its most eminent expounder, that evolution cannot account for the first appearance of life. Greatly to the disappointment of some of his followers, Darwin is obliged to postulate three or four germs of life created by God. To explain the continuance of life, he is obliged to call in a pangenesis, or universal life, which is just a vague phrase for that inexplicable thing, life, and life is just a mode of God's action. Plants, the first life that appeared, have no sensation. How did sensation come in? Whence animal instinct? Whence affection, — the affection of a mother for her offspring, of a patriot for his country, of a Christian for his Saviour? Whence intelligence? Whence discernment of duty as imperative? It is felt by all students of mental science that Darwin is weak when he seeks to account for these high ideas and sentiments. Careful, as being so trained, in noticing the minutest peculiarities of plants and animals, and acquainted as he has made himself with the appetites and habits of animals, he seems utterly incapable of understanding man's higher capacities and noble aspirations, of seeing how much is involved in consciousness, in personal identity, in necessary truth, in unbending rectitude; he explains them only by overlooking their essential peculiarities. It is allowed that geology does not show an unbroken descent of the lower animals from

the higher; on the contrary, it is ever coming to breaks, and, in the case of a number of tribes of the lower animals, the more highly organized forms appear first, and are followed by a degeneracy. It is acknowledged that in the historical ages we do not see such new endowments coming in by natural law, — the plant becoming animal, or the monkey becoming man. That matter should of itself develop into thought is a position which neither observation nor reason sanctions. Science gives no countenance to it. Common-sense turns away from it. Philosophy declares that this would be an effect without a cause adequate to produce it.

But these inquiries have brought us face to face with a remarkable body of facts. The known effects in the world — the order, beauty, and beneficence — point to the nature and character of their cause; and this, not an unknown God, as Herbert Spencer maintains, but a known God. "The invisible things of God from the creation of the world are clearly seen, being understood from the things that are made, even his eternal power and Godhead." But in the very midst of the good there is evil: the good is shown in removing the evil, in relieving suffering, in solacing sorrow, and conquering sin. Evil, properly speaking, cannot appear till there are animated beings; and as soon as sentient life appears there is pain, which is an evil. It does look as if in the midst of arrangements contrived with infinite skill there is some derangement. It may turn out that the Bible doctrine, so much ridiculed in the present day, of

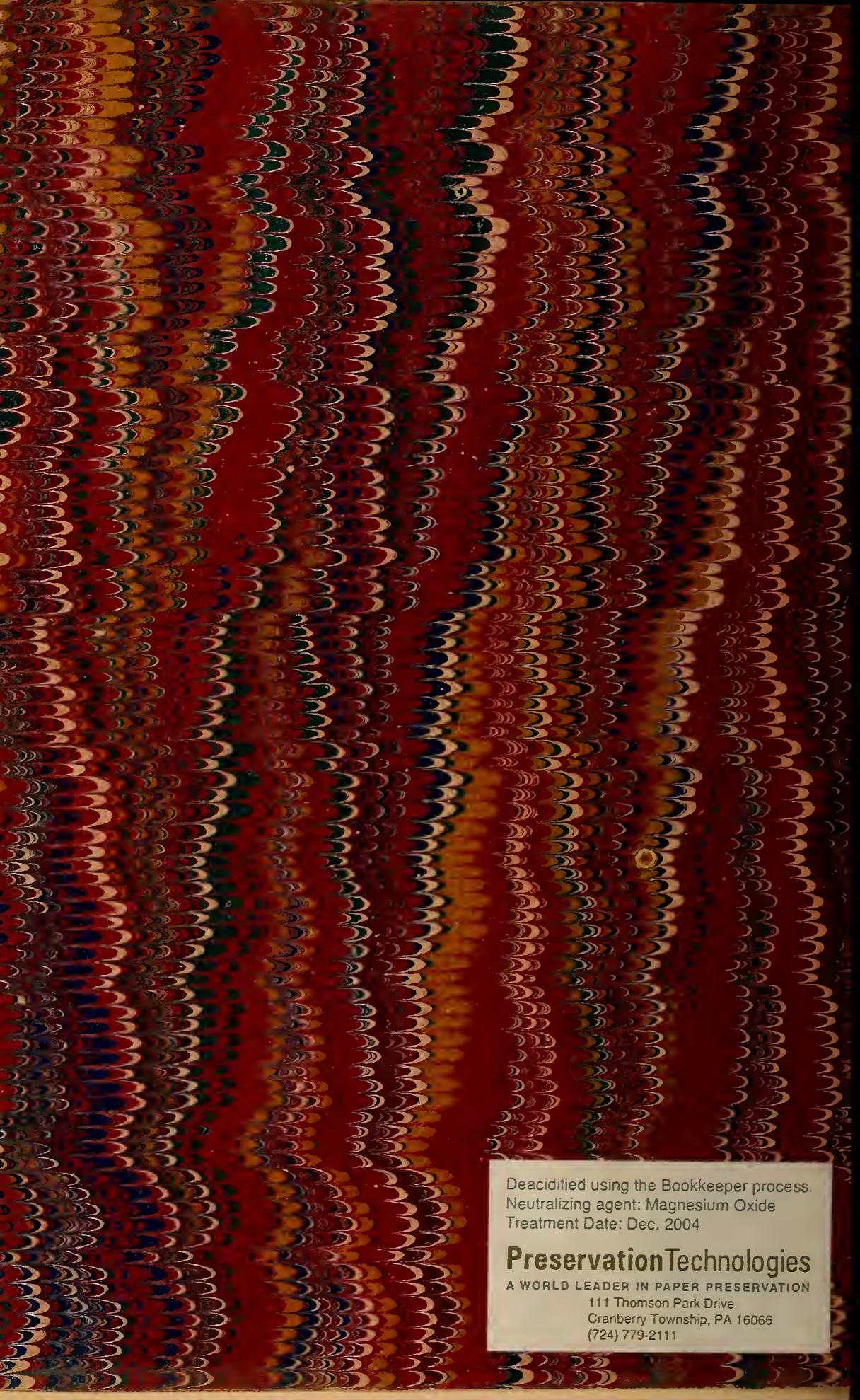
there being a Satan, an adversary, opposed to God and good, has a deep foundation in the nature of things, even as it has a confirmation in our experience, without and within us, where we find that when we would do good evil is present with us. The old Persians had a glimpse of the truth, probably derived from a perverted tradition, and confirmed by felt experience, when they placed in the universe a power opposed to God; but they misunderstood the truth when they made that power coeval and coequal with God; and the old Book, which some are regarding as antiquated, may be telling the exact truth when it tells us that sin is a rebellion to be subdued, and in the end everlastingly cast out. How curious, should it turn out that these scientific inquirers, so laboriously digging in the earth, have, all unknown to themselves, come upon the missing link which is partially to reconcile natural and revealed religion! Our English Titan is right when he says that at the basis of all phenomena we come to something unknown and unknowable. He would erect an altar to the unknown God, and Professor Huxley would have the worship paid there to be chiefly of the silent sort. But a Jew, born at Tarsus, no mean city in Greek philosophy, and brought up at the feet of Gamaliel, but subdued on the road to Damascus, by a greater teacher than any in Greece or Jewry, told the men of Athens, who had erected an altar to the unknown God, "Whom ye ignorantly worship, him I declare unto you." It does look as if later science had come in view of the darkness brooding on the face of the deep without knowing of the

wind of the Spirit which is to dispel it, and divide the evil from the good, and issue in a spiritual creation, of which the first or natural creation was but a type.

We do not as yet see all things reconciled between these two sides, — the side of Scripture and the side of science. But we see enough to satisfy us that the two correspond. It is the same world, seen under different aspects. We see in both the most skilful arrangement; we are told in both of some derangement. Both reveal a known God; both bring us to an unknown source of evil. But with the sameness there is a difference. The relation is not one of identity, but of correspondence; like that of the earth to the concave sky by which it is canopied; like that of the movement of the dial on earth to that of the sun in heaven. On this side is a wail from the deepest heart of the sufferer; on that side there is consolation from the deepest heart of a comforter. On the one side is a cry like that of the young bird when it feels that it has wandered from its dam; on the other, a call like that of a mother bird, as you may hear her in the evening, to bring her wandering ones under her wings. You may notice on that side a bier, with a corpse laid out upon it of a youth, the only son of his mother, and she a widow; on that other side the same picture, but with one touching the bier, and the dead arises, and is in the embraces of his mother. On this side you see a sepulchre, and all men in the end consigned to it, and none coming out of it; on the other side you see the great stone rolled away, and hear a voice: "He is not here; He is risen."

The grand reconciliation is effected by that central figure standing in the middle of the ages, by Him who has "made peace through the blood of His cross, by Him to reconcile all things unto Himself, by Him, I say, whether they be things on earth, or things in Heaven."

We have been able to take only a very cursory glance at the inscriptions on the wall of his temple. It is the aim of all learning, sacred and secular, to enable us to read and comprehend them. The superscription over the central figure was in letters of Greek and Latin and Hebrew, that the people of all countries may read it, and that we may proclaim it in every language. In the great contest going on without and within, every man must be on the one side or the other; let us see that we be on the right side.



THE DEVELOPMENT HYPOTHESIS.

DR. McCOSH.