

Theology on the Web.org.uk

Making Biblical Scholarship Accessible

This document was supplied for free educational purposes. Unless it is in the public domain, it may not be sold for profit or hosted on a webserver without the permission of the copyright holder.

If you find it of help to you and would like to support the ministry of Theology on the Web, please consider using the links below:



Buy me a coffee

<https://www.buymeacoffee.com/theology>



<https://patreon.com/theologyontheweb>

PayPal

<https://paypal.me/robbradshaw>

A table of contents for *Journal of the Transactions of the Victoria Institute* can be found here:

https://biblicalstudies.org.uk/articles_jtvi-01.php

JOURNAL OF
THE TRANSACTIONS
OF
The Victoria Institute,
OR,
Philosophical Society of Great Britain.

EDITED BY THE SECRETARY.

VOL. XXXVIII.



LONDON :

(Published by the Institute, 8, Adelphi Terrace, Charing Cross, W.C.)

ALL RIGHTS RESERVED.
1906.

ORDINARY GENERAL MEETING.*

REV. G. F. WHIDBORNE, M.A., F.G.S., SUCCEEDED BY
LIEUT.-GENERAL SIR H. L. GEARY, K.C.B., V.P., IN THE CHAIR.

The Minutes of the previous Meeting were read and confirmed.

The following paper was read by the Author :—

*EVOLUTIONARY LAW IN THE CREATION STORY
OF GENESIS.* By Rev. A. IRVING, B.A., D.Sc.

“ὄυχι ἡ ψυχὴ πλεῖόν ἐστι τῆς τροφῆς” ; (Ἰησοῦς ὁ Ναζωραῖος) *MATT.* vi, 25.

“The antagonism between Science and Religion arises much more from a difference in the spirit and temper in the students of each than from any inherent opposition between the two.”—ARCHBISHOP TEMPLE, *Bampton Lectures*, 1884, Lect. viii.

“Those who are conversant with the history of scientific ideas are aware that a belief in the gradual and orderly transformation of Nature, both animate and inanimate, is of great antiquity.”—Professor Sir G. H. DARWIN, F.R.S. ; Presidential Address to the British Association, Cape Town Meeting, 1905.

CONTENTS.

1. Statement of the author's position : (a) philosophically, (b) geologically.
2. The Darwinian dogma non-commensurate with the facts.
3. Perspective of the Dual Revelation.
4. Closer consideration of Genesis i, ii (1-3) :
 - Leading ideas embodied in the Creation Story—
 - (a) Manifestation of actual creative power,
 - (i) In the creation of *matter* (the monotheistic idea of verse 1).
 - (ii) In the creation of *life*.
 - (iii) In the creation of *man* (a being endowed with spiritual faculties).

* Monday, January 15th, 1906.

- (β) The meaning of "God said": successive manifestations (phases) of *creative thought directing* the powers inherent in nature,
- (i) Luminosity of the nucleate planet—the *barysphere* (v. 2, 3).
 - (ii) The *expansive* of dark intervening space (as seen in the "spiral nebulae") as solar and planetary gravitation increased (v. 6), evolution of the *lithosphere* and the *hydrosphere*.
 - (iii) Emergence of land above the universal Cambro-Silurian ocean, evolution of a land-flora (mostly of vascular cryptogams) from the previous cellular cryptogams, the former the ancestry in the Devonian and Carboniferous Ages of the present land-flora (v. 9, 11).
 - (iv) Clearance of the terrestrial *atmosphere* with greater condensation of the solar mass—direct solar rays reach our planet—enormous and rapid development of plant-life with a reduction of the proportion of CO₂ and an increase of that of O₂ in the atmosphere (v. 14, 15).
 - (v) Evolution (in the Mesozoic Age) of mobile air-breathers with organs of vision, amphibians, reptiles, birds (warm-blooded)—inception of mammalian life (v. 20, 21).
 - (vi) Fuller development of Tertiary mammalia (warm-blooded) culminating in the *Homo* of the Quaternary Period (v. 24, 25).
 - (vii) The *Homo* endowed with spiritual faculties to exercise the overlordship of creation and to worship the Creator—a day without "an evening and a morning" (i, 27–30, ii, 1–3).

I. STATEMENT OF THE AUTHOR'S POSITION.

IN approaching this subject in the present state of our knowledge, we have to take into account many things which, with the advance of critical research and the widening of the geological outlook, are floating in the intellectual atmosphere at the present time. In doing so, one has to dismiss that notion of "inspiration," which requires a slavish adherence to the letter, and to look rather to the spirit and intention of the inspired record. Along with what is called "Monism" we can recognise that the universe of Being has an unity in itself like its divine Author; that in its origin it is one, though in its elaboration, manifold; without committing ourselves to the bald pantheism of the line of Pope, in which he speaks of the Creator as the soul of the universe,—

"Changed through all, and yet in all the same";

which moreover seems to "run on all fours" with Haeckel's later doctrine of "substance." We may fairly contend that what there is of truth in the materialistic monism is all contained

in that higher monism involved in the monotheistic conception of "creation" revealed on the first page of the Bible.

With Herbert Spencer and his school we admit frankly that there is a *limit to "the knowable,"* so far as human knowledge can be advanced by the human intellect alone; but we part company with him and his school, when they in their arrogance declare all else to be unknowable. The "pure agnosticism" of George Romanes* does not frighten us, though we resent that *agnostic dogmatism*, which is so much the fashion in these days of shallowness—the shallowness of a newspaper-educated public. There is still a place, we maintain, for a *reasoned faith*, which recognises behind all phenomena and all manifestations of energy (in the whole range of "the knowable") beneficent Mind and Will (corresponding in *kind* to the *ultimate facts of our own consciousness*), which can choose its own way of making itself known in a measure to its spiritual offspring through the *spiritual intuitions of the human mind*. Without any conflict, therefore, with physical science we can claim a place in the highest philosophy for "Revelation," which all centres in the Incarnate Word.

"The acknowledgment of God in Christ,
Accepted by the reason, solves for thee
All questions on the earth and out of it,
And has so far advanced thee to be wise."—BROWNING.

Tennyson (*In Memoriam*) describes *knowledge* as—

"Half grown as yet, a child, and vain":

and reminds us that—

"She is earthly, of the mind,
But wisdom heavenly, of the soul."

In the deep consciousness of the "Ego," we say with him—

"I think we are not wholly brain,
Magnetic mockeries";

and can join in his prayer—

"Let knowledge grow from more to more,
And more of reverence in us dwell."

Man is in fact something more than a mere thinking machine.

In the geological outlook the present author's position is substantially that which he took in his graduation thesis in 1888,

* See his *Thoughts on Religion* (Longmans, 1904).

supplemented and published by Messrs. Longmans in 1889 under the title of *Chemical and Physical Studies in the Metamorphism of Rocks*. That was intended as an onslaught upon the extreme uniformitarian teaching of the Lyell School; and, so far as the writer is aware, has never been refuted. On the contrary, after most favourable notices in such papers as the *Scotsman* and the *Saturday Review*, with many other minor notices, its main contentions have been strengthened by such utterances as are found in the papers enumerated below,* while the fundamental conception, which underlies the more speculative parts of the dissertation, has been amply confirmed by the discovery of the frequent occurrence of "Spiral Nebulae," which were introduced to the acquaintance of the members of this Institute in the striking lecture of Sir Robert Ball, F.R.S., the Cambridge Astronomer, four years ago.† See further letters to *Nature*, by myself, vol. lxxii, pp. 8, 79.

II. THE DARWINIAN DOGMA NON-COMMENSURATE WITH FACTS.

Human knowledge is twofold: (i) there is the region of what we can observe through the senses, aided and supplemented by such powerful means as are furnished by the telescope, the microscope, the spectroscope and the photographic plate, together with the many and various devices of the chemical and physical laboratory, all of which (*pace* Mr. A. J. Balfour)‡ can be included under the head of "phenomena"; and (ii) there are deeper truths, which the mind reaches by reasoning through processes of *induction* from what is observed. These inductive processes lead us a good way in the direction of the *noumena*, the inner entity of things, but with limitations; so there is always an element of mystery remaining, furnishing a field for speculation, and therefore for a *reasoned faith*, even in things

* *Vide* Professor Bonney's *Rede Lecture* at Cambridge (1893); Professor Sollas's Address on *Evolutional Geology* to Section C of the British Association (1900); Lord Kelvin's Address to the Victoria Institute (1897); and Sir Robert Ball's Address (or Lecture) to the same Society (1901). To these may be added Hugh Capron's *Conflict of Truth* (Hodder and Stoughton, 1903), a work in which things are looked at from the astronomical point of view, and possesses the great merit of literary power.

† *Trans. Vict. Inst.*, vol. xxxiii.

‡ Presidential Address, British Association, Cambridge, 1904.

which belong to "the knowable," in the Spencerian use of that term. It is therefore reasonable to be prepared for an even larger element of mystery in matters with which "revelation" professedly deals—God, man's relation to Him; the great Christian verities. Not even the most thorough-going materialist can charge us with superstition here, if he reflects upon what the human intellect can do in controlling and directing the powers stored in Nature. We recognise the mind or intellect of the Chemist behind the wonderful advances that have been made in our day in *synthetic chemistry*; the mind of a Bauer (*e.g.*) in the synthesis of *indigo*; the mind of an Emil Fischer in the synthesis of *sugar*.* And we feel ourselves on ground as logically safe, when we insist upon the *factor of directivity* (as lately ably expounded by Professor George Henslow)† being superadded to those factors that are included in the Darwinian dogma of *evolution by natural selection through survival of the fittest*. We recognise that as playing its part in those *variations* whereby "natural selection" is made possible. Such directivity, we maintain, cannot find its full explanation in mere chance changes in the environment calling into play new reactions of the *protoplasm* of living beings; still less can that account for the protoplasm itself, or for the differentiation which has come about between *man* and the *anthropoids*. On this point it matters little whether the genus *Homo* is structurally related more closely to the orang, the gorilla or the chimpanzee among the anthropoids‡ with whom he is said to claim a descent from a common ancestry; the important point is that anthropology and palæontology combine to testify to his appearance in the created series at the place assigned to him by the inspired writer, so far as that place could be assigned in language intelligible to an unscientific age in the history of mankind. The non-recognition of the distinction between the *Homo* of the naturalist and the Man of Scripture and philosophy may be said to constitute the fundamental fallacy that vitiates the whole argument of the *Romanes Lecture*, lately delivered at Oxford by Professor Ray Lankester, F.R.S.;

* To these we may add the name of Ladenburg, recipient of a Royal Society Medal in the year 1905.

† See *Christian Apologetics* (London, John Murray, 1903), a series of addresses delivered at University College, London.

‡ See Review in *Nature* of Duckworth's *Morphology and Anthropology*, vol. lxxi, p. 433.

a fallacy which, I think, Romanes himself would be the first to detect if he were still amongst us in the flesh. "Male and female created He them" (v. 27) is not mere rhetorical iteration, but emphasis of the fact that the higher creation of *humanity* lifted the human *anthropoidea* as well as the *anthropoideus* to a higher plane of being.

III. PERSPECTIVE OF THE DUAL REVELATION.

In the Bible, and therefore in every biblical subject, we must recognise the *progressive* character of the Revelation, as well as the living power, with which its different parts or "books"—its *βιβλια*—have spoken to the hearts and consciences of men and women for so many generations, with its variations of colour and perspective, as it has been transmitted to us through many men and many minds, the Holy Spirit of God taking hold, now of one, now of another type of human mind and character, and compelling it to give utterance to the eternal truths, which "the Father of our Spirits" would communicate to His children for their good. As the great Bacon has tersely expressed it—"The first creature of God in the works of the days was the light of the sense, the last was the light of reason, and His sabbath-work ever since is the illumination of his spirit" (Essay on "Truth"). And if that illumination of the human spirit has been, and is still progressive—whether we regard on the one hand that revelation of the "eternal Power and Godhead" given through "the things that are made" (as man is gradually learning to spell it out), that "Lehre der guten Mutter Natur (menschliche und abmenschliche)," of which Goethe seems to have had a better grasp and insight than either Spencer or Haeckel; or, on the other hand, that word of inspiration, which we maintain, runs through the Bible—we must be prepared to find in the earlier stages—in the one case and in the other—some crudeness of thought and expression. We have no more right to expect to find the fully developed "tree of knowledge" in its inceptive stages than we have to look for the fully developed morphology and external conformation of the giant oak of the forest in the germinal bud of the acorn, though potentially they are contained within it. The application of the figure is plain enough. The germ of all revelation is contained in the statement, with which the "Creation story" of Genesis opens—"In the beginning God created the heaven and the earth." The contention of this paper

is that the rest of that story is intended to unfold to primitive man the idea of an *orderly procedure*, whereby, under the *direction* of a Power, which is not nature, the present order of things has been brought to be what it is; that in fact the scientific doctrine of *Evolutionary Law* (as God's method of working) runs through it all. And the *evolution of humanity* (in its fuller and higher sense) is the pivot on which it all turns, as well as the goal to which it leads. For to man has been given a higher nature carrying with it the possibility of moral perfection on the one hand, and of moral failure on the other. But outside the range of humanity we cannot fail to see the truth of the inspired utterance—"God saw everything that He had made, and behold it was very good," each creature fulfilling the law of its being, while the *inorganic* world has its own laws and powers subserving and maintaining the *life of the organic* world, which controls them and directs them to its own ends upon this planet. All this is thrown into the form of what is as much a *poem* as the 104th psalm, the 28th chapter of the book of Job, or chapters 38 to 41 of that monumental book, without the mysticism ascribed to it by Swedenborgians.

In dealing with it we have a right to look at it in its professed relation to Revelation as a whole, as that culminates in Christ* and the New Testament; and we have to recollect that the inculcation of spiritual truth, appealing to the spiritual perceptive faculty, is from first to last the object of Revelation, to provide sustenance for the spiritual man through* that perceptive faith or spiritual appetite, which is not a mere intellectual faculty, although it involves intellectual processes; that perception of things spiritual which "varies from man to man and depends largely upon character."† To this faculty the teaching of Christ and His Apostles appeals everywhere. Its exercise is intimately connected with the right disposition of the will, and so with all that goes to influence, or give direction to, *volition*. We recall the words of the Great Teacher: "If any man willeth to do the will of God, he will know of the doctrine whether it be of God"; and the spiritual side of faith is fully recognised by St. Paul, when he tells us that—"with the heart man believeth

* That is to say, *the Christ of history and of the Church*, not such a mere nebulous adumbration of the divine-human image as a physicist may find sufficient for his own intellectual and spiritual needs. (See Prof. Silvanus Thompson's address to the Victoria Institute, vol. xxxvii, 1905).

† Archbishop Temple, *Bampton Lectures* (viii), 1884.

unto righteousness." Such points serve to illustrate what we may call the higher philosophy of Revelation, and mark a stage of its development far and away beyond what we are justified in looking for in its inceptive stages.

The dual Revelation may be represented by two distinct geometrical planes, in which the intellect moves. One of these is the plane of *Nature*, as that unfolds itself to observation and inductive reasoning; the other is the plane of *spiritual intuition*. They intersect, and, while each of them may be regarded as indefinite in extent, they have their common centre in God. But this is not all; for they are not stationary. Each rotates round the common centre, so that they intersect at an indefinite and ever-varying series of points. In a highly developed nature therefore every state of consciousness has its spiritual and intellectual relations both to the individual soul and to the universe of Being.

When the idea is presented to our minds by the theologian of *γενεσις* or "creation" as that of "making things out of nothing," he presents us with what is to pure reason something unthinkable, as I pointed out years ago* ; and this remains true, even when we take into account all that has been put before us of late as to the *ultra-gaseous possibilities of matter and the evolution of the elementary atoms*.† What does strike us with marvellous force is that the inspired writers—without attempting to give men scientific ideas of the origin of matter and the laws of nature—for the discovery of which God has endowed men with proper faculties—tell us much of the working of Almighty Power in forming and upholding and controlling the present order of things; and they recognise the *origin of life* simply as an *act of Divine volition*. In the "Creation Story," when it is fairly studied, as I have remarked in the paper already cited, "the difficulties of reconciling the 'Mosaic' account of the Creation of the present order of things with the teachings of Science are almost trivial as compared with the *power of that insight* which rejected everything not in harmony with the central monotheistic idea." On this Dr.

* A. Irving, "Things New and Old" (*Clergyman's Magazine*, Jan. 1893).

† "A belief in the evolution of matter is fast becoming not only possible, but inevitable": W. G. D. W., in *Nature*, Sept. 21st, 1905 (p. 506); in review of Dr. Le Bon's, *L'évolution de la Matière*. See also Prof. Wind, *ibid.*, Oct. 5th, 1905 (p. 574).

James Moorhouse, late Bishop of Manchester, remarked to me in a letter: "I think you have a grand penetrating thought in that remark. There are many scientific verisimilitudes in the Old Testament. Some people, seeing these, ordinarily assume that it was one purpose of Divine Inspiration to reveal physical truth. I think this is more than doubtful; but your admirable sentence above gives, I think, the true account of it. The organs of Old Testament revelation had a firm grasp of the monotheistic idea. This commands so wide a range of thought that it enabled them instinctively to reject much which was out of harmony with the general order of God's action in the physical world, and also to instinctively express those general aspects of physical truth which are in harmony with that order."

IV. CLOSER CONSIDERATION OF GENESIS I AND II (1-3).*

In the "Creation Story" itself we find that the author had in his mind two distinct conceptions of the *γενεσις* of the things which "God *created* and *made*" (ii, 3). In the first place we note that at three points, and three only, does he make the statement "*God created*"; and these occur where we can recognise, in the light of the teaching of science, as even he seemed to recognise, *definite departures* in the evolutionary process, whereby the present order of things, culminating in the "Man" of Scripture, has been brought about. To the author the whole range of created things seems to fall into three categories:—

- (i) *Non-living matter*, with its energy and properties;
- (ii) *Living beings*, with their power of motion, growth, and reproduction each after its "kind" or species;
- (iii) *The Spiritual Nature of Man*.

For he tells us—

God *created* the heaven and the earth.

God *created* every living creature (and therefore life).

God *created* man in His own image.

* Space forbids any attempt to deal with the question of the Mosaic authorship of Genesis, but one feels bound to suggest that, with the evidence of the Tel-el-Amarna tablets (first described to this Institute by M. Naville), and with the portrait of Amraphel and the translation of his laws (which we owe to the ability and industry of Dr. Pinches) the adverse criticism as to the traditional authorship of the Pentateuch must be largely discounted

These are what we may call the three *primary factors* of what constitutes the order of nature in the fullest and most comprehensive sense. It is true that the author does not apply the term "living" formally to the vegetable kingdom, though he *implies* it in his description of the more prominent *life-functions* observable in that department of nature. Nor does he date back the appearance of life upon this planet to the early stage of its evolution, to which the revelations of Science carry us. Why should he? Who could have understood him, had he done so?

In the second place the author, whoever he may have been, seems to recognise *directive* intelligence guiding the powers inherent in nature along definite lines, in his frequent use of the expression—"God said," as introductory to his description of each broad and general *phase* of the manifestation of creative power, as it presented itself to his mind. This very expression used for marking off each such *phase* of what we may speak of as "the things that are made," seems to have been intentionally used to exclude the notion of the crude "carpenter theory," upon demolishing which Herbert Spencer has expended a considerable amount of second-rate ammunition. It was a "bogey" to the mind of no really educated man, nor to any real student of Science.

How *life* first came into play in the earliest *Protistæ* of the warm waters of the Cambrian or Pre-Cambrian ocean we know not.* Haeckel has so long persuaded himself that he knows, that he speaks of *abiogenesis* almost as a scientific truth, although it is only a *scientific belief*, which through "unconscious cerebration" seems to affect the colour and perspective of all his ideas. It is not likely in the nature of things that we could have structural forms preserved in the fossil state of either the earliest protozoa or the earliest algæ or fungi, though the graphite and anthracite of the Cambrian and Silurian stratified rocks have been probably ascribed rightly to the mineralisation of marine algæ. But all that is outside the intellectual vision of the author of the *Creation Story*, as is also the fauna of the palæozoic ocean; nor ought we to expect him to have anticipated the results of the science of palæontology, which is only

* "The mystery of life remains as impenetrable as ever, and in his evolutionary speculations the biologist does not attempt to explain life itself, but adopting as his unit the animal (*sc.* organism) as a whole, discusses its relationship to others and to the surrounding conditions." (Prof. Sir G. H. Darwin, F.R.S., Presidential Address, Brit. Assn., Cape Town Meeting, 1905.)

a century or two old. Such omissions in no way vitiate his conception of Evolutionary Law causing an orderly development of the universe, which is here presented to the mind of primitive man in the mineral, vegetable, and animal kingdoms, as the outcome of the action of beneficent mind and will behind it all.

This wonderful poem hath indeed its marvels, as we perceive in its anticipations of some of the most recent conclusions of science. Thus, if we allow for the "personal equation" in the human author, there is a clear substratum of scientific truth underlying the first three verses, such as would be expressed, if we paraphrased them freely, thus:—

"The beginning of things was the coming-into-being by the Will of God of the matter of the universe, as we know it. Such matter existed at first as a dark and formless waste (R.V. v. 2). Energy resulting in motion came into play, as a further result of the action of the Creative Spirit. As a consequence a further advance was made in the generation of heat and light, the matter becoming incandescent from its own heat."

The advance from the darkness of the formless (disintegrated and ultra-gaseous) condition of the matter of the universe, to the luminosity of the embryonic earth (by chemical combination), strikes the mind of the author as so marked, that he clothes the idea in a metaphor: "God said, Let there be light." He recognises that this globe was at its inception self-luminous, just as we see, with the aid of stellar photography, those separate centres of the "spiral nebulae" to be, or to have been at the time, when they emitted the light which reaches the negative of the astronomer's camera. How did he get such an idea? How did he, thousands of years ago, thus anticipate one of the latest revelations of science, which, deduced by some of us* previously from the facts presented by geology and thermal chemistry, is now brought with such powerful conviction to our minds by telescopic photography?

The inception of the earth's *barysphere* as a separate centre of condensation in the rotating nebula was the prevailing idea in the author's mind in his speculations some seventeen years ago. In the present state of our knowledge, with new light thrown upon the evolution even of the "atoms" of the chemist, the explanation of such separate centres seems to come

* See A. Irving, *Chem. and Phys. Studies* (1889).

within the horizon of our mental vision; although here, as with vital evolution, we may be thrown back upon the hypothesis of a *directing influence* which eludes our powers of analysis.*

A shallow criticism could, a few years ago, ridicule the notion of light appearing in this globe before the sun and the stars are taken into account; but that criticism, like much other criticism of the same fibre, is now seen to have been a little "too previous." The earth was passing through the "solar phase" of its existence, and was a sun to itself.

As condensation proceeded about the original barysphere, the luminous gaseous matter of our planet, with that of the other planets and of the central orb of the system, became more and more separated, with an intervening dark *expanse* of space; the fluid matter ("the waters") of the earth was marked off from that of the other members of our system by terrestrial, planetary, and solar gravitation. Rendered poetically, "*God said, Let there be an expanse in the midst of the waters.*"†

Loss of heat by radiation into space allowed the gradual liquefaction of the mineral matter of the globe, with a gradual formation of a thin "crust" in the "pre-oceanic stage," the two together making up the "lithosphere" of the globe; and with further fall of temperature of the whole mass by radiation of heat, the watery and other vapours began to condense upon the still hot crust, giving rise to such widespread vulcanicity as that of which we can read the evidence in the moon's surface; the globe became in time covered with a mantle of hot water, above which, as a physical necessity, there must have floated a dense "atmosphere," impervious except even to the most diffused light from the sun, even if that central orb had, at that period of the history of our solar system, entered upon its *solar phase* of condensation (see Lord Kelvin's address to the Victoria Institute, 1897).

At the stage in the history of our planet following upon the formation of its "hydrosphere," we may fairly place the Cambrian and Silurian fauna of the universal ocean, the temperature of which was not less than 80° F., over the whole

* Mr. Jeans' phrase "gravitational instability" is a useful one in this connection. (See *Nature*, Oct. 12th, 1905, p. 591.) The heaviest and most refractory metals, such as platinum, would be the first probably to form the nucleus of the barysphere, but a gravitational centre once formed, gravitation would be rapidly augmented.

† For an able discussion of the term "the waters," see Hugh Capron's *The Conflict of Truth* (chap. xiii.)

surface of the globe, every species of which has since become extinct. That fauna was marked (*inter alia*) by the incipient development of organs of vision in the trilobites and (later) in the palæozoic Ganoid fishes in response to the feeble light which reached the now non-luminous earth from the sun and other luminous bodies. The bulk of that ocean included the present waters of the globe added to the present polar ice-caps and the subterranean waters.

As the lithosphere and the hydrosphere cooled, so the *atmosphere* gradually cleared, as a physical necessity; while contraction of the former caused its form to depart from the strict geometric regularity of a spheroid; the water collected into the primitive ocean-basins as the simple effect of gravitation, and "the dry land appeared," to yield the land-flora which, beginning in the Devonian, reached its maximum development in the Carboniferous period, as our planet was more exposed to solar rays, under the influence of which the richly-laden atmosphere of the period furnished an ample supply of the food-stuff of plants (*carbon-dioxide*, CO_2), along with a plentiful supply of *free oxygen*, which is as necessary for the respiration of plants* as carbon-dioxide and sunlight are necessary for the assimilation by them of carbon. A temperature of 70° to 80° Fahr. seems to have prevailed universally.

It may be fairly maintained that the first ten verses of the first chapter of Genesis cover, as a sketchy outline (wanting of course in many details) the evolutionary history of our planet down to about the age of the Old Red Sandstone; and that the next ten verses cover that stage of the same progressive development of our earth and the solar system, which is covered by the Carboniferous and Permian (or Dyas), considered as one continuous period with the Devonian, which in a broad sense palæontology seems to justify.†

When we look at the abnormal facies of the English Trias, that period seems to present a great break in the continuous development of life-forms; but this is less the case in the German Trias, and in the Trias of the Eastern Alps we find the actual palæontological record of the progressive nature of the changes

* See Stirling, *infra*. The hypothesis that the vital action of vegetation originated the oxygen of the atmosphere is utterly untenable.

† For a more extensive study of the physiographic conditions of our planet during the Palæozoic age, see Prof. Hermann Credner, *Elemente der Geologie*, 6th edition, pp. 408, 441, 465, 495, 506, 534, 535; also Prof. Zittel, *Aus der Urzeit*, pp. 226-229, 254-262.

through which life-forms passed, from the fauna which broadly characterises the palæozoic, to that which broadly characterises the Mesozoic series of stratified rocks.* It is well to emphasize the fact that there was no occurrence even at that stage of wholesale or sudden exterminations, or of the sudden appearance of new forms on a general scale. Yet in a general sense we can differentiate the life-forms of the one period from those of the other. It is only in the Mesozoic age, when we may fairly suppose that the composition of the atmosphere became pretty nearly what it is at present, that *warm-blooded animals, which require not only a plentiful supply of free oxygen, but also the rapid elimination of CO₂ from their blood,† appear in the form of birds*; while the same period of the earth's history was marked by the appearance of "great sea-monsters" (*Ichthyo-, Plesio-, and Pliosaurus*), along with a prolific and abundant marine fauna including bony fishes; and *phanerogamous plants* seem to have gradually attained their mode of existence to the present constitution of the atmosphere.‡ Broadly, as the result of evolutionary change, *pari passu* with changes of physical conditions in the environment,§ we can recognise a gradual and progressive advance in the life-forms which appear upon the stage of the world, over those which prevailed in palæozoic times; and without doing violence to the narrative freely interpreted, on principles already assumed, we may fairly connect all this with what is stated in verses 20-23 of Genesis i.

When we pass on to the Tertiary age, we find that this again presents its broad general characteristics, the most noteworthy of which is the great development of the *mammalia*, the first dawn of mammalian life having appeared rather late in the Mesozoic age,|| though only to such an extent as to have been quite subordinated to the other great classes of the vertebrata; and the tertiary mammals range in an unbroken series down to the present day, as the ancestry of the *mammalia* now living on the globe.

* The present writer's work in this department of geology may be found summarised in his paper, "Twenty years' work at the Younger Red Rocks," *Geol. Mag.*, August, 1894.

† See *Nature*, vol. lxxii, p. 355, for a remarkable lecture on Respiration by Dr. Stirling, at the Royal Institution.

‡ To reach their full development in Tertiary times.

§ Chiefly—(i) lowering of temperature and diminution of salinity of the ocean waters; (ii) purification of the atmosphere from an over-dose of CO₂.

|| No one, I fancy, believes in the *Microlestes* now, any more than in the *Eozoon Canadense*.

The land-fauna reached its full development, culminating in the genus *Homo* during the Tertiary and Quaternary Periods, in the latter of which the *Homo* first appeared, so far as any trustworthy evidence carries us.* The fact, that some of the largest mammals (like the whale) acquired aquatic habits of life, is a matter of detail, of no more significance than the converse fact, that many molluscs have acquired a terrestrial mode of existence, so far as the general view here adopted is concerned; and this is all that we can reasonably expect to be recognised in verses 24-26 of the poem under consideration.

The Evolutionary Cycle was completed, and it only needed the superaddition of the mental and spiritual faculties, with which man is endowed, to give to him that place in creation which is assigned to him in the remaining verses. These tell of his moving since on a *different plane of evolution* to the rest of the created series, during that "*seventh day*" without "*an evening and a morning*," in which we are left by the inspired writer to believe we are still living, the period in the history of our planet marked by the progressive "*illumination of the human spirit*."

In looking at the Creation Story as we have done in this paper, the orderly *sequence of essential facts*, as they are stated, has been regarded as of primary importance. In the Story itself some of the statements that occur are parenthetical, they add to the details of the picture, but form no part of its essential outlines. The introduction of "*an evening and a morning, one day, a second day*" (R.V.), and so on, may fairly be regarded as the frames, in which the story is presented in a series of minor pictures, as a great help to the memory when writing was rare, intended to serve and at the same time to indicate certain recognisable stages in the unbroken forward movement of the whole, tying it on to things and associations of ordinary human experience, but of no temporal connection with those stages or "*days*." Those stages are further emphasized by the poetic expression "*God said*," as if to remind us (at each advance in the general evolution of "*the things that are made*") that it was all the result of the continued operation of one and the same Creative and Directive

* The evidence supposed to be furnished by "*eoliths*" has now completely broken down. See Prof. M. Boule in *L'Anthropologie*, tome xvi, No. 3, 1905. The present writer has long maintained that owing to the *vitresosity* of the silica of flint, all the features presented by so called "*eoliths*" can be explained as *accidental*.

power, as distinguished from the "gods many and lords many" of the old Assyro-Babylonian cosmogony, which lay in the background of the writer's mental vision; but in each case of its use, as much a figurative expression as that which the psalmist uses, when he sings, "By the word of the Lord were the heavens made, and all the host of them by the breath of His mouth." (Psalm xxxiii, 6.)

In the present state of our knowledge we may perhaps say of Genesis i and ii (1-3)—that it is a descriptive poem, the production of a genius gifted with exceptional insight supplemented by the special illumination of the Spirit of God, and inwrought with things that are matters of ordinary observation, implying a general sequence almost suggesting *evolutionary law*, without forestalling the results of the slow operation of the human mind in arriving at its present standpoint; but intended to drive home to the understanding of primitive and untutored minds the great *monotheistic idea*, which lies at the foundation of all the Revelation contained in the Holy Scriptures, and is enunciated in the first verse of the Bible.

Supplementary Note A.

Since this paper was written the author has been disappointed—after reading carefully twice over the address of Professor Sir G. H. Darwin to the British Association at Cape Town—in coming to the conclusion that the mind of that distinguished scientist is almost a blank as to the teaching of *thermal chemistry*. Yet this is a real factor even of "the first order" (as a mathematician would say) in any theory of the evolution of worlds which starts with the nebular hypothesis. If we reflect, for example, on two most prominent instances, the *stability* of the compound silica (SiO_2), and the *stability* of the water molecule (H_2O), as some indication of the enormous thermal value of the combinations which have given us these most widely distributed compounds, and reflect further upon the high temperature of the flame of the oxy-hydrogen blow-pipe,* we can scarcely fail to see the importance of *heat of combination in the evolution of molecular matter*, as we know it. To proceed by a leap from the discussion of the "nebula" to the discussion of a hot molten sphere revolving and rotating in

* One gramme of hydrogen in burning into 9 grammes of steam yielding over 34,000 thermal units, that is to say, heat enough to raise 34,000 grammes of water from 0°C . to 1°C .

space is scarcely philosophical. It is the old story of the "mathematical mill," the output of which depends upon what is put into it. It leaves a gap in the argument which cannot be bridged over by any speculation upon the heat-giving power of radium and its congeners. If these are *endothermic* entities, whence the original heat which took part in the evolution of their atoms?—A. I.

Supplementary Note B.

At the Secretary's request I offer a few remarks upon *The First Chapter of Genesis compared with Science and Criticism*, by the Rev. D. M. Berry, M.A., published in Melbourne, but *undated*.

There is very little in this pamphlet which is new to me. Some good points seem to be made, but there are many statements and assumptions which I should call in question. It is vexatious to find the writer consistently misquoting by writing "heavens" for the "heaven" of the R.V., and generally in the A.V. of chap. i. Mr. Berry still clings to the idea of "the waters" meaning the hydrosphere of the globe, and gets (it seems to me) in some confusion in consequence over the first appearance of *light* upon our planet. He would have got more help from Hugh Capron's *Conflict of Truth* than by quoting from Mr. Clodd, a rather "broken reed" to lean upon. His whole conception of the "firmament" is vitiated by his overlooking the fact that the proper word is "expanse" (R.V.). In making no reference to the *spiral nebulae* he is not up to date; and he follows too blindly Lord Kelvin's impossible hypothesis as to vegetation supplying the atmosphere in the first instance with O₂ from CO₂, since oxygen is as necessary for the stimulus of protoplasm in the living vegetable cell as in animals. Mr. Berry moreover quotes the existence of *graphite* in the Archæan rocks as evidence of vegetation. This, I maintain, is an exploded fallacy, as much so as the *Eozoon Canadense* since Möbius' monograph appeared in 1880. (See A. Irving, "On the Genesis of Diamond and Graphite," *Chem. and Phys. Studies*, App. ii, note L; also paper in the *Chemical News*, No. 1505.)

Nor is he up to date in the matter of Egyptian chronology; for he seems to be unacquainted with the recent advances made in that department of research, as described by Prof. Flinders Petrie in a lecture to the Victoria Institute. At the same time I should be prepared to endorse some of his criticisms of the views of Dr. Driver, whose strength as a Hebraist seems to bear

an inverse proportion to his strength as a geologist. In Canon Driver's paper in *The Expositor* (January, 1886) on the "Cosmogony of Genesis," the best thing seems to me to be his quotation (p. 44) of Dr. Rausch's view of "the six days" as "six Divine thoughts or ideas realised in Creation"; and that is substantially what I have contended for in my paper. With the general aim and drift of Mr. Berry's paper I am in full sympathy, though he wants the scientific "touch" of a real worker in science.—A. I.

Supplementary Note C.

Of all our leading scientists it may be said that not one surpasses Sir Oliver Lodge, Principal of Birmingham University, in power of insight into the "philosophical" aspect of great physical truths. Among his more important utterances in the last two or three years the following may be mentioned:—

Romanes Lecture, at Oxford, 1904.

On Mind and Matter: Morning Post, Oct. 13th, 1904 (a telling criticism of Haeckel).

On Miracles: Ibid., Oct. 25th, 1904.

The Reality of the Unseen: Ibid., March 13th, 1905.

On Psychological Research: The Times, Nov. 14th, 1905.

DISCUSSION.

Dr. W. WOODS SMYTH, F.Med.S.—Mr. Chairman, I am thankful to the Society for bringing this paper before us, and also to Dr. Irving for having introduced it and for the clearness with which he has presented several points.

In a general sense Dr. Irving considers the first chapter of Genesis to be a poem or poetical. I dislike to disagree with anyone, but still I must hold that is not the case. The poetic diction of the Hebrew is everywhere distinguished from prose. And the first chapter of Genesis is absolutely without indications of the poetic. It is strong on the contrary.

Again, Dr. Irving has an idea running through that the fact of its being in the form of a poem may atone for what we may call its shortcomings in some way. What I want to say is, the chapter has

no shortcomings. It is absolutely unerring. It is, if there is no other portion of the Bible so, verbally inspired. I have investigated that chapter in the Hebrew, letter by letter, in the fiercest light of modern and recent science, and I can find no discrepancy; and I should like to hear anyone here put it to the test and see if they can find an error or mistake. It is a revelation from God. We know it was not designed for the first or second age, but for all ages. Its simple beauty is perfect. Philosophically and scientifically considered, it is unsurpassed by any literature in the whole world. It is unapproached, because it is in a language that, better than any other, can express the course of Nature.

This language is distinguished by its tenses. These tenses are not tenses of time, but express modes of action. Now it is the modes of action that are of all importance. One tense that is used 49 times is the imperfect, and it means that which is the incoming, the unfinished, the continuous. It is used throughout, and there could not be a better expression of evolutionary law than the incoming, the unfinished, the continuous; or to put it in the language of Duncan Weir, who did not believe in evolution, it is expressing action in process and progress of evolution.

Then the next point that I would like to refer to is the expression "God said." Dr. Irving thinks this implies directivity, but the true explanation of it is found in John i, 1. "In the beginning was the Word and the Word was with God, and the Word was God. The same was in the beginning with God. All things were made by Him."

I would like to refer to a few special points. *Directivity* I look upon as absolutely unscientific and unscriptural. None of us believe in directivity in regard to inorganic evolution. We know that all the changes from the nebulous state down to the present changes that are going on in this earth, namely, shifting of sea and land, are all due to the properties, previously impressed upon matter and energy in the beginning. With regard to organic life, God gave it all that dowry of attributes which has led to progressive evolution up to man himself, and we have in the fact the grandest light possible thrown upon the moral responsibility of man. Life is an independent factor, and was always held responsible for its actions from the lowest form up to man. If it failed, death was the unfailing penalty.

Professor ORCHARD.—To me the title of this paper was in the nature of a surprise, a surprise that the Rev. Author should attempt to harness the evolution theory to the revelation of the Divine record given us in Genesis, and this surprise, I am sorry to say, was not diminished by the perusal of the paper.

I notice, on page 75, that the author observes that the contention of this paper is that the creation story in Genesis is an attempt to unfold to primitive man the idea of an orderly procedure, whereby, under the direction of a Power, which is not nature, the present order of things has been brought to be what it is. I agree with him; but he goes on to say that in fact the “scientific doctrine of Evolutionary Law, dimly conceived,” runs through it all. How do these statements tally? Some sort of proof ought to be given.

I agree with what the speaker who preceded me says with regard to the history not being a poem; the whole structure is that of prose, not of poetry. Poetic figures implied do not make the history a poem. We do not want poetical licence. All the six days refer to completed acts.

I am sorry to see on p. 79 we have this idea of the history being a poem. It is nothing of the sort. I must protest against the attempt of the lecturer to force upon the author a theory which he almost in set terms disavows. On p. 77 Dr. Irving tells us that the author of the history of Genesis believes that God created, not evolved. It is rather strong to say that the author of this record believes in evolution. Could he have used terms which more emphatically were out of harmony with evolutionary hypothesis? A former member of this Institute, Dr. Samuel Kinns, pointed out and proved that the history of creative events set out in that Divine record in Genesis is in the order in which modern science believes it to be.

Mr. ARTHUR SUTTON.—May I ask the Lecturer if he would kindly define what he means by the term “evolutionary law”? It is quite possible we may have misunderstood him in the way in which that term has been used.

Dr. IRVING.—Evolution is the idea which has taken hold so extensively in recent years of the scientific mind, that the sum total of the universe, so far as we know it, is the result not of chance, on the one hand, or (I may venture to use the expression) of capriciousness on the other; that the Author of Creation has unfolded to us

some of His thoughts in enabling us in modern times to see how those properties with which he endowed matter have worked together to produce the sum total of results. There is a great deal of what the first speaker said with which I heartily agree. Of course I cannot pretend to touch on what he said on the Hebrew side of the question. I am not a Hebraist, but I gladly accept the strong support given to my contention from that quarter.* I have taken the revised version of that chapter in the Revised Version of the Bible as sufficient for my purpose in dealing with the subject-matter. There is no doubt much might be said and has been said, and seems to be well said on that point, but I do contend that *evolution includes the immanence of Divine power*. I do not believe that God wound up the universe like a clock which runs down. In the nature of things, if God creates, His will and energy manifests itself; and evolution expresses that idea, when made to include directivity. It is difficult to explain in a sentence the word evolution, but I think we may fairly maintain that it may include that. If we believe in the existence of creative power at all, it is reasonable to include in our idea of evolution directive influence, which is identical with the genetic principle of nature. I see no reason why creative power, once acting, should cease acting; and you see that life was given not once for all, but is still given mediately for individual existence, as the continual manifestation of Divine volition; and so far I maintain we are fairly on harmonious grounds with the Bible revelation, when we talk of evolution. On this point Mr. Woods Smyth and Professor Orchard are mutually destructive. Some of the former's most sweeping remarks involve *petitio principii*, and his reference to St. John i, involves an anachronism.

This planet has been itself a product of evolution, as dissipation of energy has proceeded.

In reply to Professor Orchard, I can only say that he seems to have failed to catch the drift or aim of my humble attempt to harmonise in the light of the teaching of the "New Geology"; and I absolutely decline to accept the late Dr. Samuel Kinns as a

* More especially the use of the imperfect (continuous) tense in the Hebrew, which comes out so strongly in the Greek imperf. indic. as distinguished from the aorist. Thus, "God was creating"; "God was saying."—A. I.

competent exponent of what "modern science believes" or teaches in this first decade of the twentieth century.

Mr. WOODS SMYTH.—If we accept God's directivity we make Him directly responsible for bringing in life to be destroyed and responsible for the death traps that are in our organisation; but evolution explains these. Life was made independent, and God demanded obedience from life and gave it a law, which is the law of God we have in our own Bibles. It is the law in a dynamic form.

Rev. Dr. IRVING.—Man is endowed with will and consciousness, and the power of knowing right from wrong; but there has been a general evolution of human powers. There has been an evolutionary illumination of the human mind, as there has been an evolutionary development of living creatures upon this globe, as there has been an evolution of the inorganic materials of which the globe is made up as well as of its structure. There is a three-fold evolution.

The CHAIRMAN (Lieut.-General GEARY).—We are all agreed this evening has been most interesting, and we are deeply indebted to Dr. Irving for having brought this subject before us. I feel that a short discussion does not exhaust the subject. It will give us something to think over, and we shall read the lecture over again with renewed interest. I think I am only expressing the wish of everyone here in offering Dr. Irving our best thanks for his kindness in coming here and reading the paper.

The SECRETARY seconded this.

I think our Lord Himself has given us a rule. He said, "My Father worketh hitherto, and I work." The Father's work in the realm of Nature was completed, and Christ's work in the realm of Grace was begun.

The meeting closed with votes of thanks to the Chairman and his predecessor in the chair.

COMMUNICATIONS.

From Rev. JOHN RATE, M.A. :—

I have read with interest the Rev. A. Irving's article on evolutionary law, in which he says: "We maintain for a reasoned faith

which recognises behind all phenomena beneficent mind and will, corresponding in kind to the ultimate facts of our own consciousness which can choose its own way of making itself known in a measure to its spiritual offspring through the spiritual intuitions of the human mind." Nothing can be more appropriate as an illustration of this than the words of Sir Isaac Newton in his *Principia* to the third edition A.D. 1726, published by the Royal Society.

Dr. Halley, the great mathematician and astronomer, has prefixed a Latin deduction closing with these words :—

Nec fas est propius mortali attingere Divos.

I think in Roubiliac's statue of Newton in Trinity College, Cambridge, these words occur :—

"Oc genus humanum ingenis superavit."

Twickenham, Jan. 14th, 1906.

From Rev. G. F. WHIDBORNE :—

I very much regretted that I was obliged to leave the Meeting before the discussion of my friend Dr. Irving's paper, as there was much that interested me in it.

There is, however, one remark that I should like to be permitted to make even now. It seems to me that in any attempt to correlate the "days" of Genesis with cosmogonic periods it is well to look out for coincident points. One such may perhaps be found in the beginning of animal life. In Genesis we find this in the fifth day, in Geology in or before the Cambrian period. Does not this suggest that it may be that all the formations from the Cambrian upwards may be included in the fifth and sixth days? If so, Geology has absolutely no details to give us of the earlier days. In other words, the Geologic Record may begin with a gap—an imperfection which if Evolutionists realised, they might find very useful to them. At all events, while the waters brought forth abundantly the earliest forms of animal life we know, vegetable life appears abruptly with the land, and it seems a little puzzling to imagine it evolving from aquatics. May it have had a long unknown past history before the Cambrian time?

From Mr. HENRY PROCTOR, M.R.A.S. :—

May I be permitted to add a few remarks to Dr. Irving's excellent paper on "Evolutionary Law in the Creation Story of Genesis"?

The language of the first chapter of Genesis seems to bear out Dr. Irving's view that it is a story of evolution. Verse 11, for example, says, "Let the earth *bring forth* (produce) green herbs and vegetation," "βλαστησάτω βοτάνην" (lxx), and v. 20, "Let the waters *swarm* with swarms of living souls" (Heb.), or as in French R. V., "Let the waters *produce*, in abundance, living beings."

And in verse 26, the purpose of God in evolution is clearly stated, "Let us *make* man in Our Image, after Our Likeness, and let them have dominion . . . over all the earth." A purpose which the Scripture states is not yet accomplished. For "NOT YET do we see all things put under" man as the vicegerent of God, but in the "age to come," this authority will be given to all mankind who shall have attained to the image of God. Up to the present Christ alone is said to be the impress of His Substance, "the express image of His Person, but He is the *first-born* among many brethren, who are fore-ordained to be conformed to His Image." For not unto angels hath He subjected "the inhabited earth to come," but to Jesus as the "First-born of an entire creation"—that is, the New Creation which shall have dominion over all the earth. This is the end and purpose of Evolution, as foreshadowed in Genesis i and completed in Revelation xxii.

Dr. IRVING.—My friend Mr. Whidborne will find many "coincident points" in the *Synoptic Parallelism* appended to this paper, which, I may add, was in MS. before the paper was written. As to the inception of animal and vegetable life on this globe, I have nothing to add to what is stated on p. 10. The infra-Cambrian stratigraphical "gap" is well known, but is a small thing in the totality of planetary evolution. To Mr. Proctor I may be allowed to say that man's overlordship of creation is a *fact*. It is, however, not absolute, but relative. Under the illumination of "God's Spirit working in capable men,"* man has advanced a long way in controlling the powers of nature to his own ends. I thank Mr. Rate for the "*nec propius*" caution of Dr. Halley.

* Archbishop Benson, Sermon before the British Association for the Advancement of Science, Southampton Meeting, 1882.

ANALYTICAL PARALLELISM SUGGESTED.

Thesis:—God (from the first) was bringing into being the present Order of Nature, “the heaven and the earth” (Gen. i, 1).

(Enunciation of the *Monothestic Doctrine* of Creation.)

THE CREATION STORY OF *GENESIS* i, ii (1–3).

THE TEACHING OF “THE NEW GEOLOGY.”

1st Stage:—

The [material of] the earth was waste (“without form”) and void, and darkness was upon the face of the deep; and the spirit of God was moving upon the face of the waters; and God was saying, “Let there be *light*.” (vv. 2, 3.)
(vv. 4, 5, commentary on the facts stated in 2, 3.)

Dark formless waste of elemental nebulous matter; evolution of mineral matter; integration by atomic and molecular *motion* according to chemical affinities; *luminosity* results from rise of temperature due to chemical combinations and gravitational shrinkage, as *separate centres of condensation were formed in the revolving nebulous mass*. [Possible storage of heat (as pressure increased) in such endothermic bodies as *radium*.]

2nd Stage:—

An *expanse* in the midst of “the waters” divides the waters from the waters (v. 6).
(vv. 7, 8, explanatory with definition of the term “heaven” of v. 1.)

Further concentration of the fluid matter (“the waters”) about the initial *baryspheres* of the planets as seen in the spiral nebulae; separation of the nebulous matter of the system into central orb and planets; slow cooling of the earth by radiation of heat; formation of the *hydrosphere* by condensation of water (H₂O) upon the thin “crust” of the *lithosphere* (the Archæan crystalline schists) floating on a siliceous magma (now crystallised into the Ur-gneiss and the igneous “intrusives”).

3rd Stage:—

The waters under the heaven gathered together, dry land appears; this dry land brought forth “grass,” “herbs,” and “trees.” [*Terrestrial vegetation* described by enumeration of examples familiar to all mankind] (vv. 9, 11).
(v. 10, definition of “earth” and “seas”; v. 12, recognition of propagation of species by organs of fructification in the vegetable world.)

Slow emergence of land above the waters of the *hydrosphere* owing to unequal contraction and tidal movements of the rotating *lithosphere*; outlining of continents and permanent ocean-basins; evolution of terrestrial vegetation, represented at first by *cellular* cryptogams, but in the Devonian and Carboniferous Periods by *vascular* cryptogams and a few Conifers; precursors of the land-vegetation of later periods and of higher development.

4th Stage:—

Lights in the expanse of heaven [connected with] seasons, days, and years, to give light *upon the earth* (vv. 14, 15).
(vv. 16–18, descriptive in the light of facts commonly known to mankind.)

Further condensation of aqueous and other vapours, as cooling in space continued; direct solar (and stellar) rays begin to reach the surface of our planet, while the central orb of our system develops (by further contraction) more definitely its “solar phase”; day becomes marked off from night; all this resulting in the rapid luxuriant growth of the vegetation of the Carboniferous and post-Carboniferous Periods, with purification of the heavy, vapour-laden *atmosphere* from great excess of carbonic acid gas (CO₂). Age of *Cryptogams*.

5th Stage:—

The waters [of the ocean] were swarming with swarms of living moving creatures [including] “great sea-monsters” (R.V.), and fowl (winged creatures) flew above [the surface of] the earth (“on the face of the expanse of the heaven,” *cf.* v. 7) endowed with the power of propagation, each after its kind (species) (vv. 20, 21).
(v. 22, creative and beneficent will emphasized.)

Enormous development of air-breathing forms of life with organs of vision (amphibians, reptiles, birds) through the Mesozoic Age; earliest traces of mammals, playing as yet a very subordinate *rôle* upon the stage of the world as compared with the other four classes of the *Vertebrata* and with the *Mollusca*, the *Annulosa*, the *Annelida* and the *Coelenterata*. Warm-blooded animals first appear. Age of *Gymnosperms*.

6th Stage:—

The earth (dry land) was bringing forth the living creature, the beast of the earth, cattle, and creeping things, each after its kind or species (vv. 24, 25). And God was creating “Man” in His own image with capacity for propagation, and endowments (intellectual and moral) to enable him to exercise the overlordship of creation (vv. 26–30).

Great development of *Mammalia* in the Tertiary Age, culminating in the “Homo” of the Quaternary Age, along with further development of the lower terrestrial vertebrates. The crown and summit of the fauna of our planet is reached; the *homo* is endowed with faculties which reflect something of the “divine nature”; he becomes the *Man* of Holy Scripture capable of participation in a higher sphere of being than the rest of the sentient creation. Age of *Angiosperms*, foliage-trees and palms, with the development of present contours of continents and climatic zones.

7th Stage:—

The heaven and the earth of v. 1 finished, God completed His work and “rested” (ii, vv. 1–3).
(A day *without* an “evening” and a “morning.”)

The mechanism of the universe (so far as our planet is concerned) was fully developed; mechanical and physical, vegetable and animal evolution had done their preparatory work; this planet became a fit habitation of Man under “the illumination of the Spirit of God,” and the Incarnation of the Creative Word (S. John i, 1–14).

NOTE.—As time-periods the “Stages” cannot be sharply defined; their relative duration can only be estimated by development of living forms; measurement by thickness of strata altogether fallacious. Five controlling factors of evolution as displayed on this planet:—

- | | |
|--|--|
| 1. Gravitation. | 2. Integration of matter by chemical affinity. |
| 3. Dissipation, by radiation into space, of the heat-energy. | |
| 4. Life. | 5. Spirit. |