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ARTICLE IV.

THE COSMOGONY OF GENESIS AND ITS RECONCILERS.

BY PRESIDENT HENRY MORTON, PH.D.

WHEN the famous Gladstone-Huxley controversy in the *Nineteenth Century* for 1885–86 had been closed and its results placed in the most satisfactory shape for the best interests of theology by the admirable paper of Henry Drummond in the same journal for February of 1886, it might have been supposed that the efforts of the Reconcilers of the Cosmogony of Genesis with the results of scientific investigation would have been intermitted, at least as to the questions thus far disposed of.

Recent as was this controversy, and great as was the attention which, by reason of the distinguished position of its participants, it attracted, it however seems already to be largely forgotten even by some of those who have been so attracted by this subject as to add themselves to the long list of the "Reconcilers."

The same also appears to be true in reference to another almost cotemporaneous controversy on the same subject between the leading geologist of America, Professor Dana, and the leading Hebrew scholar of England, Canon Driver.

As the papers containing these controversies are scattered through numerous journals,[1] and involve reference to a number of books not easily accessible to many, I have thought that an abstract of the literature of the subject

[1] E. g. the Nineteenth Century, the Expositor, the Andover Review, and the Bibliotheca Sacra.

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would have some value and be of interest to readers of the BIBLIOTHECA SACRA.

As I propose, moreover, to make this not a mere abstract of documents, but to introduce explanations and comments of my own, it will, I think, be well for me to place myself in touch with my possible readers, by a brief introductory expression of views on the general subject of the Reconcilers and their work.

In my opinion, this work, in past time, has been invaluable to the cause of religion, and those who have labored at it have been actuated by the highest and best motives, as well as possessed of distinguished capacities in their several lines. In view, however, of the advances in biblical science made during the last century, which are at the present time attaining general recognition and acceptance, these works of reconciliation are like the earthworks thrown up from time to time by an advancing army, which, notwithstanding the invaluable protection they have afforded, must be abandoned, because any attempt to continue their occupation would be inconsistent with a safe advance and with a successful prosecution of the campaign.

Until the beginning of the present century, and indeed in some quarters much later, the cosmogony of Genesis was on all sides accepted as a strictly literal narrative of the creation of the universe, and of the earth with its various species of living things, by a series of Divine acts or fiats occupying the space of six natural days.

About this time, however, the sciences of astronomy, geology, paleontology, comparative anatomy, and the rest, began to reveal facts concerning the actual or probable history of the earth's development, which year by year rendered it more and more difficult for thinking men to accept the old view; and, after various attempts to discredit the conclusions of these sciences, the theological teachers little by little recognized that they must be accepted, and that

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some modification of the old views or interpretations must be made, to save them from the position of absolute conflict with the growing mass of scientific knowledge.

To accomplish this work appeared a succession of able writers, about evenly divided among reverent men of science and broad-minded theologians, who proposed scheme after scheme, having a general unity of plan but many modifications of detail, by which the account in Genesis might be so interpreted as to bring it into harmony with the proved facts and reasonable deductions of science. These schemes, one and all, were admirable in motive, highly creditable as a rule to the learning and eloquence of their authors, and for the time very efficient in securing their object, a *reconciliation.* I can myself well remember the satisfaction with which Hugh Miller's "Testimony of the Rocks" was read, and how well it appeared to meet the requirements of its day.

Able, however, as were these writers, and admirable as was their object, yet as time went on, partly through the developments of scientific knowledge (e. g. the growth and finally the general acceptance of the theory of evolution), their schemes one after the other fell out, and were seen to be inconsistent or incomplete, until it looked as if the former impossibility of accepting the *record of Genesis* and also the *record of the rocks* must again be faced.

In this crisis help came from a new quarter. Cotemporaneously to a certain extent with the development of scientific research into the physical records of nature, had grown up the scientific research into the literary records of religion, or the science of Criticism as applied to the Bible.

As the student of geology, by a careful study of the surface of the ground, had been enabled to recognize successive strata underlying one another, and to reach some reasonable conclusions as to their relative dates or order of formation, and also as to the methods by which one or

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another layer had been produced; so the critical student, by a careful study of the text of the Bible, had been enabled to recognize in it the various strata, consisting of the work of successive writers and editors, and to assign with greater or less precision their date or succession and also the conditions involved in and controlling their production.

The result of this was to show that the writers of the Bible were first of all *men*, influenced by the ideas and customs of their times, and addressing their cotemporaries in language such as they understood and used, running counter to none of their ordinary conceptions as to the objects around them or the phenomena of nature. Also that these *men* were truly *inspired* with such knowledge, as neither they nor any human being since could attain to unaided, as to the relations of the *Creator to his universe* and of *God to man*, including the picture of a good God, hating every kind of iniquity and punishing transgression of his moral law, and yet long-suffering and patient with erring man, holding in fact the relation of a loving Father to his wayward children.

This was a knowledge then and forever beyond the reach of the human intellect as a deduction from observed phenomena, and with this knowledge were the writers of the Bible in various measure *inspired;* but they were not inspired as to matters of science, art or history, either near or remote, but were left to such sources of information, accurate or otherwise, as might be available to them, with no other guidance and protection from error than that which was involved in their lofty moral aim, perfect candor and honesty of statement.

To quote the words of one of the highest living authorities among biblical critics in reference to the special subject now before us, the Cosmogony of Genesis: "It neither comes into collision with science nor needs reconciliation with it; its office lies on a different plane altogether; it is

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to present under a form impressive to the imagination, adapted to the needs of all time, and containing no feature unworthy of the dignity of the subject, a truthful *representative picture* of the relation of the world to God." [1]

Again, turning to a source from which we would hardly have expected such very liberal utterances, we find in the works of the Abbé Loisy entitled "Les Études Bibliques," [2] and "Les Mythes Chaldees de la Creation et du Deluge," [3] statements which are in substance to the effect, that the science of the Cosmogony of Genesis is that of the age in which it was written, and has been in part derived from the Babylonian myths, and moreover that, in the opinion of this author, those who strain the meaning of its words for the purpose of securing a harmony with the science of to-day are risking injury to faith, and bringing discredit on the Scriptures themselves and the church which accepts them.

To those holding these views, the entire process of "reconciliation" was obviously unnecessary. It would involve no loss of confidence in the *real inspiration* of the writer of the first account of creation in Genesis (whether he was Moses, or an antediluvian poet, or a priest in the year 450 B. C.) to suppose that he intended to picture the creation as accomplished in six natural days by successive and distinct fiats or acts of the Creator, and that he arranged the order of these fiats or acts according to his own best judgment as to their natural sequence, placing, for example, vegetation in its full development before animal life, because he saw that animals required such vegetation for their support; also that he intended to describe the sky as a dome or vault from which the sun, moon, and stars were supported as moving and movable lamps.

[1] Canon Driver in the Expositor for 1886, 3d Series, Vol. iii. p. 45.
[2] Published at Amiens in 1894, at pp. 23, 33, and 81.
[3] Published at Amiens in 1892.

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The story thus told and interpreted has served for at least twenty centuries to bring to the hearts of great, good, and wise men of every age and country, the fundamental truths it contains as to the relations of the Creator to his universe, and it will still so serve, as well as if it could be interpreted in agreement with views of the actual details of the cosmogonic process which were substantially undreamed of until the present century

Yet further, to the biblical critic the work of reconciliation would appear futile as well as unnecessary, for even if the first cosmogony of Genesis could be reconciled with the results of scientific investigation, there would then present itself the second cosmogony, beginning in the fourth verse of the second chapter with the words, "In the day that Jehova God made earth and heaven," and which goes on to describe how God made the man (Adam only) out of dust, then planted for him a garden and made trees good for his food, then made animals for companions, and finally Eve out of a part of Adam's body. This certainly could neither be "reconciled" with the first cosmogony nor with scientific results by any rational method of interpretation, and it is worthy of note that most reconcilers ignore this second narrative altogether.[1]

[1] It is of course true that many apologists have attempted the impossible task of reconciling these absolutely inconsistent statements, but their conspicuous failure is a sufficient refutation, and I believe that the all but universal opinion of intelligent commentators is well expressed in the following quotation, from "The Handbook for Bible Classes—Genesis (edited by Professor Marcus Dods, D.D., and Rev. Alex. Whyte, D.D., Edinburgh), which is found at p. xviii of the "Introduction": "But the most convincing proof of the regardlessness of scientific accuracy shown by this writer is found in the fact, that in the second chapter he gives a different account from that which he has given in the first, and an account irreconcilable with physical facts. For in the second chapter he tells us that after God had made man he saw that it was not good for him to be alone, and said, I will make a helpmeet for him. And out of the ground the Lord God formed every beast of the field and every fowl of the air, and brought them unto Adam to see what he would call them.

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Such (though, as I feel, very crudely and inadequately expressed), being the situation, after the development and general acceptance of the results of critical investigation; the problem worked on by the reconcilers simply vanished from the horizon of those accepting these results, or, to refer again to our former metaphor, it was seen to be a position which had lost its strategic importance on account of a general advance of the line, whose defensive works must necessarily be abandoned, especially when, as at once appeared, their longer occupation seriously embarrassed the advance of the general line of battle by obstructing its line of supplies.

In the words of Professor Henry Drummond: "From this standpoint (that of biblical criticism) the problem of the reconciliation of Genesis with geology simply disappears."[1]

There were, however, some, notably those who had already committed themselves to theories of reconciliation, who declined to accept the results of the new science of biblical criticism or who failed to realize their bearing upon the problem of reconciliation, and who still sought to maintain their defense of the old fortifications.

Conspicuous among these was, and is, Sir J. W. Dawson, who may be considered as at once one of the earliest, as well as one of the latest, of the recent reconcilers, since in 1893 he has published a volume on "The Origin of the World according to Revelation and Science," which, as he

That is to say, he represents the creation of man as preceding the creation of the lower animals, an order which both the first chapter and physical science assure us was not the actual order observed."

"But here again, though the statement is not in literal accordance with fact, the impression made upon the mind is true and right. It is merely the writer's way of saying that man was the important part of the creation, and that the other animals were made for man—a fact which science also assures us of in its own strictly literal and demonstrative manner.'

[1] Nineteenth Century (Feb. 1886), p. 209.

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there tells us, is in the main identical with his volume "Archaia," on the same subject, which he published in 1860.

This author is a conspicuous example of that conservatism which adheres to ancestral conclusions, and finds itself unable to assimilate the new ideas which constitute the life of progressive science. Thus in view of the all-but-universal acceptance of the doctrine of evolution at the present day, not only among men of science but among liberal-minded theologians and men of cultivation generally, it is almost amusing to read as follows in the above-mentioned work by Dawson: "There are what I would term the five fatal objections to evolution as at present held as a means of accounting for the introduction and succession of animals." [1]

It is again curious to compare a recent statement, as to the results of the higher criticism, made by Professor W. H. Green, of Princeton, who is almost the only Hebrew scholar of eminence who stands out against the general consensus of opinion among Hebraists on that subject, with Sir J. W. Dawson's disposal of the same in his preface of 1893.

Dr. Green says: "The critical partition of Genesis has been gradually elaborated during more than a century by a succession of scholars of the greatest eminence, who have expended upon it an immense amount of learning, ingenuity, and patient toil, until they have at length brought it into a shape in which it is accepted with substantial unanimity by European critics of widely different schools of thought and every various grade of belief and unbelief." [2]

Such being the deliberate judgment of an acknowledged master in Hebrew scholarship as to the opposing school, let us see how Sir J. W. Dawson disposes of the matter. On pages v and vi of his preface he says: "Besides this

[1] The Origin of the World, p. 228.

[2] Art. "The Pentateuchal Question," Hebraica, Vol. v. (1889), p. 140.

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the greater part of the methods and conclusions of the higher criticism, as applied to the earlier books of the Bible, while complicated, dreary, and based on minute points of verbal detail, seem to be neither scientific nor historical, but rather a diseased product of the hypercritical and skeptical spirit of the age." A mind on which the scientific developments of the last thirty-three years could produce no more effect than this, would of course remain firm in its early impressions, and hold in 1893 the views which appeared reasonable in 1860.

Turning now to the direct consideration of the reconcilers, I would first state that I will confine myself to what may be considered the cotemporary class (i.e., those who are now living, or those whose work was done at about the same time, and is in a way intermingled by quotation and reference with that of the others). Arranging them in the chronological order of their earliest work as reconcilers, this class includes Professor Arnold Guyot, Sir J. W. Dawson, Professor J. D. Dana, and the Right Honorable Mr. Gladstone.

Before entering upon the discussion in detail of the systems or modifications of a system developed by these writers, permit me to say a few words as to the broad features of the problem before them. The two accounts to be reconciled were:—

1st. The account of Genesis, which, taking the plain meaning of the words employed, described a creating of the earth, with its occupants, atmosphere, and surrounding heavenly bodies, by a series of distinct acts or fiats in a given order or succession during six natural days.

2d. That of Science, which describes, (*a*) in the general terms of the nebular hypothesis, the progressive development of the earth and heavenly bodies; and (*b*) in the general terms of the theory of evolution, the development of all forms of vegetable and animal life from the lowest germs

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or protoplasm, whose simplest form now recognized is the Amœba Proteus.[1]

At the first glance the reconciliation of these two accounts would seem rather hopeless, to say nothing of any minor questions, such as the exact order of succession or the like. The scientific record was distinct, and not capable of any considerable flexure in the way of interpretation, and therefore the burden of accommodation was thrown mainly on the interpretation of the Hebrew narrative.

For this one would have supposed that a profound knowledge of the Hebrew language would have been an essential qualification on the part of the reconciler. Curiously enough, however, not one of the gentlemen above named possessed or made claim to any such knowledge of the Hebrew language as would give him weight as *an authority* in matters relating to the proper rendering of Hebrew words and phrases.

Most of them have been contented to found their conclusions mainly on the translation of our Authorized Version, and in one case at least Professor Guyot founds an argument on an error corrected in the Revised Version.[2]

So much being premised, I will now turn to the scheme of reconciliation proposed by Professor Guyot as the same is developed in his volume entitled "Creation,"[3] and this I can most clearly and fairly present in the first instance by quoting the tabular statement which he gives in the last two pages of this volume.

[1] See The Whence and the Whither of Man, by Professor J. M. Tyler of Amherst College (Scribner's Sons, 1896), p. 33.

[2] Creation (Chas. Scribner's Sons. 1893), p. 87.

[3] The edition of 1893.

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ERA OF MATTER.

Introduction.

THE BIBLE.	SCIENCE.
In the beginning God created the Heavens and the Earth. And the Earth was desolateness and emptiness, and darkness was upon the face of the deep.	Matter is not self-existent. Primitive state of matter. Gas indefinitely diffused.
First Day: And God said, Let Light be, and Light was. And God separated the light from darkness.	*First Activity of Matter.* Gravity. Chemical action. Concentration of diffused matter into one or more nebulæ, appearing as luminous spots in the dark space of heaven.
Second Day: And God said, Let there be an expanse in the midst of the waters. And God made the expanse, and separated the waters under the expanse from the waters above the expanse.	*Division.* The primitive nebula is divided into smaller nebulous masses. Formation of the visible, lower, starry world.
Third Day. *a.* And God said, Let the water under the Heavens be gathered to one place and let the dry land appear. *b.* And God said, Let the earth bring forth vegetation.	*Concentration.* The nebulous masses concentrate into stars. Our sun becomes a nebulous star. Formation of the mineral mass of the earth by chemical combination of the solid crust, the ocean, and atmosphere. The earth self-luminous; a sun. First appearance of land. Azoic rocks. First infusorial plants and protophytes.

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Fourth Day. And God said, Let luminaries be in the expanse of the Heavens to separate the day from the night, and they shall be for signs, and for seasons, and for days, and for years.	Chemical actions subside. The earth loses its photosphere; sun and moon become visible. First succession of day and night, of seasons and years. Differences of climate begin. Archaean rocks. Photophytes. Protozoans.
Fifth Day. And God created the great stretched out sea monsters and all living creatures that creep, which the waters breed abundantly, and every winged bird.	Plants and animals appear successively in the order of their rank — marine animals, fishes, reptiles, and birds. First great display of land plants. Coal beds. Paleozoic and mesozoic ages.
Sixth Day. *a.* And God made the beasts of the earth, and the cattle, and every creeping thing of the ground after its kind. *b.* And God created man in his image.	Predominance of mammals; the highest animals. The beasts of the earth, Carnivorous; the cattle, Herbivorous animals. Tertiary age. Creation of man. Quaternary age.
Seventh Day.—Sabbath. And God saw all that he had made, and behold it was *very good*. And God rested on the seventh day.	No material creation. Introduction of the moral world. Age of man.

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In considering this tabular statement, it will be first observed, that what science recognizes as the primitive state of matter, i.e. gas indefinitely diffused, is, according to our author, indicated in the Hebrew text by the words translated in the Revised Version as "The earth was waste and void, and darkness was upon the face of the deep." Now what do Hebrew scholars say as to the meaning of the Hebrew words here used?

Canon Driver, in reference to the use of these same words in the same connection by Professor Dana in an article indorsing Professor Guyot's system, says: "Were the Hebrew words concerned of rare occurrence or doubtful significance, were there any ambiguity of construction or sense, the latitude claimed would be cheerfully and cordially granted. But no such doubt or ambiguity exists. Professor Dana's accommodation of the nebula theory to the cosmogony of Genesis is purchased at too high a price. It implies that in verse 2 "earth" and "waters" denote nothing resembling what those words expressed to the ancient Hebrew, but matter in that unimaginable condition when it was not yet endowed with force."[1]

Turning to the work generally referred to as the "Speaker's Commentary," and to the volume on Genesis in which chapters i.–xix. are treated by Canon F. C. Cook, I find on pages 31 and 32 as follows: "*And the earth was without form and void. Desolate and void.* These two words express devastation and desolation. . . .

"The purpose of the sacred writer is to give a history of man, his fall, his promised recovery, then specially of the chosen seed and the rise of the Theocracy."

"He therefore contents himself with declaring in one verse, generally the creation of all things, and then in the

[1] Art. "The Cosmogony of Genesis," Andover Review for 1887, pp. 648, 649.

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next verse passes to the earth, man's place of abode, and to its preparation for the inhabitation of man."

"The meaning of the verse before us evidently is, 'In the beginning God created the universe,' but at the time now to be spoken of, the earth which is our chief concern, was shapeless and waste"; "*darkness was upon the face of the deep.* No light penetrated to the desolate and disordered ruin. The deep may mean either the confused mass itself, or, as more frequently, the abyss of waters and the clouds and mists with which the earth was surrounded."

In the first volume (that on Genesis) of Lange's Commentary [1] we find the same ideas developed as to the meaning of the words translated "desolate," "void," and "deep," though the passage is too long for insertion here in full. I can only quote a fragment as follows: "It is clean against the text to say that the chaos, as something that is primarily the earth, embraces, at the same time, the heaven that exists with and for the earth. For it is very clear that the language relates to the original condition of the earth, although the genesis of the earth may serve by way of analogy for the genesis of the universe."

Again, in the large work of Professor George T. Ladd, D.D., of Yale College, entitled "The Doctrine of Sacred Scripture," occurs the following: "The correspondence of the *Tohu-va-Bohu* of Gen. i. 2, and the cosmogonic period when the heavens and the earth were 'in the condition of a gaseous fluid,' is specious. For, according to the Mosaic Cosmogony, the heavens were made from the earth-mass which was at that time unillumined, and moreover the term תְּהוֹם (a mass of raging waters) has no resemblance to a gaseous fluid. (This is certain from the etymology of the word הוּם, to roar), and from its use elsewhere: compare Gen. viii. 2, 'and the waters assuaged'; Ezek. xxvi. 19, 'when I shall bring up the deep upon thee and the great

[1] Edited by Dr. Philip Schaff (Scribner's, 1893), p. 163.

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waters shall cover thee'; Jonah ii. 5, 'The waters compassed me about, even to the soul; the deep was round about me'; Ps. xlii. 7, 'deep calleth unto deep.'"[1]

Turning next to the second pair of comparisons in Professor Guyot's table, we find the work of the first day given in the biblical narrative as, "And God said, Let Light be, and Light was. And God separated the Light from the darkness."

This is said to correspond, in the science-account, with "First Activity of Matter, Gravity, Chemical Action, Concentration of diffused matter into one or more nebulæ, appearing as luminous spots on the dark space of heaven."

As to the above I would remark, in the first place, that the omission of the important words, "And God called the light Day, and the darkness he called Night," is entirely unwarranted and misleading, because these words clearly exclude the interpretation which would make the statement in the Bible the equivalent of a reference to the formation of the nebulæ. In the text of his book on page 46, Professor Guyot dismisses this serious difficulty in the way of his theory, in an off-hand manner as follows: "'And God called the light *day*, and the darkness he called *night*.' Both words are here specific names used without reference to any period or succession of time."

In other words in this connection, the Creator is represented as applying the word "day" not to any period of time, but to nebulæ appearing as spots of faint luminosity in the otherwise dark space of heaven; and as applying the

[1] The word תְּהוֹם, according to Gesenius, is a poetic word, and means properly "a mass of raging waters, so called from their noise and roaring; specifically *the sea, ocean, the deep* (Gen. viii. 2; Job xxviii. 14, etc.; Amos vii. 4). More rarely used of any other *mass of waters*, as those covering the earth at creation (Gen. i. 2; Ps. civ. 6). Or the subterranean waters, *the deep, the abyss*, whence springs, fountains, streams (Gen. xlix. 25; Deut. xxxiii. 13). Also used in the description of roaring waters or floods (Ps. xlii. 8; Ezek. xxxi. 4)."

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word "night" not to any period or succession of time, but to the dark spaces between the nebulæ.

Is this good Hebrew? We can only reply, What do Hebrew *scholars* say about the meaning of these words, as here used? Turning to page 2 of "Genesis"[1] by Professor Marcus Dods, D.D., I find as follows: "Besides, the writer immediately goes on to say that the light and darkness had their boundaries fixed, and were called *day and night*, that is to say, the division which still continues was then made, and that which now distinguishes light from darkness was then introduced. (Any allusion, therefore, to other light than that which the sun supplies is here quite irrelevant)."

In the volume on Genesis by the Very Rev. R. Payne Smith, D.D., belonging to the series of Commentaries for Schools, edited by C. J. Ellicott, D.D., Bishop of Gloucester and Bristol, I find on page 69, "God called the light Day . . . Night. Before this distinction of night and day was possible there must have been outside the earth, not as yet the sun, but a bright phosporescent mass such as now enwraps that luminary; and secondly, the earth must have begun to revolve upon its axis."

Without indorsing the strict scientific accuracy of the expressions here used, the entire statement may be accepted as showing that the terms "day and night" in the opinion of this Hebrew scholar indicated what they do to the ordinary reader, periods of successive light and darkness, and not "specific names" for "nebulæ appearing as luminous spots in the dark space of heaven."[2]

[1] Handbooks for Bible Classes (T. & T. Clark).

[2] In reference to the Hebrew words יוֹם and לַיִל Gesenius says, of יוֹם: *a day* so called from the diurnal heat, root יוּם. Same word used in Aramaic, Samaritan, and Arabic. "Spoken of the natural day, from the rising to the setting sun (Gen. i. 14, 16; vii. 4, 12; viii. 22; xxxi. 39. Also of the civil day of twenty-four hours which includes the night." (Compare our English usage.)

Gesenius says of לַיִל: *night.* Same in Arabic, Syriac, Aramaic, Ethi-

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So far as to the propriety of the interpretation which Professor Guyot puts upon the Hebrew words and phrases expressing the work of the first day; but I think that a word is here in place also, in reference to his statement of the scientific narrative.

This, taken in connection with the related portions of the text of his book (pp. 43–48), amounts to the assertion that, according to the scientific view of this subject, the matter of the universe as first created was inert, or void of such properties as are indicated by the words Gravity and Chemical Action, properties capable of producing in it motion, and consequently light.

On this, in its relations to the science of physics, I think that I may, without presumption, express an opinion to the effect that such an assumption is entirely discordant with all physical conceptions of the nature of matter. As a *metaphysical conception*, that of matter in an inert state, or devoid of the properties by which we recognize it, and which necessarily involve motion as one of its conditions, is perhaps capable of being entertained.

I am not prepared to go so far as some, and say that the idea of matter without properties is "unthinkable," but I am entirely confident that such an idea is contrary to all the conceptions to which the science of physics leads us. We know matter only by its properties, and to whatever department of human thought the idea of matter without properties (which result from the action of forces) may belong, it is certainly no part of physical science, or such as

opic, etc. "By many regarded as a primitive word and its etymology is at least very doubtful. But as יוֹם *day* comes from the idea of heat, so לַיְלָה *night* may come from that of cold, viz., as causing one to *roll* or wrap himself in his cloak or bed-covering from root לוּל to *roll*." (This etymology is generally discredited now, but for the very reason that לַיְלָה being a "primitive root," its meaning is so concrete and invariable that any "philosophical" idea is inadmissible.)

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one trained in the methods of physical science could indorse.

This idea as to the necessary relation between matter and its properties, and indeed between matter and motion, is no novelty. As long ago as 1874, the present writer, in an address delivered at the fiftieth anniversary of the Franklin Institute, said as follows: "If the matter of the universe were to be brought to a state of rest, it would no longer be the universe, it would no longer be matter as we can comprehend that idea; or in yet other words, matter is matter, the universe is the universe as much by reason of the motion of its individual atoms as by reason of their actual existence."

To illustrate this, two views, one the exterior or artistic, the other the interior or scientific, are then given of the same scene.

"We are in a valley among snow-capped mountains and before us a lake spreads its mirror to the sky. No breath of air ripples its surface, no wavelet breaks upon its beach, nothing is there but absolute repose. So says the artist, and painting such a scene, he calls his picture 'Silence,' Repose, The Lake of Dreams, or some such appropriate title."

"Now, however, let us look at the same scene with eyes touched by the wand of science, and opened to see beneath the surface of things. What do we then behold? Is there any longer an impression of repose? Of rest? Of sleep?"

"Look at that mass of water with its mirror-like surface. We see there a perfect Sebastopol of flying missiles, water molecules hurled in clouds from the surface into the air, water molecules hurled back from the air into the water surface. It is by such action as this, science shows us, that evaporation takes place, or the invisible though rapid passage of the liquid water into the viewless air."

"The whole mass of the water is likewise thrilling

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through with those heat motions, of which if deprived partially, it would freeze into ice, and if robbed utterly, would shrink into some formless horror, of which even the imagination of science can form no picture."

"We turn now to the breezeless air, and here again we see that it *is* air, and not some densest, solid, or nameless nonentity, only because of the ceaseless flight of its countless molecules, which, rebounding, jostling, ricochetting, glancing, but ever on the wing of motion, make it the light elastic fluid which we know as air."

"And if we next turn to the towering rocks and snow-capped peaks, we will find the same conditions in a modified form. All undoubtedly thrill with the quick heat-pulse which is the very soul of matter, and in all probability owe their distinctive characteristics to peculiar modes of motion among their atoms."

The above expresses no new or individual opinion of its author, but only a pictorial statement of the views long before announced by Helmholtz, Sir William Thomson, Faraday, Tyndall, and others.

Turning next to the work of the Second Day as indicated in Professor Guyot's table, we find this as set forth in the biblical account in the following words: "And God said, Let there be an expanse in the midst of the waters. And God made the expanse, and separated the waters under the expanse from the waters above the expanse." In connection with this statement we find Professor Guyot laying down the law most emphatically as to the proper meaning of the Hebrew word *rakia*, which he renders expanse, meaning thereby open space, but which the Authorized and Revised versions both render "firmament," with the idea of a solid dome or partition. Let us now see what Hebrew scholars have to say about this; but, first, I would call attention to an argument in support of his translation,

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to which Professor Guyot appears to attach some weight, but which is in fact founded on another imperfect translation. Thus on page 55 Professor Guyot says, "and further, verse 20, that God created the birds to fly in the open firmament of heaven," meaning in the open space.

But, as the margin of the new version shows, this expression is equivalent to "on the face of the expanse of the heaven," which implies not an open space, but rather a solid surface or dome. Moreover, this same phrase is used in verse 2, "The spirit of God moved upon the face of the waters"; also in Lev. xiv. 7, "into the open field" (R. V.), but literally "upon the face of the field"; Ezek. xxxii. 4, "cast thee forth upon the open field"; xxxiii., "in the open field" (R. V.), and in many other places, always denoting in front of a surface.[1]

Evidently, then, in assuming that because the Authorized Version says that birds are to fly *in* the open firmament of heaven, this "firmament" must be a clear space in which birds can fly, Professor Guyot is simply relying upon an inadequate translation, corrected in the margin of the Revised Version and elsewhere.

Returning now to the opinion of Hebrew scholars as to the proper signification of *rakia* in this place, the retention of the word "firmament" in the Revised Version is of itself very significant, even though "expanse" is placed in the margin.

Turning to Genesis by Dr. Marcus Dods, we find on page 3: "The chaotic darkness having been dealt with, the watery mass is next reduced to order. This is effected, in the first place, by separating the waters into under and upper waters by means of a *firmament*. *Expanse* is a more accurate rendering of the word. But the purpose served by the expanse seems to involve the idea of solidity conveyed by the word *firmament*. . . . That the sky was a

[1] See Canon Driver, Andover Review, Dec. 1887, p. 664, Note 2.

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structure, more or less solid, capable of upholding the upper waters, and with windows (sluices) which could be opened to let these waters through, was probably in primitive times believed."

The story of Babel would indicate that this view of a solid "firmament" was accepted at the date when that narrative was written, and the theory of Cosmas, the Egyptian monk, which obtained such general acceptance in the early church and down through the Middle Ages, shows that a like conception was agreeable to the educated minds of much more recent periods.[1]

In Lange's Commentary of Genesis, I find at page 168, after, "Let there be a firmament. . . . 'The heaven was to the Hebrews a material substance (Ex. xxiv. 10), a fixed vault established upon the waters that surrounded the circle of the earth (Prov. viii. 27), firm as a molten mirror (Job xxxvii. 18), and borne up by the highest hills, which are therefore called the pillars and foundations of the heaven (2 Sam. xxii. 8; Job xxvi. 11); openings or doors are ascribed to it (Gen. vii. 11; xxviii. 17; Ps. xxviii. 23).'"

Again, turning to the article by President W. R. Harper, in *Hebraica* for 1888, on "The Pentateuchal Question," I find on page 28 as follows: "8. In P. the universe is conceived of as a diving-bell in water תהום (i. 2); the vaulted roof is the רקוע השמים (i. 6) with the יבשה (i. 10) as the floor, (cf. how the flood is produced in P. by water let in from top and bottom at once (vii. 11; viii. 2 *a*), the sluice-gates (נתינות) in the floor (תהום) broken up, and the openings (ארבות) of the heavens opened.)"[2]

[1] See History of the Warfare of Science, A. D. White, 1896, Vol. i. p. 89 *et seq.*

[2] Gesenius: רָקִיעַ is properly "a solid expanse." The root means "to beat out," i.e. to spread or expand by beating, as God did the Earth (Ps. cxxxi. 6; Isa. xlii. 5; xliv. 24; in Syriac the *Aphel* means to *found* pro-

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The most serious question of translation or interpretation in this place, however, comes in reference to the Hebrew word rendered "waters." Is it consistent with sanity, not to say accuracy in interpretation, to make the word "waters" stand for great and small primitive nebulæ and "the visible lower starry world"?

It does not seem to me, aside even from a knowledge of Hebrew forms of expression, that anything short of a wild devotion to a theory could enable any one to find in this division of the waters, the separation of the luminous primitive nebulæ into the "visible lower starry world."

But let us see what Hebrew scholars think about this word and its meaning in this connection. The quotation recently made from Dr. Marcus Dods shows what his opinion is, and Canon Driver in reference to the same rendering, given by Professor Dana in his indorsement of Professor Guyot, says: "I protest against the assumption, which Professor Dana's theory involves, that an attenuated vapor or nebula could be denoted in Hebrew by the word 'waters.' . . . The ordinary interpretation of verses 6–8 must be acquiesced in. The verses describe something which, in the conception of the narrator, took place subsequently to the 'making' of the earth, presupposed already in verse 2, and this, no doubt (without raising the question whether the firmament was conceived as solid or not), was the separation of the waters which the Hebrews regarded as stored in the clouds [or in the heavens above the solid firmament,

perly by beating and stamping in order to make a solid foundation. The noun רָקִיעַ *the firmament* of heaven (Gen. i. 6), etc. The Hebrews supposed the firmament to be spread out like a solid hemispheric arch over the earth, shining and pellucid as sapphire (Ex. xxiv. 10; cf. Dan. xii. 3); in it were fixed the stars (Gen. i. 14–17); and above it was the celestial ocean with windows in the firmament through which the waters fell as rain upon the earth (Gen. i. 7; vii. 11; Ps. civ. 2; cxlviii. 4); this latter being the common notion, although the true state of the case was not unknown to the Hebrews (see Gen. ii. 6; Job xxxvi. 27–28).

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H. M.] (Gen. vii. 11: 'The windows of heaven were opened'; Ps. civ. 3: 'Who layeth the beams of his chambers in the waters,' etc.), from the waters on the surface of the earth."

Turning now to the work of the third day, as given in Professor Guyot's table, we find under the biblical account:

"*a.* And God said, Let the water under the Heavens be gathered to one place and let the dry land appear."

"*b.* And God said, Let the earth bring forth vegetation," and under the Science account—"*Concentration.* The nebulous masses concentrate into stars. Our sun becomes a nebulous star. Formation of the mineral mass of the earth by chemical combination of the solid crust, the ocean, and atmosphere. The earth self-luminous; a sun. First appearance of land. Azoic rocks."

"First infusorial plants and prototypes."

Confining our attention at first to section *a*, can we be anything but lost in astonishment at finding the simple, straightforward statement of the separation of the oceans from the continents of the earth by the upheaval of the latter transformed into the whole history of the earth according to the nebular hypothesis, including a stage in which it was a self-luminous sun?

And if we regard this as a possible rendering of the Hebrew account, must we not, with Professor Huxley, "stand aside and admire the marvelous flexibility of a language which admits of such divers interpretations"?

I must freely confess that when I first read this part of Professor Guyot's scheme of reconciliation I could hardly trust my eyes and senses, and even felt for a moment that this might be intended as a sort of *reductio ad absurdum*, to expose the weakness of such schemes.

There is, however, no mistake about the seriousness with which this part of the scheme is propounded; but I do not think it requires serious consideration or proof of its un-

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reasonableness; this is manifest on mere perusal. Even Professor Dana, in his article intended to be, and in fact constituting, a general indorsement of Professor Guyot's scheme, cannot accept this element, but throws the formation of the earth as well as the solar system from the primitive nebula, into the work of the second day, as part of the separation of the waters from the waters. He regards this part of the third day's work in its natural sense as consisting in the upheaval of the continents.

Turning to Lange's Commentary on Genesis, I find, on pages 168 and 169, "That the physical dividing of the earth-mass and of the water-mass is here presented, is clear. . . . It is thereby implied that the elevations and depressions of the earth's surface—the hills and vales, the highlands and the ocean depths—are here formed, just as it is so precisely set forth; (Ps. civ. 6–8, with which compare Prov. viii. 24)." The same view is expressed or implied in every commentary I have consulted.

We now come to Professor Guyot's second part of the work of the third day.

It will be noticed that the biblical account is given as "And God said, Let the earth bring forth vegetation." This, of course, is not intended as a quotation or translation, but only as a statement of what Professor Guyot thinks himself at liberty to substitute for the very different statement of the biblical writer, in order to make the biblical record match the geological record. The geological record shows that only the very lowest forms of vegetable life existed at this early period, and that grasses and trees and seed-bearing plants generally did not make their appearance until long after many animal forms had appeared in large quantities. The Bible, however, says in this place, not "And God said, Let the earth bring forth vegetation," but "And God said, Let the earth bring forth grass, the herb yielding seed, and the fruit-tree yielding fruit after his

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kind, whose seed is in itself upon the earth, and it was so." If these words, however, are to be understood as meaning what they say, then, as Professor Guyot himself admits, "Geology would assuredly disprove" their statement.[1]

To meet this difficulty, the Professor asserts that the writer of Genesis, for a sort of economy of statements, describes these vegetable forms as appearing at a time when only their *germs*, according to the theory of evolution, were present, and makes no reference to them at the much later period when they were actually brought forth.

Not for one moment is any question of the sincerity, honesty, and high moral purpose of this writer to be entertained; but it is certainly a subject of some surprise to find how readily he allows himself to take the greatest liberties with the biblical statements in order to bring them into accord with the scientific records. Another instance of this is furnished in the same connection.

The Hebrew word *bará*, "create," is used in connection with the original formation of matter, of the animals and of man. This suggests to him that there was something radically peculiar in these three instances, which distinguished them from all the other processes of the earth's genesis. As regards the second example, the introduction of *life* would seem to be the distinguishing characteristic. Here, however, a difficulty presents itself. As regards the property of *life* or simple *vitality* it is quite impossible to make any distinction between animal and vegetable structures, and indeed, in the lowest forms of each, a distinctive definition is all but impossible, and yet, in the biblical account, *bará* is only used for the strictly *animal* creations, while vegetation in all its forms is described as being *brought forth by the earth*, two days or periods before the *creation* of animals.

To meet this difficulty, Professor Guyot resorts to the

[1] See Creation (1893), p. 89.

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following remarkable lines of arguments. First, he says, "If it [the development of plant life] is not indicated in the text by *barâ*, it is because it is but the peristyle of the temple of true life, the *sentient* life, and the condition of its existence." Second, he says in effect, The words actually used in describing the advent of vegetation are "Let the earth bring forth," but these words are used in verse 20, for the creatures developed in the waters, which manifestly were possessed of sentient or animal life, therefore we are authorized in writing-in *barâ* in place of "Let the earth bring forth," in verse 11.

In other words, having founded an argument and based a distinction on the special force and meaning of the word *barâ*, "create," our author proceeds to show that this word is used, in the very same connection, as the equivalent of an expression so different as "the earth, or the waters, bring forth," and that therefore the *distinctive barâ* may be written into the account in place of the apparently contrasting phrase "Let the earth bring forth."

If Professor Guyot had been aware that the original meaning of the word *barâ* is "to carve," he would not have gone to such lengths in his effort to transfer it from the twenty-first verse into the eleventh verse.[1]

A third argument founded on the erroneous translation of the fifth verse of the second chapter of Genesis, given in the Authorized Version, need not be noticed, as its foundation vanishes when the correct translation of the Revised Version is substituted.

[1] Gesenius, בָּרָא means, properly, *to cut, to carve*, to form by cutting or carving, compare the cognate Arabic root. The notion of breaking, cutting, separating, is inherent in the radical syllable פר, the same belongs also to the softer syllable בר.

See also article on "Cosmogony," by Professor Cheyne, in the Encyclopædia Britannica (9th ed.), where he also refers to Schrader and Mr. R. Martineau; Lange's Genesis, p. 127.

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What shall we say with reference to such a process of reconciliation as this?

Does it really need comment? Returning, however, to the main issue now before us, the attempt to reconcile the specific statement of Genesis, that all sorts of plants and trees, including the highest orders, were developed in the third day or period, with the evidence of geology that none but the lowest forms were produced until long afterwards; this also would hardly seem to require comment. Its distinct statement is an adequate answer. However, as Professor Dana, in his article on the same subject,[1] substantially accepts and indorses what Professor Guyot says in this relation, I will quote what a few modern Hebrew scholars say on this subject.

Dr. Marcus Dods says, "The work of clothing the earth with plants is included in this same day. *Let the earth bring forth grass*, etc. The word translated *grass* means all tender, fresh green vegetation in general, of which two kinds are specified as being of importance to man, or as embracing the chief products of the soil, *the herb* and the *fruit-tree* (cp. verses 29 and 30). God said, *Let the earth bring forth*, conferring on the earth power to reproduce annually the requisite food. Hence, too, the mention of *seed*."[2]

Turning next to Dr. Driver's article in the *Andover Review*, 1887, p. 646, after quoting the eleventh verse in full, the writer says: "Can words express more plainly that, in the conception of the narrator, vegetation, including the higher kind of plants, such as fruit-trees, had appeared on the earth during the third day, two days—that is, *ex-hypothesi*, two periods—prior to the first appearance of animal life, on the fifth day? I ask Professor Dana, Is this in accordance with the teachings of science? Certainly it is not

[1] In Bibliotheca Sacra (April, 1885), p. 211.

[2] Genesis, pp. 3, 4.

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in accordance with the teachings of his own 'Manual of Geology.' I there find it stated that land plants (such as alone are indicated by the words of Genesis) first appear contemporaneously with such invertebrata as mollusks, corals, and crustaceans, and that prior to this period nothing but the remains of *marine* plants are discoverable in the earth's strata."[1]

Turning to the work of another Hebrew scholar,[2] we find "The Early Narratives of Genesis" to adopt throughout a position, like that of Dr. Driver, opposed to the reconcilers, but for brevity we will quote here only a few words on the present topic: "But were it possible that the well-known difficulties of 'the days,' the formation of the heavenly bodies, *the priority in creation of vegetable to animal life*, and of birds and fishes to reptiles, could be successfully met," etc. (p. 28). The italics are mine.

In this connection I would note that Professor Asa Gray of Cambridge, in his book "Natural Science and Religion,"[3] refers to the impossibility of separating the lower grades of vegetable from those of animal life, even by the analysis of scientific methods, as a settled opinion of science.

This, of course, is not the expression of an opinion as to the geological evidence of the contemporary developments

[1] "Manual of Geology (ed. 3), p. 157, where, with reference to the graphite of the earliest or Laurentian rocks, which Professor Dana regards as 'strong evidence that plants of some kind, if not also animals [is this in agreement with Genesis?] were abundant, the words occur, 'The plants must have been the lowest cryptogams, or flowerless species; and mainly at least marine algæ or seaweeds; for the Primordial beds next succeeding contain remains of nothing higher. This argument from the Primordial examples exclude all mosses, and the *ordinary terrestrial plants;* but not necessarily lichens, since these grow in dry places, etc.' Even through the main periods of the Lower Silurian, in which the radiates, mollusks, etc. (animal forms), appear, 'algæ or seaweeds, of the kind called fucoids, are the only forms observed' (pp. 169, 186); the first traces of fernlike land plants are named on pp. 197–198."

[2] Dr. H. E. Ryle, Hulsean Professor of Divinity at Cambridge.

[3] Scribner's Sons (1891), p. 10 *et seq.*

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of the lower forms of animal and vegetable life, but is only the foundation for a strong inference in view of the theory of evolution, that their origin was a common one, and therefore contemporaneous.

(To be continued.)

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