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ARTICLE II.

THE COSMOGONY OF GENESIS AND ITS
RECONCILERS.¹

BY PRESIDENT HENRY MORTON, PH.D.

WE now come, in Professor Guyot's table, to the second part of the same, which is headed Era of Life, and opens with the work of the fourth day. The biblical account of this is given not in the words of Genesis, but in an abbreviated form, which we may assume as standing for the text of verses 14-18. As the science parallel of this, our author gives: "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. Protophytes. Protozoans."

The gist of the problem which is here presented to the reconciler consists in this: According to the account given in Genesis, the work of this day consisted in the *making* of the sun, moon, and stars; but, according to the account given by science, these heavenly bodies must have been *made* long before. To reconcile this discord, Professor Guyot, like several others as we shall see, including Professor Dana, assumes in effect that the very emphatic statements of Genesis as given in all the translations as to the *making* of the heavenly bodies are to be interpreted as meaning that the work of the fourth day consisted in making the sun, moon, and stars *visible from the earth* by the removing of clouds, luminous or opaque according to different writers.

¹Concluded from the April number.

Here we have a question which the Hebrew scholar should decide, as it is purely one of interpretation, and may be stated as follows: Can the language of verses 14-18 be interpreted as stating that the heavenly bodies were not *made*, but only *made to appear*, on the fourth day?

Let us see what answers are given to this question by Hebrew scholars. Dr. Marcus Dods, on page 4 of his "Genesis," says: "*Fourth Day Creation of Heavenly Bodies as Lights.* There was already light; these luminaries are created to regulate its distribution on the earth. Keil's idea that these bodies already existed, and that it is only their relation to the earth that is now described, is subversive of the idea of *creation* conveyed in the words '*Let there be.*'" Dr. Ryle, in his "Early Narratives of Genesis," 1892, page 9, says: "It is again only a non-natural interpretation which explains the formation of the sun and the moon on the 'fourth' day as . . . not the *formation* of the heavenly bodies (see, however, ver. 16), but the first *manifestation* of their orbs through the mists that had before hidden them from the earth." Dr. Driver, in the *Andover Review* for 1887, page 645, having special reference to Professor Dana's indorsement of Professor Guyot's scheme, says: "The difficulty which the work of this day occasions in every attempt to accommodate the nebular theory to the Cosmogony of Genesis, is well known. Sir J. W. Dawson labors strenuously though unsuccessfully to overcome it. Professor Dana seems strangely unaware of its magnitude. Considering the purpose of the luminaries to have been to mark seasons and other divisions of time, all that he says in reference to it is, 'The great purpose of the sources of light was, therefore, accomplished by them whether they were made or made to appear.'

"Is there, then, no difference between *making* and *making to appear*? Or is Hebrew incapable of expressing the idea 'appear'?" The idea is expressed by one of the com-

monest words in the language, a word occurring in this very chapter. Here, on the contrary, the writer expresses as explicitly as it is possible for language to do, his sense that the luminaries had no existence prior to the fourth day, and that the work of the fourth day consisted in their formation. 'And God said, *Let there be* luminaries in the firmament of heaven to divide the day from the night, . . . *And God set* them in the firmament of heaven to give light upon the earth,' etc. (ver. 14-18). Had the writer meant 'appear,' it would have been easy for him to write, *Let the luminaries appear* in the firmament of heaven, as he had written in verse 9, 'and let the dry land *appear*.' And if there were any doubt as to the meaning of *be*, it is removed by the word *made* in verse 16, which is perfectly unambiguous and distinct."

Also, Professor Ladd, in the first volume of "The Doctrine of Sacred Scripture," says on page 263, "That the words of Genesis i. 14, 'And God said, *Let there be* lights in the firmament,' may be made to refer to the merely phenomenal change by which the heavenly bodies are now first made visible from the earth, is not exegetically defensible; nor does it essentially change the scientific objections."

It would thus appear that the notion of transforming the language of Genesis as to the *making* of the luminaries into expressions implying that they were only *made to appear* cannot claim the support of the leading Hebrew scholars.

There is, however, another consideration of some weight, indicating that there was no thought in the mind of the author of this passage in Genesis (nor even, we may say with all reverence, in the intention of Him who inspired this writer to make this moral revelation) of conforming his description to the actual or probable physical relations of the subject. I do not think that any one can read these

verses without getting the impression that the prominent, if not the sole, idea in the mind of the narrator, and that which he desired to impress upon his hearers or readers, in reference to the luminaries, was that they were made or introduced into the cosmical system for use as "signs, and for seasons, and for days, and for years."

Light fully adequate for the full development of vegetable, and consequently for animal, life, already existed; but the luminaries furnished, in addition, those divisions of time which, to the mind of a priestly writer, were of inestimable importance as regulating those ceremonial offices, the observance of which it was his ruling idea to indorse and inculcate. The heavenly luminaries, supported from the dome of the firmament and moved about by angels under the direction of Jehovah, constituted, to his mind, a vast celestial timepiece, to guide as well as to inspire the divinely ordained ceremonial worship.

But what does reverent science, regarding the "luminaries" and the entire universe as not only the work of God the Creator, but equally as expressing the present power and will of God the Preserver, now as always immanent in his creation,—have to say as to the *purpose* of the luminaries in their relation to the earth and man? Are they simply or mainly time-recorders like some elaborate church clock, ringing out the hours and days and noting the times for feasts and fasts and ceremonial worship? These ends they undoubtedly have served, but what are *they*, in comparison with the vast and beneficent operations by reason of which we are veritable *children of the sun*, owing every particle of energy by which we live and work to his prodigal outpouring in past and present time.

The forest stream which, temporarily imprisoned in the pond, supplies power to the sawmill or flour-mill, and the vast flow of Niagara, an inappreciable fraction of whose power, harnessed to the wheels of the turbines, is able to

do the work of a manufacturing city, alike owe every foot-pound of their working capacity to the solar heat-energy, which has raised in vapor their waters from the low level of the ocean to the higher level of the streams and lakes.

Every throb of the steam-engine which weaves our garments, prepares our food, or contributes to the necessities of life in any way, owes its existence to the solar energy which in geologic or in modern times caused the growth of the vegetable matter which, transformed into coal or used directly as wood-fuel, has stored up and held for our benefit this energy, until we liberate it. Every form of energy by which we live, and (in so far as thought involves the coöperation of physical activities in the chemical laboratory of the brain) every thought we think, we owe to the beneficent energy streaming to us from the sun. Is it wonderful that with some inkling of this relation, there should have been in early times nations of fire-worshippers who adored the sun? and may we not see in the description of the luminaries as made to serve the office of a cosmical timepiece, a conscious effort to enforce a moral truth and correct a prevailing error, rather than an attempt to relate the actual process or reason of their creation?

So again of the moon; what is her value as the slow-moving hand of a celestial timepiece, compared with her work as mistress of the tides of both ocean and atmosphere?

Turning next to the work of the fifth day according to Professor Guyot, we find it to be described in the Bible substantially as follows: "And God created the great stretched out sea monsters and all living creatures that creep, which the waters breed abundantly, and every winged bird."

Then as the account given by science we find: "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."

Except that it omits reference to the fact that the creatures are described as essentially aquatic, i.e., "brought forth by the water," and that the truly bird-like character of the winged birds is not as clearly made plain as when the Bible says, "and fowl that may fly above the earth in the open firmament of heaven," we may accept Professor Guyot's rendering of the biblical narrative. But what will be thought of his rendering of the science account, when we know that there is not the least evidence of the existence of birds properly so called in the period referred to, nor until long afterwards, and that Professor Guyot himself admits as much in the text of this book (pp. 113, 114), but is satisfied with pointing to the "bird-like affinities" of the family of the Dinosaurus (Lizards who stood upon their hind legs like kangaroos), to the bat-like Pterodactyls and bird-like reptiles with teeth, which "prepared the transition to the *true birds, which made their appearance, in small numbers, at a later time.*" At the opening of the chapter containing this matter, the Professor says, "The fifth and sixth days offer no difficulties, for they unfold the successive creation of the various tribes of animals which people the water, the air, and the land *in the precise order indicated by geology.*" (The italics are mine.) To what lengths will devotion to a theory carry a learned, honorable, and devout man!

Lest my statement as to the late arrival of birds should be questioned, even though it is supported as above by Professor Guyot, I will quote an authority which on such a subject as this I presume no one will question. Professor Huxley, on page 25 of his *American Addresses*,¹ says: "Nothing could be further from the facts as we find them; we know of not the slightest evidence of the existence of birds before the Jurassic, or perhaps the Triassic formation; while terrestrial animals, as we have just

¹ D. Appleton & Co., 1893.

seen, occur in the carboniferous rocks." Even Professor Dana does not find himself able to support his friend Guyot in this item of his scheme, for he says: "This course of progress accords in a general way with the readings of science, and the accordance is exact with the succession made out for the earliest species of these grand divisions, *if we except the division of birds about which there is doubt.*"

Before leaving this item in Professor Guyot's scheme of reconciliation, we must notice another astonishing discrepancy.

Science, as he states in his abstract and develops fully in his text, indicates that the age of fishes and great reptiles was also the age of preëminent vegetable development; so that, as Hugh Miller has suggested, our planet, viewed at that time from another of its group, would have shone with a green color. There is, however, not a hint of this in the Genesis account of the fifth day; but, instead, the production of vegetation in its most advanced forms is described as taking place in the third day.

Such a trifle as this, however, does not seem to trouble the robust powers of accommodation of our author; for, after describing at great length these vast forests which have given us our coal beds, he concludes his chapter on the fifth day as follows: "The accordance of these facts of geology with the Mosaic account is so evident that no further explanation is necessary." I can only add that in my opinion no comment on this statement is necessary.

Now at last we come to the work of the sixth day as given in Professor Guyot's table. The biblical account as he states it reads thus:

"*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."

The account of science reads: "Predominance of mammals; the highest animals. The beasts of the earth, Car-

nivorous; the cattle, Herbivorous animals. Tertiary age. Creation of man. Quaternary age."

It will be observed that in the text of Genesis we read in this place, "and everything that creepeth upon the earth after his kind." Now, according to all Hebrew scholars, these words necessarily include reptiles, and science proves that reptiles (as Professor Guyot has himself shown at great length) abounded so as to be characteristic of the previous or fifth day or period.

What is to be done with this? An easy if inadequate method is adopted by our author. On page 120 of "Creation," he says: "The creeping animals of the sixth day are not reptiles, but, according to Gesenius, the smaller mammalia—rats, mice, etc."¹

¹Gesenius is the standard Hebrew lexicon, and, though not likely to be in the possession of ordinary readers, is reasonably accessible; but, to save trouble, I will transcribe exactly what I there find under the Hebrew word used for "creeping thing" in the twenty-fifth verse translated above, i.e., *remes*, as well as its verb *ramas*.

"I. רָמַשׁ 'to creep,' 'to crawl,' the appropriate verb for the motion of the smaller animals which creep along the ground; both those which have four feet or more, as mice, lizards, crabs (and this is the proper signification of *ramas*), and also those without feet, which glide or drag themselves upon the ground, as worms and serpents. Gen. i. 26, after the mention of quadrupeds both domestic and wild, of birds and fishes [says]: 'all the creeping things (*reptiles*) that creep upon the earth' (see ver. 28, 30; chap. vii. 8, 14, viii. 17, 19; Lev. xi. 44). Sometimes the earth is said 'to creep with creeping things'; Gen. ix. 2 [literally]: 'upon all with which the earth creeps,' i.e., all reptiles which creep upon the earth.

"2. In a wider sense spoken of aquatic or amphibious reptiles; Gen. i. 21, 'the creeping animals with which the waters swarm'; Lev. xi. 46; Ps. lxxix. 35. So of all land animals whatever, Gen. vii. 21 (beginning); Ps. civ. 20, 'all the beasts of the forest do creep forth,' (supply) by night from their dens—

Hence—

"רָמַשׁ 'a creeping thing,' 'reptile,' collectively 'reptiles'; (Gen. i. 25, 26; vi. 7, vii. 14, 23); often, 'whatever creeps upon the earth' (Gen. i. 25; vi. 20; Hos. ii. 20; [18 in English], cf. Deut. iv. 18). Once of aquatic animals (Ps. civ. 25). So of all land animals whatever (Gen. ix. 3)."

Admitting as I do freely the learning and piety of Professor Guyot, I must confess myself as entirely unable to account for this assertion as to the statement of Gesenius, but must leave it, with several other passages in his book, as among the inexplicable mental operations of one advocating a favorite theory which encounters radical obstructions.

In concluding his discussion of the work of the sixth day with the creation of man, Professor Guyot again reverts to the use of the word *barà* as expressing *creative* action in a peculiarly emphatic manner at the introduction of matter, of life, and of mind.

As already pointed out, this, so far as the introduction of life in its vegetable form is concerned, is in direct conflict with the text of Genesis, and consequently, as an argument for the conclusion here reached, has little weight.

I am entirely prepared to accept the indications of a special exercise of Divine power in the development of man's moral and spiritual nature, but on this subject, as I understand, true science has of necessity nothing to say, and therefore there is, and can be, no opening for the work of the reconciler in this connection.

So far as science can deal with the problem of man's creation or development, she must of necessity limit her labors to his physical structure and perhaps his mental capacities, and what she has done on *these* lines is certainly (incomplete and far from conclusive as it must be admitted to be) distinctly in the direction of bringing him into line with the general evolutionary series in which we find the lower forms of life, animal and vegetable, year by year more completely arranging themselves. Every reverent scientist will cordially agree with Professor Guyot's statement when he says, in reference to the series prior to man, "Whether or not we view this order as the result of evolution, God's guiding hand must be discerned, without which

nature alone could not have produced it," and will willingly extend this view so as to include the origin of man; but when the position is taken that science agrees with or supports the view of man's creation as a radically new act of divine power, not involving and being a link in a continuous and gradual process of development still going on and to reach its culmination in the future; then I can only say that such is not my understanding of the teachings of science, and refer as my authority to such works as "The Ascent of Man," by Professor Henry Drummond; "The Destiny of Man," by Professor John Fiske; "The Whence and the Whither of Man," by Professor J. M. Tyler; "Sermons on the Old Testament," by Canon Driver,—all of which treat the subject from a religious standpoint; and Huxley's "Lay Sermons," "Man's Place in Nature," etc., and Darwin's "Descent of Man," where the subject is regarded from a purely scientific point of view.

In fine, it seems to me that, with the highest personal respect for its author, it is impossible to judge this work of Professor Guyot more favorably than as an earnest and conscientious but necessarily unsuccessful attempt to solve an insoluble problem.

I have discussed this scheme of Professor Guyot thus in detail, because it is not only the earliest in date of the class to be considered, but also because it develops in an orderly manner the various important features of the subject, and will enable me to treat the other schemes quite briefly by alluding to their resemblances or differences.

I will now consider the scheme of Professor Dana, because, though not next to that of Professor Guyot in chronological order, it was so closely related in other regards as to be most conveniently treated in this order.

As already indicated, this scheme of Professor Dana appeared in the *BIBLIOTHECA SACRA* for April, 1885, under the title "Creation; or the Biblical Cosmogony in the Light

of Modern Science," and in the form of a review of Professor Guyot's work with the same title which I have just been considering, and which Professor Dana desired to defend from attacks made in the interests of the obsolete exegesis which attempted to interpret Genesis as a literally correct narrative of events, in defiance of scientific discoveries and conclusions.

In the article above mentioned, Professor Dana expresses his agreement with Professor Guyot in all but a few points; and aside from these, therefore, his scheme falls under the same criticisms as I have already made with reference to Professor Guyot's work. The first point of difference is that Professor Dana does not attempt to find the diversion of the nebulous matter of the primordial universe and the formation of the solar and other systems in the gathering together of the waters in the work of the third day, but relegates this to the separation of the "waters from the waters" on the second day. In so far as the work of the third day is concerned, this is a great improvement, and relieves the scheme of one of its objectionable features, but the extravagance of the suppositions concerning the previous periods is in no wise relieved, and Professor Dana follows Professor Guyot in his extraordinary treatment of the question of the appearance of grasses, trees, etc., on the third day.

He also follows Professor Guyot in the confusion of the use of *barà* in describing the introduction of *animal* life on the fifth day with the expression "Let the earth *bring forth*" for the introduction of *vegetable* life on the third day.

Professor Dana also accepts without comment the view that the specific and emphatic language of verses 14-18, as to the making and setting in the heavens of the sun, moon, and stars, may be understood as meaning that, by the clearing-off of clouds in the earth's atmosphere, the

heavenly bodies became visible. It may be asked, To whom? and the reply must be, To the plants and animals of the lowest forms which alone had been so far produced. In addition to all the other difficulties in this item of the scheme, it certainly seems strange that a whole day should be devoted to this raising of the curtain on a scene long before *set* in all of its details, while the audience of spectators for whom it was intended had not yet begun to come into existence. This certainly does not agree with Professor Dana's canon (p. 207) to the effect that: "II. The brief view of creation in Genesis sets forth only the grand stages of progress in the creative work, or those great events that marked epochs in the history. . . . A method of interpretation that puts among the eight epochs an event not of this epochal character should, therefore, be received with doubt." Was the clearing of the sky from clouds "an event of this epochal character"?

We now come to Professor Dana's discussion of the work of the fifth and sixth days, in which the difficulty of the order as regards birds, and as regards "creeping things of the earth" or reptiles, develops itself.

As regards birds, he does not attempt to escape it by calling saurians which stood on their hind legs, and bats or bat-like creatures, *birds*, or by taking the circumstance that these might be regarded as preparing "the transition to the true birds," as warrant for describing them as "fowl that may fly above the earth in the open firmament of heaven," and as "every winged fowl," in the manner followed by Professor Guyot, but admits that about the division of birds "there is doubt."

As regards the creeping things, i.e., "everything that creepeth upon the earth" (ver. 25), Professor Dana seems to have accepted the erroneous statement of Professor Guyot as to the meaning given to the Hebrew word *remes*, and thus to have supposed that the animals which the

earth brought forth on the sixth day were all of the class mammalia. Working on this basis, and also assuming a remarkable liberty as to statement of facts on the part of the inspired author, as he had before done in following Professor Guyot's rendering of grasses and trees and the *making* of the sun and moon, Professor Dana runs into a very curious dilemma. Thus (on p. 215) he says: "The succession in the living tribes given in the chapter is: (1) Plants (third day); (2) Invertebrates and the lower Vertebrates (fifth day); (3) Mammals, or the higher Vertebrates (first half of the sixth day); (4) Man, the head of Mammals (second half of the sixth day). . . .

"The sixth day's work includes only that particular division of Vertebrates, to which man himself belongs, whose common characteristic, that of suckling their young, is, through the feelings of subjection, reverence, and affection it occasions, of the highest value as a means of binding child to parent, man to man, and man to his Maker." But, as a matter of correct translation or quotation of the text of Genesis, the work of the sixth day includes, after beasts and cattle, "everything that creepeth upon the earth." This most certainly includes the immense class of reptiles and other crawling creatures which do *not* suckle their young.

Whatever may be the force of the suggested appropriateness in confining the creations of the sixth day to mammals, it was not appreciated by the writer of Gen. i. 24, 25, who, even though inspired, according to Professor Dana, with a knowledge of the true order of creation or development, has chosen to place the reptiles and other creeping things of the earth, with beasts, cattle, and man, in the sixth day, while he relegated birds, whose affection for their young is one of the most beautiful illustrations of the fostering care of the Creator for his human children, to the

fifth day, contrary to the teaching of science as to the actual order.

It appears, then, that, with the exception of his reference to the division of land from water on the third day, in which the natural interpretation of the Hebrew passage is accepted, Professor Dana's scheme of reconciliation brings the biblical and scientific accounts no more into harmony than does Professor Guyot's, and contains exactly the same errors as to the rendering of Hebrew words, either expressed or implied, as when he assumes "all creeping things" to exclude reptiles, etc., and to refer only to mammals.

I do not see, therefore, how the conclusion can be avoided, that, with all his eminent learning as a mineralogist and geologist, Professor Dana also has, by a conspicuous failure, contributed to the demonstration of the insolubility of the problem which he has undertaken to solve.

I will now turn to the scheme of Sir J. W. Dawson, first developed by him, as we have already said, in 1860 in a volume entitled "Archaia," and republished in 1887, and again in 1893, under the title, "The Origin of the World according to Revelation and Science." This author tells us in substance in his prefaces, that neither the developments in biblical criticism nor in biological science as expressed in the doctrine of evolution, have led him to modify his views as given out in 1860 in any degree, for the simple reason that he regards both the results of biblical criticism and of the doctrine of evolution as substantially worthless.

In view of these statements, it might be thought, that, in reference to a subject whose treatment rests necessarily on the results of biblical criticism for a correct understanding of the text of Genesis, and on the results of the doctrine of evolution for a correct understanding of the origin of the world according to science, an author in this posi-

tion would hardly come within the category of *recent* reconcilers, or be more worthy of attention than the many members of the same class whose work closed before the date at which Sir J. W. Dawson's began. But as this author is still living and publishing on this and related subjects, it would seem needful to consider his scheme of reconciliation, also, especially in view of his high standing and wide reputation as a geologist and man of varied learning.

Considering, then, the scheme of reconciliation developed in the above-mentioned book, we find, in the first place, that it avoids most of the errors in translation of Hebrew words and interpretations of texts which render the schemes of Professors Dana and Guyot so absolutely unsatisfactory.

Sir J. W. Dawson regards the creation of the heaven and the earth referred to in the first verse of Genesis as meaning the production out of nothing of "the whole extraneous space" and of "our globe as a distinct world." This interpretation, besides being natural, is in accordance with the views of all Hebrew scholars of the present day as to the meaning of the words, though entirely opposed to the renderings accepted by Professors Guyot and Dana, as essential to *their* schemes of reconciliation.

Coming next to the second verse, we find the same natural and correct rendering of the critical words "unshaped and empty," or "formless and uninhabited," as used also by Isaiah to describe the desolation of Idumea, and by Jeremiah of nations ruined by God's judgments. There is no suggestion here of the cloud of inert matter, without properties, diffused through space, imagined by Professors Guyot and Dana, and it is also to be noticed that the nebular hypothesis is also left out of the scheme of reconciliation so far.

Coming next to the development of light and its separa-

tion from darkness, in verses 4 and 5, this is described as meaning the development of light in "luminous matter diffused through the whole space of the solar system, or surrounding our globe as with a mantle." To meet the words translated, "And God called the light Day, and the darkness he called Night," these explanations are, however, seriously modified or abandoned as follows:—

"To explain the division of the light from the darkness, we need only suppose that the luminous matter, in the progress of its concentration, was at length all gathered within the earth's orbit, and then, as one hemisphere only would be illuminated at a time, the separation of light from darkness or of day from night would be established."¹

In this connection, the nebular hypothesis is given a hearing, but only as illustrating what may have gone on, but is *not* referred to in the Genesis account.

Finally, it is suggested that all three of the conditions above described may have existed in succession, and be referred to in this passage. After this comes the remarkable statement: "For the reasons above given we must regard the hypothesis of the great French astronomer as a wonderful approximation to the grand and simple plan of the construction of our system as revealed in Scripture."

Our author surely has here forgotten his previous chapters in which the earth or "our globe as a distinct world, with all the liquid and aeriform substances on its surface," was referred to as created *in the beginning*, and as being "formless and uninhabited," which certainly excludes the entire series of developments described in the nebular hypothesis from any subsequent period, because, long before "our globe" was "a distinct world," etc., the sun must have reached an advanced state of concentration. In fact, the treatment of this part of the subject exhibits a failure to clearly apprehend, at one time, all the conditions in-

¹The Origin of the World, pp. 117-118.

volved in the several successive statements made by the author himself.

Indeed, the reconciliation of Genesis with the nebular hypothesis in any definite way, involves the following dilemma: To get the nebulous state of matter and its successive concentrations out of the sacred text, we must treat the first eight or ten verses in the arbitrary manner of Professors Guyot and Dana; while, if we give these verses their legitimate and natural meaning, as does Sir J. W. Dawson, there is nothing to correspond with the stages of the nebular hypothesis, and it is only as the result of a nebulous or somnolent state of mind that the natural rendering of the text and a reference to the hypothesis can be supposed to be compatible.

In this same connection may be noticed a strange oversight as to a well-established fact in physics or meteorology into which our author has fallen. On page 121, we read: "After it [the earth] had been left outside the contracting solar envelope, it might still retain some independent luminosity in its atmosphere, a trace of which may still exist in the auroral displays of the upper strata of the air." From the time of Benjamin Franklin the aurora has been universally regarded by astronomers and physicists as an electric discharge in the rarefied atmosphere at considerable elevations, of exactly the same nature as that now produced in the artificially exhausted vessels known as "Geissler tubes." That it should have anything to do with self-luminous matter is a suggestion quite foreign to physical science, and indeed contrary to all the results of observation. Indeed Lemström produced an artificial aurora by means of a network of wires presenting many points to the sky.¹

Coming next to the work of the second day, the separation of the waters above and below by the firmament, our

¹ *Nature*, Vol. xxviii. pp. 60-63, and pp. 128-130 (1883).

author accepts the old and familiar explanation, that this refers to the parting of the water in the clouds from that on the surface of the earth.

In thus translating *rakia* as the expanse of atmosphere, our author differs, as we have seen, from many of the best Hebrew scholars; but we do not attach much importance to this subject in its connection with processes or schemes of reconciliation, because this phrase is manifestly so indefinite and obscure, if not taken in its natural meaning of a solid dome supporting the celestial cisterns, etc., that it may be made to fit any part of the creative process, as we have seen, from the separation of the nebulæ and their formation into stellar systems, according to Guyot, to the temporary maintenance of a cloud canopy, according to Dawson (see p. 170).

I should only remark, that to assign as the work of an entire day this merely temporary and relatively insignificant stage in the clearing-up of the earth's atmosphere, seems hardly worthy of an inspired writer, while the permanent separation of heavenly from terrestrial space by a solid firmament would be, in the mind of a writer in ancient time, a work of adequate importance and dignity.

We come now to the work of the third day, the upheaval of land and the development of plants. Though the subject is somewhat obscured by a multitude of words and much irrelevant matter, we gather that our author admits that the language of Genesis here calls for vegetation of the most advanced character, and that Geology gives no evidence of any such vegetation until much later, when it appears in the Carboniferous period, and later, in company with highly developed forms of animal life.

This Gordian knot he cuts by the extraordinary suggestion, that these higher forms of vegetable life may have existed at this early period, but have perished so as to leave no trace of their character in the geological records (p.

194). What sort of *reconciliation* shall we call this? Not of Genesis with *Science*, but rather with *nescience*.

Futile as were the attempts of Professors Guyot and Dana to escape this difficulty, they at least showed some respect to science and its results; but this simply substitutes for the records of geology the fanciful creations of the would-be reconciler. Our author himself seems not to have been quite satisfied with the above way of solving the problem; for, after quoting from Professor Dana various reasons why the earth *may* have had on it vegetable life earlier than animals, he suggests that the words of Genesis must refer to the first introduction of vegetation (see p. 197). This is evidently borrowed from Professor Guyot, and has been already shown to be absolutely inconsistent with the language of the Hebrew record.

Passing next to the work of the fourth day, we find our author vibrating in a somewhat confused and confusing way between the opinion that the words of Genesis here refer to the *final completion* of the sun, moon, and stars at this time, and the suggestion that they were now appointed to their office by having their mutual relations and regular motions, now for the first time perfected.

For neither of these suggestions is there the slightest foundation in science or in the conjectures of the nebular hypothesis, but, on the contrary, both are radically opposed to these views. In other words, at a time when the earth had sufficiently cooled to have supported in a previous "æon" a varied and highly developed vegetation, the sun, moon, and heavenly bodies generally must have been, to all intents and purposes, in their present condition. We have here again a striking illustration of the manner in which an "ignus-fatuus" of a pet theory can lead an able and learned man into a mist-covered marsh of unfounded and shifting assumptions.

Turning next to the work of the fifth day, our author

draws attention to the fact that the word for "create" is here, as in the case of the production of matter and of man, employed for the introduction of the new subject, and does not attempt to carry this back, like Professor Guyot, to the introduction of vegetable life. He, however, as we might expect from his emphatic rejection of the doctrine of evolution, here claims that in Genesis the *species* is expressly pointed out as the unit of creation.

He likewise notes that the geological period corresponding to this day includes the Carboniferous period (that on which vegetable development reached its maximum), and the Mesozoic, which was emphatically the age of reptiles.

It may be remembered that, as we before pointed out, Genesis says nothing of the vegetation developed on the fifth day, and places reptiles with "everything that creepeth upon the earth" in the sixth day. The difficult question of the birds our author disposes of as follows: "Birds also belong to this era, though apparently much less numerous and important than at present." This is unkind to Professors Guyot and Dana, not to mention Professor Huxley and other like authorities, but what will a good and learned man *not* say for a pet theory?

Before leaving the subject of the reptiles, however, it should in justice to our author be said, that he makes a long argument to prove that the words usually translated "great whales" should be "great reptiles." Admitting this, however, it still remains that all these creatures are referred to in verse 22 as those that "fill the waters in the sea," and are therefore *water*, and not *land*, reptiles, such as are found in the Mesozoic formations; so that no real progress is made towards a reconciliation of this obstinate disagreement of the records.

Coming now to the work of the sixth day, our author very candidly states the difficult facts with which all reconcilers have been obliged to struggle; but he does not

seem to us to fare any better than his predecessors in meeting them. The emphatic and repeated reference to "everything that creepeth upon the earth" he takes as indicating "the additional types of terrestrial reptiles and other creatures lower than the mammals introduced in this period." The three varieties of creatures, as our author renders verses 24 and 25, are, as first given, "herbivora, reptiles, and carnivora," and as afterwards mentioned, "carnivorous mammals, herbivorous mammals, and reptiles of the land."

Neither of these orders agrees with the geological record, which, according to our author himself, quoting from Professor Dana, is, Herbivora, Carnivora, and Herbivora of vast dimensions, then smaller varieties of both herbivora and carnivora, the reptiles having occupied an earlier age belonging to the fifth day.

To reconcile the two orders in Genesis, one author suggests that one may indicate the order in *time*, and the other the order in *rank*. But, as both disagree with the geologic record, this does not seem of much use to the scheme of reconciliation.

Indeed, while Sir J. W. Dawson's scheme of reconciliation is in advance of those of Professor Guyot and Professor Dana, in so far that it shows a much greater familiarity with the Hebrew language, and thus does not do such violence to the same in its renderings of the biblical text, it comes no nearer to a reconciliation of the same with the scientific record, because, the two being fundamentally unlike, a strict rendering of either makes agreement with the other only the more manifestly impossible, as I think appears very clearly from the foregoing detailed examination of the successive periods as they are presented by this author.

Now we come to the latest and most distinguished of the reconcilers, the Right Honorable W. E. Gladstone. To follow the fortunes of the famous Gladstone-Huxley con-

trovery, alluded to at the opening of this article, would require far too much time and space, and I shall therefore take, as the final expression of Mr. Gladstone's views, as enlightened by said controversy, the chapter in his book entitled "The Impregnable Rock of Holy Scripture," which is headed "The Creation Story."

Mr. Gladstone opens his discussion by the statement of certain *a priori* conclusions as to what the narrative of creation in Genesis i. *must be*. As briefly given by himself, they are as follows: "The method here pursued is that of historical recital. The person, who composes or transmits it, seems to believe and to intend others to believe, that he is dealing with matters of fact. But these matters of fact were, from the nature of the case, altogether inaccessible to inquiry, and impossible to attain by our ordinary mental faculties of perception or reflection, inasmuch as they date before the creation of our race. If it is, as it surely professes to be, a serious conveyance of truth, it can only be a communication from the Most High" (p. 37).

In view of the anything-but-unqualified success of previous reconcilers, this would look like a rather reckless nailing of colors to the mast. It is, however, so qualified presently as to relieve us of all anxiety. Thus, on page 38, our author says as to the strict truth of this assumed Cosmogenetetic Revelation: "But the truth or trueness, of which I speak, is truth or trueness as conveyed to and comprehended by the mind of man; and, further, by the mind of man in a comparatively untrained and infant state." Again, on page 49, our author says in relation to the same subject: "With this aim in view, words of figure, though literally untrue, might carry more truth home than words of fact; words less exact will even now often carry more truth than words superior in exactness. The truth to be conveyed was, indeed, in its basis physical; but it was to serve moral and spiritual ends, and accordingly by these

ends the method of its conveyance behooved to be shaped and pictured.”

If these qualifying expressions are taken at their full value, they make the work of reconciliation easy to the extent that it becomes quite superfluous. In other words, we have merely to determine the “moral and spiritual ends” to be served by the revelation under consideration, and then find that the statements are not so at variance with the facts expressed in “words of figure” as to fail of accomplishing “their moral and spiritual ends.” In the words of Professor Drummond: “Were the reconcilers of Geology and Genesis equal in insight to their latest and most distinguished champion, and did Mr. Gladstone himself realize the full meaning of his own concessions, little further contribution to this controversy might perhaps be called for.”

The bearing of this is so admirably presented by an illustration in the same article of Professor Drummond that I will venture to quote him in this connection. He says: “George Macdonald has an exquisite little poem called ‘Baby’s Catechism.’ It occurs among his children’s pieces.

‘Where did you come from, baby dear?
Out of the everywhere into here.

‘Where did you get your eyes so blue?
Out of the sky as I came through.

‘Where did you get that little tear?
I found it waiting when I got here.

‘Where did you get that pearly ear?
God spoke, and it came out to hear.

‘How did they all just come to be you?
God thought about me and so I grew.’

“For its purpose what could be a finer, or even a more true, account of the matter than this? Without a word of literal truth in it, it would convey to the child’s mind exactly the right impression.”¹

¹ *Nineteenth Century*, February, 1886, p. 212.

Mr. Gladstone's language above quoted would authorize us in treating the Cosmogony of Genesis in the manner above indicated by Professor Drummond, and, so treated, it would offer nothing for the skill of the reconciler, because it would become a figurative or allegorical composition of poetic character whose resemblance to or difference from the scientific view of creation would be entirely unimportant, as compared with its object of conveying moral and spiritual instruction.

Having provided himself with such a safe and unlimited line of retreat from any possible position of difficulty, Mr. Gladstone nevertheless proceeds with his system of reconciliation, and displays that command of language and felicity of expression which always distinguish him; but he labors under two serious difficulties, which he acknowledges with the greatest modesty and candor, but which interfere with his work much more profoundly than he realizes. On page 53 he says: "On the meaning of the words used in the Creation Story, I, as an *ignoramus* [italics mine], have only to accept the statements of Hebrew scholars, with gratitude for the aid received; and in like manner those of men skilled in natural science on the nature and succession of the orders of being, and the transition from one to the other."

Nothing can be more candid and modest than this statement; but, having made it, Mr. Gladstone presently proceeds to contradict the conclusions of Professor Driver as to the necessary meaning of Hebrew words as used in the connection in which they stand in the first chapter of Genesis, and to select, as reliable, certain of the conclusions of one or another of the prominent reconcilers, Guyot, Dana, or Dawson, in which, as I have pointed out, they disagree with each other as well as with the mass of scientific authorities who are not interested in schemes of reconciliation.

A considerable amount of scientific training is necessary to enable any one to appreciate the full meaning and weight of scientific statements; and, with all possible respect for Mr. Gladstone's marvelous mental power and vast ability in many fields, truth compels me to say that the work now under consideration cannot be read by any one familiar with the scientific subjects of which it treats without the impression that the author has not a clear and broad grasp of the subject, and has not always appreciated the true value of the statements of his authorities. Into the details of this work it is unnecessary to enter further than to say, that, in his scheme of reconciliation, Mr. Gladstone has followed Guyot and Dana in their adaptation of the first eleven verses to the requirements of the nebular hypothesis, contrary to the views of Dawson, whom he follows generally elsewhere, but avoids, as a rule, any reference to the exact language of the text, with which he takes great freedom of construction.

I cannot but agree with our author's modest statement on page 77, where, after alluding to Dana, Guyot, Dawson, and Stokes, he says: "I am well aware of my inability to add an atom of weight to their judgments." If any one is not satisfied with the schemes of the three reconcilers above named, he will not be likely to adopt that of Mr. Gladstone. (Professor Stokes is only referred to as authority for some scientific statements.)

The weakness of Mr. Gladstone's position is, that, rejecting the results of biblical criticism, and accepting the Mosaic authorship of the Pentateuch as he does, he deprives himself of a source of light which, as we shall see, is essential for a correct appreciation of the text of Genesis; while, on the other hand, by lack of training in scientific lines, he is led to follow scientific guides who, by reason of a bias derived from the best motives and an almost necessary result of their date and environment, are, as we have seen,

strangely unreliable on many points and apt to prove misleading. I therefore feel constrained to say that a careful and repeated perusal of the essay of the great English statesman has only impressed me more strongly with the insoluble character of the problem of reconciliation which even he has so manifestly failed in attempting to solve.

In reading the works of all these writers, the impression is the same. The more we admire their ability, learning, and pious enthusiasm, the more clearly do we see that they have undertaken an impossible task, and that their failures are in no way due to any deficiencies on their part, but only to the insoluble character of the problem they have set themselves to elucidate.

The question which the reconcilers have set themselves to answer, when reduced to its most moderate terms, is admirably expressed by Mr. Gladstone twice over in nearly the same words, on page 40 and page 42, and in the latter place as follows: "Do the propositions of the Creation Story in Genesis appear to stand in such a relation to the facts of natural science, so far as they are ascertained, as to warrant or require our concluding that these propositions proceeded, in a manner above the ordinary manner, from the Author of the visible creation?"

Mr. Gladstone of course answers this question in the affirmative, not by showing a universal and close agreement of the Genesis account with the facts of natural science, but only such a general correspondence, allowing of some points of difference and employing a broad and figurative use of words, as seems to him sufficient to warrant his conclusion.

In his introductory remarks Mr. Gladstone implies that if he could not reach this conclusion the result would be most serious. Quoting from Professor Dana, he says: "If it be true that the narration in Genesis has no support in natural science, it would have been better for its religious

character that all the verses between the first and those on the creation of man had been omitted.”

From this statement I would most emphatically dissent, and am confident that my dissent is shared by every one of the leaders of conservative higher criticism and modern theology; such as, Driver, Cheyne, Drummond, Horton, Addis, Farrar, Ryle, Kirkpatrick, Robertson Smith, Davidson, Kennedy, Adam Smith, Carpenter, Bennett, Whitehouse in England; and Briggs, Ladd, Abbott, Harper, Toy, Lyon, Curtis, Peters, Jastrom, Hirsch, Haupt, George F. Moore, H. P. Smith, Batten, Brown, S. Aceustra, Gould, Kellner, Gottheil, and Prince in this country. As I hope presently to make clear, every one of the “moral and spiritual” lessons which Mr. Gladstone considers it the aim of the writer, and even of the Inspirer of Genesis, to inculcate, will be equally, and indeed better, conveyed, if the inspired narrative is seen to have no reference to natural science, and thus to be independent of support from that quarter, and unaffected by the most conspicuous failure to make its statements square with those of natural science.

It should not be forgotten that the dispute between the reconcilers and their opponents in no way involves the question of the inspiration of the sacred record, but considers only whether this record is inspired to teach scientific *as well as* “moral and spiritual” truth.

From this it follows that a failure to answer the question of Mr. Gladstone in the affirmative, in no way involves a general denial of all its elements, or the assertion of what might be considered a counter proposition. In other words, we may and do believe that, while the presence of a divine revelation in the first chapters of Genesis is not established or supported by the relation of the narratives there given to the facts of natural science, it is fully and abundantly established by the character of the moral and spiritual enlightenment which these narratives afford.

The difficulty which presents itself to Mr. Gladstone, Professor Dana, and others in this connection comes from their expressed or implied *a priori* conclusions as to the nature of revelation and the manner of inspiration, and I think can be best cleared up by the answer to a question in some sense parallel to that of Mr. Gladstone, *In what way may we regard the statements of Genesis, so as to give them full force as Inspired Revelations of moral and spiritual truth, and yet render their agreement or disagreement with the facts of natural science entirely immaterial?*

To answer this question we must consult the biblical critics as to the probable conditions of age and authorship of the first creation story in Genesis. They will tell us that it, with many other parts of the Pentateuch, was written by a learned and pious Israelite, probably a priest, about the time of the Babylonian captivity, say 450 B.C.; that its writer was inspired by the Divine Spirit directly and indirectly through the truths handed down and developed by a long line of prophets and teachers, including Moses, to teach through its pages the following lessons:—

1st. A pure and sublime Monotheism, which should assert that the One God was the sole creator of the universe and every part of the same, from the earth and heavenly bodies down to the smallest plant or insect.

2d. That this one eternal and omnipotent Creator had placed himself in peculiar and close relations to man, in so far as he had made him the crowning work of his creation, and indeed had made him in his own image, with all the near and loving association which that implies.

3d. That the observance of the Sabbath, or seventh day of rest, was an institution of strictly divine origin, and to be observed as an essential element or factor in the development of the race.¹

¹See Ladd, *Doctrine of Sacred Scripture*, Vol. i. p. 257.

4th. That other ceremonial observances and seasons were of like divine appointment worthy of being measured and announced by the motions of the heavenly bodies.

The discrediting of polytheism is, of course, included in the first item of teaching given above; and, this being so, I think it will be found that in these four divisions I have included all the subjects of moral and spiritual teaching which Mr. Gladstone, or any of the other reconcilers here mentioned, finds in the narrative of Genesis.

As to the "moral and spiritual ends" of this revelation, the biblical critics are in substantial accordance with the reconcilers. They part company at the point where the reconcilers contend that these "moral and spiritual ends" must have been attained by a supernatural guidance of the writer in the "words of figure" or narratives with which he sought to express to his cotemporaries these high moral and spiritual ideas. At this point the biblical critics contend that in this, as in other cases, the inspired writer was left to express for himself the truths which had been conveyed to him, with such aids as his human knowledge of earlier literature and his human reason could furnish. Let us see now where these guides might naturally be expected to lead him, and in how far the result of such guidance would correspond with the narrative of Genesis and with "the facts of natural science."

In the first place, our inspired writer, being presumably acquainted with the Babylonian cosmogony, and perhaps other traditional accounts of like tenor, in which a vast and dark ocean is described as the origin of all things, the gods included, would perceive that he could best instruct his hearers by using such tradition purged of its polytheism and other unworthy elements. If this writer is supposed to be of lofty thought and capable of grand expression, which, as the recipient and transmitter of such a moral and spiritual revelation as we have supposed he cer-

tainly should be, we should expect as a natural result such a passage as we find in the first three verses of Genesis.

Guided by the ancient cosmogonies, as well as by natural experience, which would instruct even a savage that light was essential to all forms of life, the writer would put its creation next; but, knowing nothing of the nebular hypothesis or of the necessary conditions of light-formation, and having in mind the sevenfold division of time which he desired to emphasize, he would divide this light from the darkness in periods of day and night, in order that his count of time might commence.¹

Thus he would produce in substance the fourth and fifth verses.²

Again, being a man of his time, when the vault of heaven was regarded as a solid dome supporting the celestial abodes and having sluices to let down the rain, he would naturally make the next step to consist in the forming of this dome, and division of the upper from the lower waters. Thus would be composed verses 6-8 in a perfectly natural manner, and without any knowledge of the separation of nebulae according to Professor Guyot, or the development of a temporary cloud-canopy according to Sir W. J. Dawson.

It is in the highest degree natural that an intelligent man at any age, contemplating the probable formation of

¹ See Schrader's *Cuneiform Inscription and the Old Testament*.

"The august ocean was their generator."

"The surging deep was she that bare them all.

The waters thereof embraced one another and united,

But darkness was not yet withdrawn, nor had vegetation sprung forth."

Also, Sayce's Hibbert lecture for 1887, pp. 384, etc., to the same effect; Davis' *Genesis and Semitic Tradition*, 1894, pp. 1-5, 9-15; *An Introduction to Folk-Law*, by M. R. Cox, 1895, p. 254.

² The notion of the existence of light before, and independently of, the sun was common to the Babylonians and to the Aryans, as well as to the Hebrews. See Davis' *Genesis and Semitic Tradition*, pp. 18-19.

the earth as he knew it, should next describe the emergence of the land from the previously universal and primordial ocean, and experience would tell him that such land, coming out of the water, would be speedily covered with a rich and varied vegetation. The inundations of Egypt and of the country about Babylon would be object-lessons of the most instructive character in this connection.¹

Being ignorant, however, of the geological record, and of the doctrine of evolution, and of the substantially contemporaneous development of animal and vegetable forms, he would have no hesitation in placing the latest products of vegetable development in this period, and would thus furnish the reconcilers with one of their most difficult problems. The result of this natural treatment of the subject, however, would evidently be verses 9-13.

Now the inspired writer would have before him the problem of arranging the remaining elements of his subject, and as a matter of course would place man last as the final work of the Creator, and next before him the domestic and wild animals needed for his support, or as furnishing objects of chase to the hunter, and next before these the creatures of the air and sea as more remote, and, as further off still, the heavenly bodies needed for the regulation of times and seasons of ceremonial worship. Had he appreciated the conditions of the nebular hypothesis, he would have introduced the heavenly bodies before vegetation, but in the absence of such knowledge, it was natural for him to bring the development of vegetation into direct connection with the upheaval of the land from the water, and in this way came the order in verses 14-27 of heavenly bodies, then fishes and birds as coming from the sea, then land animals, and lastly man. In the arrangement of detail in this connection it was very natural to associate the birds with the fishes and creatures of the sea, both because they

¹ See W. R. Harper, in *Hebraica*, 1888, Vol. v. p. 27, second § from foot.

were alike in being removed in structure and habitat from man and the animals related to him, and also because sea-birds and flying-fish would suggest an actual relation. Had the writer been inspired with knowledge as to the facts of natural science, he would no doubt have placed the birds with the mammals on the sixth day.

In the same way it was natural to associate reptiles with the land animals among whom they were constantly encountered; but had the author known that the age of reptiles preceded that of the mammals, he would have exchanged the birds and the reptiles, and placed the reptiles in the fifth and the birds in the sixth day.

In fact, we see that where natural association would lead to an order corresponding to that given by natural science, we find a correspondence; but where a natural association of ideas or objects would give an order unlike that deduced by natural science, the former, not the latter, is followed in the biblical record. *The inference is plain, that not knowledge of the facts since discovered by natural science, but the natural association of ideas and objects was the origin of the order found in the creation narrative in the first chapter of Genesis.*¹

I cannot better comment on these results and conclude this paper than by some quotations from the admirable article by Professor Henry Drummond in the *Nineteenth Century* for 1886, to which I have already referred. Thus he says: "What we have to note is that a scientific theory of the universe formed no part of the original writer's intention. Dating from the childhood of the world, written for children, and for that child-spirit in man which remains unchanged by time, it takes color and shape accordingly. Its object is purely religious, the point being, not how certain things are made, but that God made them. It is not dedicated to science, but to the soul. It is a

¹ See W. R. Harper, in *Hebraica*, 1888, Vol. v. p. 25.

sublime theology, given in view of ignorance or idolatry or polytheism, telling the worshipful youth of the world that the heavens and the earth and every creeping and flying thing were made by God."

"Here lies the whole matter. It is involved in the mere meaning of revelation, and proved by its whole expression, that its subject-matter is that which men could not find out for themselves. Men could find out the order in which the world was made. What they could not find out was, that God made it. To this day they have not found that out. Even some of the wisest of our contemporaries, after trying to find that out for half a lifetime, have been forced to give it up."

In view of the very unsatisfactory result of such great efforts on the part of men so distinguished in science and literature as the reconcilers to whom we have referred, it is indeed a subject for gratitude that the labors of another class of scholars in a very different field have solved the problem of the cosmogony of Genesis, as well as the countless other problems which present themselves to every thoughtful and intelligent reader of the Scriptures who applies his mind as well as his eyes to the perusal of their pages.¹

¹ Since writing the above, and indeed since the completion of this entire article, my attention has been drawn to the conclusions on the same subject recorded by Rev. G. Frederick Wright, D.D., in his admirable books, "Studies in Science and Religion" (1882, pp. 365 *et seq.*) and the "Divine Authority of the Bible" (pp. 196 *et seq.*), and it gives me great pleasure to find how fully my general views as expressed above were entertained and expressed by him so long ago. In this connection I may be permitted to disavow any claim to novelty in the views expressed in this article generally, which I freely acknowledge to have been derived in substance from the various writers to whom I have alluded in various places.

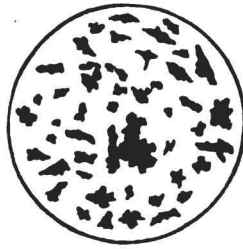


FIG. 1.—Appearance of the pigment in the microscope (Robin).

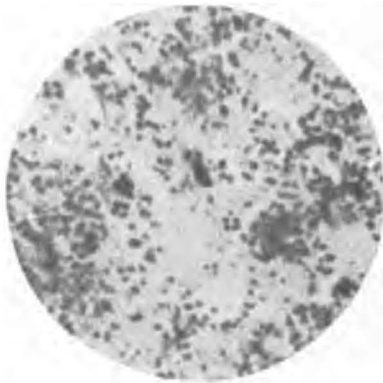


FIG. 2.—Micrococci [small globular microbes] from nodule upon an axillary hair (x 1000) (Hartzell).



FIG. 3.—Perineal hair, with brushlike extremity in which the Fungus is lodged (x 200) (Hartzell).



FIG. 4.—Axillary hair with Fungus growing upon it (x 75) (Hartzell).