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ARTICLE I.

SCIENCE AND THE BIBLE. NO. III. [CONCLUDED.]

By Professor James D. Dana, Yale College.

BEFORE entering upon our discussions with regard to the individuality of nature, we give an abstract of the views on this subject presented in the "Six Days of Creation," and the "World-Problem," with some citations also from Plato, that the reader may better appreciate the point of the remarks that follow.

According to the recent works just mentioned, Nature is a great individuality, so far independent of the Deity, that she may be said to go of herself, to require rest, to deteriorate and decay, to need reviving through the act of the Deity at intervals in her progress, in order to her recovery from her decayings; and that to carry on her series of growths, she received *λόγοι σπερματικοί* or "immaterial entities" (explained to be not merely invisible force from the Creator, but actual "immaterial entities," put into nature) as germs of the existences that were afterwards produced in nature as the womb.¹ Moreover, as all that is finite errs, therefore nature

¹ See our Article, No. II., Bib. Sac., July 1856, pp. 651, 652.

may "blunder," and "work out an idea badly,"¹ though, "in general, she is to be regarded as honest." The author also observes :

"This constant tendency of nature, general or partial, to degenerate from the primal force (or, in other words, when thus left to itself, to manifest its necessary finiteness), this, taken in connection with God's from time to time renewing it, and even supernaturally raising it to a higher law than before, may be regarded as constituting those periods of torpor and re-*viscence* which are so appropriately styled *evenings* and *mornings*."—*World-Problem*, p. 343.

And thus he explains the successive days of Genesis, and the accordance of creation with the "cyclical law, which is the law of all natures."² The idea is presented as follows in the "Six Days of Creation :"

"Not merely is each period considered in its comparative imperfection an evening to the more perfect that follows; but there is, in a still more marked sense, in each period, *considered in itself*, an evening and a morning—a time of growth and a time of decline, a time of energy and a time of torpor, when nature requires a higher power to wake her from her commencing slumbers."—*Six Days*, p. 242.

We should add, in justice to the author, that he expresses a willingness to give up his views, if they can be shown to be incorrect. To secure this end is, and has been, an object with us in our communications.

The views of Plato, as given in the myth in his *Politicus*, and cited in the "Six Days" as "germane to the argument" on nature,³ are briefly as follows: "The leading idea is the one on which we [the "Six Days"] have dwelt, the *cyclical alternation of the natural and supernatural*." The myth says: "At one time, it [the world] is guided by a divine cause, during which *period* it receives again the acquired power of life, and an immortality not innate but imparted by the Demiurgus; and then again, that it goes by itself, being left to itself so long, that even many ten thou-

¹ *World-Problem*, p. 202.

² *Six Days of Creation*, p. 239.

³ *Ibid.* pp. 243-245.

sand years may be occupied in its revolutions." The period under the direct care of the Deity is the period of production, and, in general, the order of things is from death to life; it goes on for an immense duration, and at last comes to an end, as follows :

" The Divine Pilot, letting go the helm, retires to His secret place of observation, and destiny and innate tendency are left to turn back the revolutions of the world. Then commences the reign of evil. Nature, through all her works, gives signs of woe." . . . " Deteriorations everywhere take place ; first of the vegetable, next of the animal, and finally of the human race ; until, here and there, a small and wretched remnant alone survive." . " The former laws of nature are, at length, all reversed ; until finally, when the cosmos is on the very verge of utter ruin, God beholding it in great extremity, and being concerned, lest, by being overwhelmed in disorder and utterly dissolved, it should plunge again into the limitless, formless region of dissimilitude or chaos, once more seats himself at the helm, and, having arrested it in its course to ruin, arranges it again in order, rectifies it, and thus renders it immortal."

To these views should be added, the notion of types as ideal entities. The world and all things constituting it had, to Plato's mind, an ideal existence, not merely as a thought, but as an actual though invisible entity. The ideas were the prototypes of the sensible.

The points of resemblance between Plato and the " Six Days " or " World-Problem " are as follows :

1. Immaterial entities existing before material entities.
2. The cyclical alternation of the natural and supernatural. (It will be observed, that this is not cyclical alternations in the natural alone, the thought in nature, but also between the natural and supernatural.)
3. Nature " self-subsistent," though originating in a creative act.
4. The occasional revival of nature by one or more supernatural acts.
5. The deterioration and decay of nature, when left to itself by God ; this decay finally arrested by the supernatural act.

We remark, in passing, that the charge of Platonism

against the "Six Days of Creation," is surely not unjust, according to its own showing.¹

This work differs, in one essential point, from Plato; and this is of Mosaic suggestion: in the idea that a supernatural reviving, followed by a decay, corresponded to each of the *six days* of Genesis; while Plato, if his hypothesis were consistently carried out, would make only one revival and one decay for a cosmos; or, taking the myth in its more obvious meaning, as referring to periods in a single cosmos, they are, still, not periods of successive steps of progress, but, as he says, like alternations of fruitful and barren years. The golden age—the Saturnian of Plato—was in the past; and, in his creation of the animal kingdom, he made man come first, and, some time afterwards, woman, and the beasts and lower animals.

Plato, in his *Timæus*, the work in which he especially aims to give his theory of nature, does not introduce the notion of decays and supernatural revivings. He makes but one world—the earth—the stars being "the immortal gods." He holds that before the creation of the world, there was the eternal Creator—the Good and Intelligent. The ideal world, as the archetype of the sensible world, also existed from eternity; and, apart from it, though not without beginning, there was an indeterminate chaotic mass. Within the latter, the ideal archetype was placed by the Creator, making thus the world-soul, and creation went on according to the har-

¹ In the edition of Plato against the Atheists, published by Prof. Lewis in 1845, with copious notes and dissertations, he everywhere manifests great admiration for Plato, though not more than this loftiest of philosophers merits. But the extent to which he apologizes for the Greek sage, and endeavors to prove his accordance in sentiment with St. Paul, manifests the partialities of an advocate rather than the wisdom of a just critic. Many of the views brought forward in the "Six Days of Creation" appear in the notes to this edition of Plato. The more recent work is in fact a development from the earlier thoughts, although with some modifications and additions.

The discussion in the "Six Days," of the meaning of the word *day* in Genesis, bringing out the conclusion, on exegetical grounds, that the days were "indefinite periods of time," is one deserving attentive consideration. But this, as we have before said, is incidental to the main topic in that work,—the theory of nature, which is the special subject of our criticisms.

monic relations of numbers. Thus the material world, and, after it, the organic, came forth — the beautiful and the good displayed in sensible forms. In the closing sentence of the *Timæus*, we read: "Thus has been formed this universe, which comprises all animals, mortal and immortal; a visible animal, containing all visible animals; a sensible god image of the Intelligent God, very great, very good, finished with beauty and perfection, the one world, of one nature."

The account seems to imply that there was a series of supernatural acts in the creation; but this apparent successiveness has been attributed to the historical method of presenting the subject. It speaks of the world as having a beginning in an act of the Creator, but makes it eternal in duration, and not subject to age or decay, "since it is only the evil that would destroy what was beautifully made." Yet Plato elsewhere argues that nature is necessarily finite.

The myth appears to have been written when thoughts rising from the earth, and the bondage of matter with its growths and decays, were occupying the author; and the *Timæus*, when ideas, coming from above, of the Good and Beautiful as the supreme ideal, and God the end and source of all science, "the pattern after whom all is fashioned," gave a very different character to his views of nature. The two proceed from the opposite poles of the good and the evil, which Plato's philosophy was never able to harmonize.

The idea of some kind of individuality in nature, at least as regards a *law of progress*, is not a mere dream. With the ancient philosophers, it was only an inference from changes in animal and vegetable life and other cyclical movements. But through modern research the idea has the basis of actual demonstration. In the world, finite mind stands before the works of Infinite Mind; and these works, as has been shown, are expressly adapted to the characteristics and limits of finite mind. It is, therefore, in a sense, mind studying mind. And among the results to be looked for, is a knowledge of certain laws of finite mind, of the laws of matter and life, and of all progress or history. We have reason-

able assurance, therefore, that what we read, we read aright, if reason is just to itself and to its Author. We hence speak confidently when we say that science has traced out the history of the earth from its youth onward; that it has noted its featureless beginnings, a mere globe of fire; its spreading lands and multiplying rocks, forming continents and rising mountains, coming forth in order; till, finally, it appeared finished, with all its diversity of detail, in climate, surface, rivers and oceans, fitted for its great destiny. So we have read, too clearly to doubt, respecting a parallel progress in living beings, from the time of their first appearance: the earlier tribes, of inferior grade; then others, ranging to a higher level in species; and so on, gaining in superiority, through the ages, according to an exact system. And we have learned, besides, that all this progress, both of lands and life, reached its culminant point in man.

There is progress, therefore, and progress by law, as truly as in any developing germ. The details on this point were, to some extent, given in our first Article. We now pass to the consideration of the question:

What is the true idea of Nature's individuality?

Among species, in the world, there are two kinds of individuality: the *inorganic* and the *organic*. Only the last involves in itself any true progress, or the principle of cyclical developments; and this, alone, can be the type of any plan of progress in nature. Still, the inorganic is at the basis of the organic and of universal laws. We therefore may review some of the characteristics of individuals in this, as introductory to a statement of those in the other, department of nature.

L. INORGANIC INDIVIDUALS.

1. Made of matter, combining or accreting through its ultimate forces,¹ and reaching its perfection of individuality in

¹ It should be understood that modern science knows of no forces in nature but those that were early recognized by man. She has only studied out the

mathematical solids, called crystals; as complete in the first molecule as in the large aggregation, and therefore without any true growth.

2. Capable of change by the reaction of its own and external forces of combination or aggregation, but not by reproduction in cyclical order.

3. Forces characterized by an oppositeness in opposite directions, or what is called polarity; illustrated in the laws of attraction or combination, electricity, magnetism, light, heat. From crystallization, the true organizing process in dead matter, we learn that the three diameters of a prism correspond to axial directions of polarity; so that the prism, in view of the different polarities of its sides, may be said to have an upper and a lower surface, a right and a left, a front and a back.

4. Forces acting by undulations, or an alternateness of movement. The phenomena of light are connected with these undulations. The law of alternateness in the action of force is exemplified also in the cleavage of crystals and the symmetry of parts in many inorganic formations.

5. Forces characterized, in some actions, by a spirality of movement, shown by the dependence of magnetism on the spiral flow or activity of the electric force.

6. A universal sympathy, through all matter; not merely in the direct action of attraction, but, more comprehensively, in a mutual reaction of all forces tending to mutual modification or change, and a certain mean condition as a result of the reaction:—As when two bodies, unequally heated, force one another, through this interaction, to some mean temperature, the particular value of the mean being dependent on the *rate of cooling* in each, as well as the *temperature* in

laws of those forces. Light, heat, electricity as in the lightning, attraction, have been exhibited in common phenomena ever since the world began. Nature cannot keep her forces secret; but the modes of their action or their laws she holds concealed, until they are sought out by truth-loving man. So perfectly is this now understood, and so thoroughly has science searched nature, measured and weighed her powers, and blended them together in one, that the future discovery of a new power in nature is as probable as that the philosopher's stone will yet come to light.

each ; or, as when bodies, in the process of active combination, tend to promote activity of combination in other bodies.

7. Finite forms, finite laws of combination, finite proportions and harmonies.

II. ORGANIC INDIVIDUALS.

1. Made of matter growing through an internal process, carried on by living cellules, and passing, through a rising grade of changes, to an adult organic structure.

2. Capable of reproduction of self, through the evolution of germs, the process going on in continued cyclical order. — The germ, a minute cellule, consisting, in animals, seemingly of oil and albumen, for all species alike, but in each endowed with a special nature or condition of force, on which the peculiar line of development depends ; this force, fixed in character or amount, so that it is no more capable of change, or obliteration, by any mixing of breeds, than the equivalent of oxygen, or of either of the other elements.

3. An oppositeness essential to reproduction, termed sexual ; also an oppositeness exhibited in growth, — as in the root by inevitable law descending, whether in the light or the dark, and the stem ascending, making an upper and a lower extremity in plants, and similarly in animals ; besides which, there is also, in the latter, a right and a left, and a front and a back, the opposite sides being seldom identical.

4. Growth involving alternations or cycles of activity and rest ; illustrated in successions due to the cycles of the year, as the ayers of wood in a tree, marking its annual growth ; in others, due to the cycle of the day ; and for man, at least, to that of the week.

5. Growth characterized by a spirality in its progress ; brought out distinctly in vegetation, but disguised among the higher forms of life ; the spiral being the line of continued progress.

6. A mutual sympathy ; but only between individuals of a species. — But besides this, the process of growth is, to a great extent, under the laws of inorganic forces ; as it de-

pend on the conditions and nature of the material around. Mutual action and reaction, therefore, come in ; and while germs are essentially stable, as stated under 2., they admit of variations, or librations from outside influences, like all else in nature ; and the amount of libration is part of the law of a species, to be specifically ascertained by investigation.

7. Finite forms, finite proportions, and finite harmonies.

The parallelism between certain of these characteristics of inorganic and organic existences, will be observed by a simple comparison of the two, number for number. The alternateness in acting force, besides being expressed in the very nature of force, is seen again in crystalline cleavage (or the quality of splitting, naturally, into thin laminæ), this being due apparently to weakness and strength of attraction, alternating with one another, in the process of aggregation ; and this is parallel with the alternations in the tree, producing its layers of wood, and also in other products of life. The spiral lines, in progress, are at the very bottom of nature, as well as at the top. An expression in external nature comes up, resounding from its very foundation, and with a depth of tone in proportion to its depth of origin. Finite proportions are seen in a cursory glance at the earth's surface-decorations ; and mind, attuned within to harmony, thence readily educed the idea of numbers, as an element in creation.¹ But as we bend down more attentively to Nature, we discover simple proportions and fixed numbers in all her forms and movements : in the laws of the celestial spheres, in the details of the forest and all living structures, in the shapes of crystals, in the relations of the elements, in the flow of light and heat, etc. Instead of a faint conceiving of harmony, we actually hear the many tones that rise in multiplied combinations. And if a mind is not moved thereby, it is because *that* mind, at least, is emotionless.

But we proceed with some other statements respecting organic beings, and those to which beyond, we more particularly refer.

¹ The World-Problem says (p. 101) that the ancients " did not wait for the slow groping discoveries of modern chemistry " to learn about these numbers.

8. In the growth or development of a germ to its ultimate result, the perfect individual, there are, as Professor Guyot states, three epochs: 1st, the germ-cellule produces, through a process of gemmation, a multitude of cellules, preparing for the new structure or organism; 2d, from these cellules, by combination and evolution with continued growth, the organism is formed; 3d, the individual is completed to the adult stage, by changes within and without, and then, there is the development of the new germ in which a following generation is involved. There are thus three epochs, and the last a double one, its second part involving the future.

9. The law of germ-development, as announced by von Baer and others: *The general evolving the complex, through a systematic specializing process of growth*; that is, from the memberless germ, or simple unit, proceeding the finished individual or complex unit, through a progress which, in the whole, is according to the principle — *the general before the special*; the more fundamental qualities of the structure under development being first brought out, and afterwards those less and less general, or more and more special; until, finally, the surface-peculiarities are completed.¹

10. The law of reproduction, *like from like*; that is, the parent is repeated essentially in the developed young, since a specific amount of any kind of concentrated force (see 2., above), can produce only an equivalent in result.

11. The spiritual part of a being is so far involved in the organization, as to continue in regular expansion with the growth of the individual.

12. Besides the *simple individual*, in organic nature, there is also the *compound individual*. The zoophyte tree is made up of many individual animals called "polyps," one having grown from another until the tree was formed, and all being combined, intimately, in the one zoophyte. An apple-tree is a compound individual, of analogous character, in the vegetable kingdom. Among the many polyps in a zoophyte, certain ones only produce ova; as, in the apple-tree, certain buds give out flowers, while all the rest are leaf-buds.

¹ See our first Article, Bib. Sac., Jan. 1856, p. 112.

Without further extending this enumeration of fundamental truths in science, we come now to the question of the kind and degree of individuality in nature, as suggested by nature, the Bible being, here, left out of consideration.

We may consider, first, that free individuality of which man is essentially the type, as adopted by Plato and the "Six Days," and also by pantheists and materialists; and then inquire how far towards it we are borne by science, where the scientific path stops and reason mounts off.

After taking the idea of this free individuality from the analogies of species on the earth, pure reason unaided by science or the Bible, can do no less than follow the analogies faithfully; for this is its true law.

If then Man be the type, we have to admit that nature, through a plastic power or life-force, received at the creation of the germ or its vivification, evolved, in succession, her various parts—that is, the worlds, in all their details; that the progress went on, through this now inherent life-force, to higher and higher conditions in the developments, until the nature was completed; and this, not only for the inorganic arrangements, but also the organic, in all their diversity. And if man has a soul, then nature has a soul or controlling mind, for mind is among its surface-developments, and the very constitution of the inorganic in the earth, has had reference to its being the dwelling-place of mind.

Such a nature may or should have its beginning, or at least the beginning of its development or growth, in the action of a separate Power or God; it should have its period of adult years, age, and decay. If the analogy were perfectly sustained, the final grand development would be the production of the germ of another nature, of similar character, through the medium of some supernatural act; or, less perfectly, a reviving of the decaying nature by the Deity, after Plato's method.

If we assume so free an individuality, pure reason can hardly stop short of the admission that the vegetable kingdom was an evolution, through the plastic energies of nature; and so also the animal kingdom. It finds special Di-

vine interventions for these developments unnecessary. If it be admitted that one planting or act could give birth to the whole, or a large part of one of these kingdoms, why not go further, and let one act give birth to both kingdoms, or one to all inorganic and organic products? It is more simple and consistent for pure reason unaided or unrestrained by science or the Bible to conceive of the creation of a germ that would develop into the completed organism, than one that would require retouching: it is admitting the infinitude of the Creator's power; and the "World-Problem" argues that it is not atheistic. That nature, on this type, should "blunder," or do things badly, produce fungi and the like, as man has freckles and warts, and also have its torpid intervals, would, perhaps, be no inconsistency.

There is another kind of individuality, suggested by the tree, or zoophyte. It would have the same inherent and continuously acting life-force, or spirit, as that above considered; the same succession of growths without external intervention, after the first act of creation; but the surface-developments would correspond to the leaf-buds and flowers of the plant, or the unproductive and productive polyps of the zoophyte. We should therefore have to regard animal life as analogous to the leaf-buds of the great compound nature-individual, and man as the blossom, sending up its fragrance of mind to the celestials.

With such premises, one of these two notions is the legitimate conclusion of reason. It would be easy to put the hypothesis into language that would sound more transcendental. But we prefer to look the thing in the face, instead of leaving it in the clouds.

That we do not err in pronouncing these the natural conclusions of reason, is shown by the fact that the systems of many deists, ancient and modern, of pantheists and materialists of different schools, all follow, alike, the course of pure reason pointed out, as regards the continuous line of development from the first act or cause, or through inherent powers. Plato's theory is essentially of this kind, if taken in its true spirit.

After vaulting to such a height in philosophy, it is very easy to slip out "the beginning," and substitute an infinite series of natures ; and the Deity also, unless the theory requires a duality of powers to continue the line. The human mind, by its very velocity, under the influence of such aspiring views, almost inevitably passes the bound, and makes matter and nature eternal, and either one eternal nature-individual, or a succession endlessly continued.

We arrive, by this process, at a nature-theory in precise harmony with known individuality, perfect and magnificent, and as simple as A, B, C. Its special character would vary with the idea of the Creator to which reason would ascend, and might be theistic, pantheistic, or atheistic, and of several varieties under each.

The "World-Problem," or "Six Days" theory, although adopting the notion of a free individuality, as has been shown, does not carry it out consistently. It admits of supernatural revivings, and then decays, and also blunderings ; but, contrary to the dictates of pure reason, it makes out six revivings, and six decays or periods of repose. Individuality on the earth has its epochs ; but they are epochs of continued progress without intermediate repose, as well as without Divine intervention. The nearest approximation to repose, is in the chrysalis interval in the butterfly. But this is more apparent than real, as the changes are going on within, preparing for the next stage of the animal ; and it is merely a temporary condition in the course of the development. There is, therefore, no basis in reason for such a notion of six alternate decays and revivings. The theory is Plato's less inconsistent theory, adapted to the six days of Moses.

The theory goes so far, however, in the Platonic direction, besides adopting "immaterial entities," as to deny that "the beginning," in Moses, means the beginning of material existence, and to suggest that there may have been, "in time," before the beginning, "many other inceptive epochs in the great spiritual and material works of God." It also holds that the heavens and the earth existed as such pre-

vious to the same "beginning;" and that *light* was in the universe, long before the "first day," in which God said: "Let light be;" on which point it brings forward much argument. The author holds that matter, at some time, had a beginning in the act of a Creator, and that each inceptive epoch was begun by a direct act of the Deity. He claims that his theory of nature, and of "immaterial entities," is in Moses and other parts of the Bible. Upon this, we shall soon remark. It is plain that it does not stand the test of "pure reason."

The hypothetical assumption, in this philosophy, is the idea of this kind of free, independent individuality. Reason, looking at the "honest, open face," and proudly within itself, here takes its venturous leap from this earth of rocks, plants, and animals. And now, to ascertain the precise point from which this leap is taken, we may look from the "fair, outspokening face," to the more truthfully outspokening depths.

The great result of science may be mentioned in a word. It has learned that, in the earth's history, there has been a progress according to a regular system, harmonious in its parts and successions; and that the same natural causes acted through the past as are now at work. This much it has learned. As to methods of first origin, whether of matter or life, or specific forms of life, it knows nothing, and proclaims its ignorance; it only prescribes some limits to speculation. The plan of progress which it develops, it may show to be the appointment of an Infinite Mind. But with regard to the origin of an animal or a plant, it can only say, physical forces of the existing world did not create it: God made it. Between the Creator and these creations, lies a field over which science has run no paths and made no plotting; and here, pure reason has space for her mazy excursions.

Science is guided by facts and analogies; and the only analogy afforded, with reference to such creations, is the single one that they have come forth according to law; whence the argument, that, since the inorganic world has been

evolved through appointed forces acting as natural causes, therefore the system of life, which is according to law in its progress, has so come forth. But science discovers, even in the arrangements of the inorganic world, in its surface-features and other appointments, a reference, as we have observed, to its becoming the residence of mind ; and for this, and much besides, it has no secondary cause to suggest. It therefore takes no advantage from the simple analogy pointed out ; for it is aware that, whether made through natural causes or not, there would in either case be law, and refers all to Infinite Power or Intelligence. And here it must rest, with those who would not build a Babel. Science thus acknowledges its limit.

Moreover, in the very outset, we are met by the absence, in the world or universe, of anything like that systematic organization that belongs to a true organized individual. We see an agglomeration, only, of various kinds of dead and growing things, and we meet with no transitions that favor the view. The earth, after all our searching, shows us only physical forces, that cannot rise into vital ; and vital, that cannot change to intellectual or moral, and affords no analogies of structure that authorize our making, of the agglomeration of combined worlds, an individuality developed, in all its parts, by inherent powers.

The law of progress, and the laws or relations among created things within the reach of study, not the mode of first origin, constitute the true object of scientific research and reasoning. What, now, are some of the teachings of nature, on these subjects, teachings addressed to pure reason, and by reason to be digested.

1. *The earth and the universe one in history.* The earth is one among a number of satellites of the sun, all of which satellites would make a sphere only 1-630th the size (or 1-700th the mass) of the sun. It is one of the smaller of these satellites, being about 1-1,400,000th the size (or 1,355,000th the mass) of the central orb, which it obediently attends. The sun, moreover, is one sphere in a vast system, involved with that system in all its movements in

space, and in its laws of gravitation, of light, of heat ; that is, in the very essence or fundamental qualities of existences. We naturally conclude, therefore, not only that the earth is subordinate to the sun, and also to the universe, but that it was not created first, any more than the hand before the body of which it is a part. The point of the argument here used, is not in the inferior size of the earth, but its dependent relations to the system of the universe ; and science could not, without defying the laws of mind, come to any other conclusion. From this result flow the important principles :

(1) The *fact* of progress, in the history of the earth, implies concurrent progress in every other part of the universe.

(2) The general *law* of progress for the earth, is in analogy with the general *law* of progress for every other part of the universe.

(3) The condition of matter, in the earth's beginning, was essentially the condition in the beginning of other parts of the universe.

These conclusions make the earth's history a type, in a general way, for other worlds and the universe. We know that a single animal, as regards its more fundamental laws of development, is a type for all species of the animal kingdom : the law for one, is the law for all ; so of one plant, for all plants ; and so, we say, of one world for all worlds. This holds true, not for details, but only for the general principles of progress.

The power of appreciating such conclusions, will depend on the apprehension of the unity of God's works — their oneness in forces, in laws, in plan, thought, and end. The earth, although a small sphere in space, embodies the forces that fill immensity ; and deciphering its readings, gives the key to a universal history, which it may take an eternity to unfold.

2. *Correspondence between the progress of creation and the law of germ-development — the general before the special.* We have explained this subject (following Professor Guyot's views) in our first Article, and shown that the correspondence extends not only to the inorganic earth, but also to the pro-

gress of life. There are many details that might be given, which would add to the evidence; but we will not stop.

Reaching back in this line of history through geology, from the present era of finished continents to periods or ages of less and less extent of land, greater and greater simplicity of features, and more and more universal oceans, we come, in the remote past, to a state of general igneous fluidity, a chaos of earth. As the heavens and earth must have had a common history, this line *seems* to point still farther back, to an era of worlds combined in a more universal chaos, when Nature was all one formless deep. This suggestion relates merely to mode of progress in the line of physical causes, and does no violence to any known principles in nature or reason. But with even so good an analogical foundation, science can give the hypothesis no place, without observations carried on through the heavens and earth, that add strongly to the presumption in its favor. These researches are going on; and certain laws, already ascertained as to the forms, densities, distances, and velocities of the spheres in our planetary system, correspond so well with what would have been true in case of such an evolution from a universe chaos or deep, that the tendency is towards a belief in the nebular hypothesis, rather than against it; and this is the most that can now be said.

3. *Correspondence between the progress of creation, and the epochs of progress in germ-development.* We here, again, follow Professor Guyot. The germ of a living being, in its first state, exists, but is inert. Then development, at a moment of vivification, begins. We repeat the three epochs: *First*, the elimination of cells, preparing material for the organism; *second*, the evolution of the organism; *third*, the final perfecting of the being and the production of the new germ. There is thus a first work, a second, and then a third of double-nature, the last part the seed of the future. This is to be regarded as an exhibition of a philosophical principle, that must be true in all development, and it is essentially recognized in different systems of philosophy. There is, in every case of development, an organism, or some organized result-

ant, to be produced, and from this, the germ is to come. The first epoch *must*, therefore, be that of the preparing of material for the commencing evolution; after this, should come the forming of the structure; and then, the completion within, and the new production bearing on the future. It is not a system of progress established simply for the germ: it is the grand principle of all progress, as Professor Guyot urges, whether for embryology, geology, or human history.

Professor Guyot accordingly observes that the earth's inorganic history has three epochs, corresponding in value to the three here mentioned. The first, he reckons from the lighting up of chaos; the second, was the evolution of the universe or its system of spheres; and the last was characterized in the special case of our planet, by, 1st, the completion of the inorganic history of the earth, and 2d, the creation of the new principle, *life* (expressed in vegetation) — this the element of progress in the second era of creation; thus making a double work for this third epoch (as so made by Moses).¹

The three days of the organic history have a similar relation; and in the last of the three, in addition to the completion of the kingdoms of life, man was created with a soul—again a double work for the third epoch, and the soul the germ of the future, or the element whose progress makes the history of the following period in time.²

Creation has thus its two triads of epochs, as it has its

¹ On the third day, there was *first* the appearing of the dry land, as a result of the inorganic progress; and then *second* the creation of vegetation. The separation of the dry land and waters, as Prof. Guyot observes, was the last grand principle brought out in the inorganic history, the change afterward, only carrying it forward to its completion. This is precisely parallel with the facts respecting vegetation. The great idea of vegetable life was expressed in the first creation of a plant, although that plant was but a sea-weed; the subsequent epochs witnessed the progress of the vegetable kingdom by creations successively higher in grade, but with nothing essentially new in idea.

² We refer the reader to our first Article for other discussions on the parallels and peculiarities of the inorganic and organic eras. The fact is there pointed out that *Light* leads off each era, the *first*, light cosmical, the *second*, light to the earth for its days and seasons and the special necessities of organic progress. It is also observed that the third day of each era (the third and sixth) had *two* creations, the *second* of the two bearing on the future.

two divisions, the inorganic and the organic, making in all *six*. To these follows a *seventh*, the day of God's rest and man's redemption; and parallel with this, as Professor Guyot and Hugh Miller have brought out, redemption is the special intent of man's seventh day of rest.¹

Thus comes the number *seven*. The "World-Problem" dwells at some length on this number, speaking of it as "a dual of trinity *connected* by unity," while it should have said a dual of trinity *followed* by unity,—this unity being the time of succeeding history.

We leave the subject for further development by Professor Guyot, who, we rejoice to know, will before long publish his views. We are sure that his work will be read with deep interest, and an admiration of the man as well as his philosophy, even by those who may not adopt all his conclusions.

4. *Nature, or the universe, finite in space.* The fixed and finite numbers and proportions, as to weight, volume, and all molecular actions and conditions, have been spoken of as proofs of the adaptedness of nature to finite mind. There are no infinite blendings between elements, and none between species; so that both the inorganic and organic departments of nature consist of specific individualities of determinate value or characteristics. We have thence an analogy proving finiteness in the ultimate constitution of matter; that is, that matter consists of finite molecules or particles,—a fact which also may be otherwise proved. Ascending to a view of the universe, we may infer with equally good reason, that is, from *finiteness* in other char-

¹ Some minds would sooner pronounce the harmonies in the Mosaic account accidental, than admit any true philosophy there. But with us, they are most impressive evidence of the divinity of the chapter. With every perusal of the sacred narrative, we feel more deeply the truth, that only He who created could have written the history; the wisdom of the works is the wisdom of the word. The inorganic, the organic, and the spiritual, were the three grand steps in creation; and the Bible account makes three days for each of the first two, and the present time for the last. Its accordance with the true formula of progress, as Prof. Guyot calls it, can be no accident. There is no more reason for attributing its order of announcements to "chance" or man's unaided thought, than the succession in creation itself. Admit such a notion and you prove the chapter a myth.

acteristics, and its oneness of origination and historical progress, that *the universe is finite in its space-limits*. What there may be, in space, beyond our finite universe — what “mansions,” or systems, it is beyond philosophy to say, or the finite mind to know, before it passes the bounds of its present existence.

5. *Nature finite in time : the fact of her beginning and her final decay*. Since we can fix, through geology, a beginning to the era of man, and so also can trace all the units of earth — its species of plants and animals — back to a time when they first appeared, the time of their creation ; and beyond this, can make out a progress in the earth’s past, corresponding to the general law or formula of progress illustrated in the development of a germ, we have conclusive evidence that there was a time when the earth’s progress began ; and therefore, since the earth’s progress is the type of progress through space, as argued above, *the universe had a beginning*.

We have to admit that what is created cannot be infinite, for infinitude is an attribute only of the Creator ; and if we make the universe infinite, either in space or in time, we necessarily sink into pantheism or atheism. Hence in proving the universe finite in space and a unit in origination, we go far towards proving the fact of its creation by an independent Being or Creator.

Going back in the earth’s history, we pass through eras of greater and greater heat, to a time of complete igneous fluidity, when the earth was, itself, a sun. The moon also affords evidence of having cooled in a similar way. From the laws of light, its direct connection with heat, as well when produced by electricity as in other cases, we know that the spheres in space, shining by their own light, are also suns, having a high temperature. The history of the earth from chaos, and these other facts, thus indicate that the progress of the universe, in its history, has been a progress from a state of intenser heat than the present ; and that a diminution of heat, or cooling, has been going on from the first. This is so, whether the nebular hypothesis be true or not, but to a much greater extreme if true.

Intense light is dependent on, or connected with, a state of extremely rapid vibration of molecular force. The condition, in earlier time, may therefore be expressed by reference to molecular activity, as one of its intensest action. Light, of course, as we ordinarily understand it, is a subjective existence, our eyes being so made as to perceive, through their sensibility to certain rates of vibration; that is, to those rates that observation has found to pertain to light of different colors; and the special rates for our earth (for there may be different rates on other spheres) were ordained in the creation of eyes among animals. By characterizing the period in terms of the vibrations, we avoid any reference to seeing eyes.

Now this process of cooling, to which we have alluded, was unavoidable with the existing laws of matter, unless all space were so filled with heated matter that there could be no cooler space into which to radiate it, — a condition that would have admitted no change, and therefore no progress. But with one or more finite heated bodies in colder space, and space perhaps not absolutely empty, there is, in this respect, the duality essential to development. A gradual refrigeration would be involved in the very existence of those bodies through progressing time, preparing the way, in its earlier states, for new creations; and, in its later, leading on towards a decay of all things. For, since cooling must be still in progress, it is natural to infer that the suns are getting colder, though imperceptibly so, and must end, as has been urged by some writers, in becoming quite cold. Like all else that is finite, therefore, the end of the universe is apparently indicated in its early history. A cold sun would be death to all that lives in our planetary system; and a cold universe, a dark, lifeless nature. We may know too little of the truth, to pronounce this the actual mode of final decay in nature; still we have reason to conclude, from the finiteness in this and other qualities, and the fact of a beginning, that the universe is finite in time in the future, as well as the past.

6. *Partial decays attending the course of progress.* In all growth, there is attending decay. The animal body is in incessant movement, growing and dying, in all its history.

Besides this continuous flow, there is also, in growth, an adaptation to new conditions of existence, involving certain changes of structure. So the earth, in its^o geological progress, passed through changes of climate from hot to cold, and changes in the waters and land ; and these involved a passing away of the old species of plants and animals, as the new conditions came on. We have abundantly illustrated this, in our first Article, where it is shown that destructions of life followed destructions ; creations, creations ; and thus the earth was in incessant change.¹

Speculating on such decays in nature, the mind rather naturally thinks of some deterioration in vital force. But in fact, these so-named decays (really destructions) were largely due to changes of level in the earth's crust, a raising of the sea-bottom out of the water, over regions of continental extent, or even larger surface, destroying all sea-life, and a sinking, obliterating land-life. This old-fashioned cause of destruction is yet at work, though more limited in its effects, destroying individuals rather than species. Igneous action was another efficient cause ; and this cause also still acts, in a weaker way. Besides these, the change of climate in progress through past ages, operated ; but not so much in causing the extinction of species as of tribes, by bringing about conditions which were not favorable to any new creations of species under certain of the old tribes fitted only for earlier time and circumstances. It may also be, that species have died out from exhaustion of vital force, independent of such physical changes ; but of this we have no evidence. Moreover, this would not be precisely accordant with the analogies of animal life. For in an animal the decays attending growth are connected with the general progress of the organism, and are not due to independent finiteness in the parts themselves.

¹ Twenty or more sweeping destructions occurred (besides other partial ones) on this continent after the appearance of animal life (that is, through or during the 5th and 6th days of Genesis, and mostly the 5th), and a larger number in Europe. The catastrophe after the coal period in North America corresponds to the *middle* of the *fifth* day. The World-Problem has a remark about this catastrophe, which is based on a misunderstanding of the facts.

7. *Nature's Types.* This subject has been explained by us, but may have here some additional elucidation.

In the progress of the creation of the animal tribes, as well as plants, there could have been no system or order, unless the kingdoms of life had been constructed according to predetermined plans of structure. Such plans there were, as has been stated, and they are called *types*. We speak of quadrupeds, birds, reptiles, and fishes, as formed on the *Vertebrate* type, since a single plan, the vertebrate, is at the basis of the whole. So fishes were made on the fish-type, one subordinate to the vertebrate. These types are presented to us for study in species. A common plan of structure may be, in a similar way, at the basis of a number of related machines (say printing presses), which were made one after another for different purposes, by modifications of a general idea; and each such machine would be an example under the type. We may say that such a machine, once thought out, existed before it was made, as an idea in the mind of the maker; and if the series could have been foreseen, the whole series might thus have had an ideal existence. An idea of the type, or general plan, would involve certain constants as the type-basis: and upon these, a number of systems of variables; that is, plans of variations in the parts, as to their relative size, form, etc. A type without variables in its parts, would have but one species; and with variables, the species might be indefinite in number.

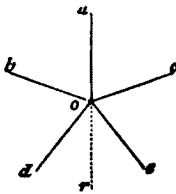
In nature, every part of a living structure is, to some extent, a variable, although some parts are far more so than others. In the Fish-type (which, in its elemental idea, comprises a series of vertebræ, with a brain at the head-extremity, a spinal cord along the body in a bone-sheathed cavity above the vertebræ, a ventral cavity beneath, and respiration branchial or by gills), the form and number of the vertebræ may vary, the amount of stony material they contain, the length of the processes and the ribs; and so also the bones of the head, the fins, skin, scales, muscles, etc. Moreover, all things are so exactly balanced in an animal species, that is, so harmonious, that a small change in the form of the ver-

tebræ, for example, involves some modification in every other part or organ of the species, and such a one as is required to keep up the just relations of the structure.

If there were any method of expressing the type and its systems of variables in mathematical terms, we might give it a definite mathematical expression. We might next think of the force corresponding to the type, or equivalent to creating the fish-type, as a particle of some specific size, — and as germs are spheres, we might as well give it a spherical form, in our conception, as any other; — for this thought is within the range of idealizing mind, although facts oppose this notion of the fish-class or any other coming from a single positing of force; and although, too, we have nothing sustaining this conception of creative force. But, this done, the mind still cannot conceive of the type-structure as an entity in space, as it cannot have a distinct and permanent conception of a variable image, although it should know the law of its variables.

We allude to this point, not from its bearing on the question between Nominalism and Realism, but to illustrate the subject of types; and for this end, we add another example.

Suppose we have, as the type, a star; the stellate form, *one* constant; symmetry between the two halves (either side of line $\hat{a}r$), a *second* constant; the star, five-rayed, a *third* constant. This symmetry requires that, however a , b , and d vary, in all cases $b = c$, and $d = e$; and also for the angles, however they vary, that $aob = aoc$, $bod = c oe$, and $dor = eor$. Now suppose a system of variables, on this idea: *First*, the star, being equal-rayed and equiangular, let there be an equal variation of length in all the rays alike. This is one system of variables. 2. Let there be a symmetrical variation in length, but not an equal variation for all the rays (a , b , d differing, but $b = c$, and $d = e$). 3. Let the angles between the rays vary, still retaining the symmetry. In nature, this third system of variables would, as a necessary requirement of harmony, accompany the second.



We have then, by these methods, the rays and the angles varying through a multitude of forms and sizes according to mathematical law, for we suppose it a result of a process of evolution, the type-idea being a five-rayed symmetrical star of no particular size, form, or angles. This is a simple case of variation on a type-structure; and it will be a convenient practice to attempt to conceive of the type-structure in the midst of its variabilities.

4. Let the rays vary in breadth as well as length, and equally or unequally (though always symmetrically, as explained), through linear, oval, lanceolate, triangular, and other shapes, and according to a law for each; again, 5. let the rays vary in thickness, equally or unequally, through cylindrical, prismatic, lamellar, triangular, and many other forms. And while the rays thus have breadth and thickness, the centre will have the same, and may vary in form; be flat, conical, ovoidal, etc.: or the rays may disappear altogether, and the form change to a simple disk, or, by lengthening upward, into a conoid, ovoid, spheroid, or a long cylindrical shape, etc. The *constant* is here the same ideal star as at first, but with the addition of breadth and thickness.

6. Let the rays of the star (of 5) vary in their markings or ornament, and be few or many branched; 7. be hollow within, under various conditions; 8. vary in texture, between stony and fleshy; and also in color.

9. Let the stony material be in pieces put together like beads, in order to make the rays; or the surface be made of plates fitted together, or of grains of various forms; or let the fleshy material be thick and opaque, or clear like jelly, the rays short and simple, or long and fringed; let the surface be smooth or covered, with spines; and let all these variations take place according to a perfect system of evolution and harmony.

10. Let now the star-type (of 4, 5, 6, 7, 8, 9) be an animal: this adds to the constants of the type the fundamental qualities of animality, viz. sensation, growth by food taken and digested within, reproduction by germs through

sexual relations, and a superior surface differing from an inferior in its functions and forms. It adds to the above variables (as to form, texture, structure, color, kind of symmetry) many new variables: as, to a mouth, whether with teeth or with none, etc.; as to the form of the teeth and their modes of movement, etc.; as to the stomach and its appendages, and all their variations; as to the liver (if any) and its variations; as to the system of reproduction; as to means of movement, taking food, etc.; as to senses, or none, etc.

11. Let, again, the number of rays, instead of five, be a multiple of five; or let it be four, or a multiple of four; or six, or a multiple of six; or let the number be indefinite.

12. Let the radiate structure be not strictly the rays of one or more mathematical planes, but of a spiral approximately circular, and this, like the above, a result of systematic evolution — a fact of all apparent circles in plants and animals.

We have passed these steps in review, in order to give some idea of the *Radiate* type in the animal kingdom, the simplest of its *four* grand divisions or sub-kingdoms. With mere animality in its lowest forms, and no senses but touch and sight (the latter usually wanting, and at the best imperfect), the type-idea includes a radiate arrangement of the organs externally and internally, and a symmetry between the two halves either side of the medial line. These are the *constants*, and the true basis of our notion of the type. It is to be observed, again, that these constants are not constants as to form, proportions, size, color, or texture, those qualities which are necessary, at least in part, in all mental images. There are limits to each system of variation; and, in this respect, the variables become constants, but in no other. Again, it should be borne in mind, that all the variations are so harmonized, that a change in one part involves others throughout a structure. From the abstract notion of the type, the mind obtains a conception of the whole system under it, as far as it can, by flashing along the systems of variables; and whenever it rests for an instant, it has lit on

some special example or species under the type. An idea of a certain amount of force equivalent to creating the sub-kingdom Radiata, if we could give it size or quality as compared with the same for the other sub-kingdoms, would not be a conception of the type-structure. Moreover, as we have said, all such notions of force are empty of knowledge, being without a foundation in reason or nature.¹

Under the type Radiata, there are three grand subdivisions: POLYPS, MEDUSÆ, and ECHINODERMS; and these have, each, their subordinate groups; and these, again, others, and so on. Now the type of one of the subdivisions, is the type for the Radiata with the addition of certain other constants, these other constants, for the highest range of subdivisions, being constants as to some of the more fundamental qualities of structure.² And so one system of constants is added after

¹ We have shown that there is no foundation for such an idea in geological facts. There is no evidence that any group of species was ever made through one process of development (see our first Article, Bib. Sac., Jan. 1856, pp. 122-127). Many of the various genera of animals have had their species distributed over several geological ages, each period having a new set of species, but all constituting the one genus. The genus *Lingula*, as has been remarked, began with two or more species in the earliest period of animal life, and has been continued, by a succession of new species, through all periods since, to the existing era. The animal kingdom has thus been brought forward by its new creations, partly through new genera and tribes replacing the old and extinct, and partly through the perpetuation of the old groups in new species. We must admit that there was somehow force used by the Creator in creation; and this is the end of knowledge, and should be the end of speculation.

² We mention some of the characteristics of these three subdivisions:—

POLYPS. A simple stomach and large ventral cavity, without ramifications; the circulating fluid, consisting of chyme (the first result of digestion) and water from outside; form, like a flower, the mouth being at the centre of a disk which is bordered by tentacles; in the normal state, the mouth, extremity upward, the polyp being attached to its support by the opposite extremity; texture fleshy, sometimes secreting coral internally.

MEDUSÆ (Sun Fishes, Jelly Fishes).—A stomach with radiating ramifications for the distribution of the circulating fluid, which consists of chyme and water; form usually a convex disk, concave below in the normal state, swimming with the mouth downward; texture usually nearly transparent, looking like jelly.

ECHINODERMS (include Star-Fishes, Sea-Eggs).—A stomach with radiating ramifications; chyme changed to chyle before passing to this system for circulation; also a distinct system of vessels for water circulation; mouth at the centre below; exterior of the animal usually made of calcareous (stony) plates or grains, and often covered with spines,—the name Echinoderms referring to this fact.

another, for each subdivision, i. e. the *class, order, tribe, family, genus*. And even for *species*, which constitute the last grade and include individuals, there may be still some variables as to the less essential qualities of size, proportion, color, and other external peculiarities, and upon these variables the *varieties*, under species, depend. We might continue these illustrations; but this is not the place for further detail.

This subject derives additional elucidation from the nature and development of germs. The whole structure and history of an animal is involved in the characteristics of the invisible germ-cellule. It is the material entity that represents the species; and which, once made, if in the circumstances fitted for development, will produce the perfect being to the finish of every organ. This it accomplishes through its inherent powers and their extrinsic relations, by bringing matter around it into its own state, and going on, rising or expanding in its scale of productions, according to a serial order, unto the final result.

The characteristics of a species are, therefore, not merely the qualities of this resultant, but the characteristics of a serial line of developments from the germ to the complete individual, which has, all along its course, for each species, some characteristic differences. We have no proper comprehension of the animal until we understand this series in its history, and the law of the series, through all the variables that partake in the progress. The law of the series may be supposed to admit of mathematical expression, though incomprehensible to minds on the earth.

These germ-cellules consist of the elements, carbon, oxygen, hydrogen, nitrogen, with a little sulphur and phosphorus, all of which are present in both the waters and the earth. To make one of these infinitesimal germs would require, then, the union of these elements, through some external power (for as inorganic material they have no tendency, of themselves, to unite into such compounds as constitute the germ), which power should also, either in the constitution or otherwise, unfix the line of serial development, that is, the sub-kingdom, class, order, tribe, family, genus, and species, to

which it pertains. If the power of such a germ may be expressed by a mathematical number, the mind might give the number a lodgement, and compare it with other numbers. It might conceive of the proportions of the elements combined, if this were known. But a conception of the germ in its potentiality is, after all this, an idea that as much demands time for its development, as the evolution of the germ itself.

Through the various grades of types that rise one above another, in unity of law and subordination, and the parallel unity in the germ, we gain some apprehension of the absolute perfection of system in the kingdoms of life. As we comprehend a species by understanding all its phases in its serial line of developments and their law, so we have a complete idea of the animal kingdom, not from existing species, but from bringing to view the succession of tribes and families along the line of history.

In attempting to conceive of the relations among the comprehensive types and those subordinate, we should not bring to mind a system of ramifications, as if the animal kingdom were like a tree with its great and small branches and branchlets—although this is a common notion; the comparison to a universe of systems in space is far more exact. The animal kingdom is a vast all-comprehensive system. The vertebrate sub-kingdom constitutes one of four grand systems within it; the fish, bird, reptile, and mammal divisions, are other subordinate systems or clusters of groups. Then the fish-type embraces its several subordinate systems; and these, still others, more subordinate. Thus there are systems within systems, in as perfect harmony as the systems within systems of the universe. And the terms in classification (genus, family, tribe, order, class, and so on), when correctly used, correspond to systems of greater and greater comprehensiveness. Each system is essentially distinct from the others of like grade, though approximating to adjoining or affilant systems by their borders, or through aberrant and usually inferior species. There are serial lines of species in nature and parallelisms among groups, but they are subordinate to this grand plan.

8. *What was put into the earth and waters, in the act of creation?* Science does not answer this question. It only says, that the germ-cellule is the simplest condition of the animal, and that if the germs were made in the waters or earth, that is, if the elements there present were, by any power, brought into the new state of combination they have in the germs, and vitalized, and at the same time they were so surrounded that they could develop, they would grow and thus contribute to the peopling of the earth. The surrounding circumstances necessary for development, are for the hen, just such as attend the germ-cellule in the egg, that is, the presence of albumen and other ingredients which contribute to the growth of the embryo. Had such ova been created of elements *in the waters*, it would have been true that "*the waters brought forth*;" if of elements *in the earth*, as truly, "*the earth brought forth*" (see Genesis, ch. i.). We only know this, — that the power of creation was exerted; and if germs preceded the perfect animals, then, of course, it was exerted in making the germs.

We repeat that we have no evidence that a group of animals has, in any case, been made from a single positing of force. Science has discovered no method of looking beyond the material entities to the "immaterial." It claims not to fathom the Eternal Mind. It leaves it for "pure reason" to flutter, clap its wings, and look the sun in the face, *if it can*.

9. *Nature's Unity.* This subject has been, more than once, alluded to in the course of our Articles. We here pass it in brief review.

The unity of nature is declared —

1. In the universality of the laws of molecular forces: one law binding the universe together in harmonious movements; the same light passing from star to star, in recognition of their one brotherhood; the same heat coming from the heavens that rises from the earth's depths or is struck out of her rocks; the same elements and laws of combination in the wandering meteorites as in our own sphere.

2. In the harmony among all molecular forces: magnet-

ism, electricity, galvanism, being but different conditions or modes of action of one power; and this one power probably the same with the universal chemical attraction; and this attraction so intimately related to cohesion, that the laws of crystallization are a fertile source of knowledge as to chemical composition; while heat and light appear to be but attendant effects of molecular activity, and have many analogous laws.

Electricity (or galvanism) and chemical attraction are so closely related (if the former be not a mode of action of the latter), that the decomposing action of the galvanic current on different substances is exactly proportioned to the combining equivalents of the elements. The combining equivalents, for example, of hydrogen, oxygen, chlorine, lead, are: $1 : 8 : 35\frac{1}{2} : 103\cdot7$. (That is, oxygen and hydrogen unite, in the proportions $1 : 8$, and $1 : 16 (= 1 : 2 \times 8)$; chlorine and hydrogen, in the proportion $1 : 35\frac{1}{2}$; chlorine and oxygen, in the proportions, $35\frac{1}{2} : 8$, $35\frac{1}{2} : 24 (= 35\frac{1}{2} : 3 \times 8)$, $35\frac{1}{2} : 32$, ($= 35\frac{1}{2} : 4 \times 8$); chlorine and lead, in the proportions, $35\frac{1}{2} : 103\cdot7$, and so for other elements). Now, 1 of hydrogen with 8 of oxygen = water = 9; $35\frac{1}{2}$ of chlorine and 103·7 of lead = 139·2. A current decomposing 9 parts, by weight, of water, will decompose 139·2 of chlorid of lead; and also, the decomposition of 9 parts of water develops an electric current just equivalent to decomposing 139·2 parts of chlorid of lead. Again, the combining weights of the elements, and their degrees of specific heat, have an inverse relation; or, in other words, equivalent parts have the same specific heat, or some simple ratio; as, $1 : 2$, $2 : 3$. Heat, moreover, is equivalent to a certain amount of mechanical force; so that heat and work have a definite relation, there being a loss of heat in steam, for example, precisely proportioned to the amount of work done. This, as well as the fact that change of size, by contraction or expansion, is a precise measure of change of temperature, brings heat and attraction into one category.

Thus the molecular forces, or so-called "imponderables," seem, to science, to be falling under one general law, or a single duality of force.

3. In the fundamental laws of structure, growth, and reproduction, common to all living species, vegetable and animal—this unity being seen in the universal law of reproduction from germs through sexual relations, the male and female functions being as distinct in plants as animals; in celules as the constituent element of organic structures; in the growth by means of arrangements for of circulation, respiration, digestion, secretion.

4. In the unity of system in each of the great kingdoms of life, the vegetable and animal.

5. In the cyclical relation of the vegetable and animal kingdoms, binding the two together into a single mutually-compensating system, the one a counterpart of the other, and both blending in with the laws of inorganic matter.

6. In the adaptation of nature and finite mind to one another,—nature's numbers and harmonies being pleasurable to the human soul, and all her beauty, wealth, and strength calculated to promote man's development.

7. Historically, in the parallel laws of development for the germ, the vegetable and animal kingdoms (looking at them through geological history), the earth, and—may we not say—the universe.

In consequence of this unity, the physics of the universe, even to the profoundest laws, are involved in a drop of water, and the grandeur of nature is dependent on the qualities of molecules. It is for this reason that man learns more of nature's secrets from her infinitesimals than from her large masses. Going to these minims for knowledge, is going our farthest towards the source of nature's energies.

10. *Nature the work of Infinite Mind, and its great end the nurturing of finite mind.* By proving that the inorganic and organic went on their systematic courses of progress together, through long ages of the earth's history, and that both reached their climax in the Age of Man, science makes the existence of mind not only a fact, but a prophesied fact; and not a prophesied fact merely, but an end towards which the past was tending, precisely as much so as the body, by development, for the uses of the soul. He who knows how

to interpret the arrangement of the lands and waters of the earth, and the reliefs of the continents, as well as the fitting up of the earth with its veins, ore-beds, and strata, sees that every mark and point has been ordered by Infinite Mind for the development of finite mind; and that the human face is not better suited for the outflow of the spirit within, than the earth's appointments for man's education as an intellectual and moral being. Indeed, man's virtues, vices, and various emotions, high and low, are, to a great extent, portrayed in nature, so that if, in his early development or afterward, he needed to speak of a moral quality or feeling, there was some animal that was its seeming personification, to act out and give permanency to the mind's impressions, and so aid him in extending his language over abstract thought, and increasing his knowledge of himself. The world of plants also is full of sentiments, and nature is ever in seeming communion with the sensitive soul. This is a common thought; still, it is not always appreciated how much man's development is indebted to the ideas embodied and acted out in the inferior living things of earth.

Years ago, when the evidences of mind in the earth's structure were little appreciated, and physical forces but half understood, the tendencies of science, as regards its relations to revealed truth, were not altogether manifest. But as the exact powers and limits of these forces have become more perfectly known, their oneness in system recognized, their completeness as a full revelation of the powers of inorganic nature apprehended, and also their subordination to mind as a final end, man's faith in nature has tended to develop faith in an Infinite Mind above nature. Knowing of no law on earth for turning matter into mind, and believing in the impossibility of such knowledge, he naturally rises, in a single thought, from nature to God. And hence it is that the old materialism is not a natural growth from the science of the present day. The healthy mind, trained in inductive science, rests not in inscrutable physical forces, because its faith is so implicit in the scrutable; it sees no foundation for a belief in world-souls, for organisms are definite organisms in

the natural world, involving specific structural relations; and it therefore appeals to an Infinite Being, rather than stop in the half-way house of Pantheism. This is the tendency of thought, if not always its result.¹

¹ We do not mean to say that science leads to no evil consequences; we could not say this of fire, light or air; but only that they are not its legitimate effects.

The wonders of science are to many minds little short of miracles, and the quick succession in which they have flashed upon the world, during the past half century, has tended to produce a spirit of credulity in wonder-working powers, and cherish among the unenlightened, a belief in the superstitious. And hence the world is now alive with necromancers, astrologers, and spirit-mongers. Science is as much to blame for this, as the sun for shining with all its brilliancy into a now clear, but once shaded, dell, and starting up new crops of weeds. Proper culture is required to remedy the evil, and not improvements in the face of the sun.

Much mischief is flowing from the misapplication, of scientific analogies, through the strong tendency of the mind to resolve the spiritual through the material, or the infinite through the finite. There comes forth the superstition of spirit-rappings, one of the mind's abnormal productions, and it bolsters itself up by an assumption of some new "magnetic" force, without considering whether the laws of force (its necessary mathematical relations) are complied with in the reputed phenomena. Thus a heresy gains strength from the false claim of a scientific basis.

Again, the searching out of natural causes in creation, increases faith in the natural, and engenders development theories. Such generalizations are partly a consequence of the progress of science, in connection with man's perverse and perverting nature. But the Bible also in some hands, even after prolonged study, has led to the hypothesis of development theories.

The great fact that in individual growth, the germ or infant expands into the intellectually endowed being, and the mind varies with the condition of the brain, as if all were a material result, is the most fertile source of materialism man has to encounter. Yet there is no more obvious fact in nature; it has been long known, and it presses the idea of natural causes as omnipotent, upon the mind of every rising generation.

It is not a discovery of Science. Still it has gained some seeming strength through the extension of our knowledge of natural causes; and the special truth in chemistry that tends to carry the mind towards this theory, is this; that rising in the scale of being is rising in the scale of chemical products, and in man the seat of what is called the mind, that is the brain, is the highest of all such compounds, that which is farthest removed from the results of mere dead forces; as if matter had here reached a height or kind of combination through the properties of a living structure that of itself evolved the faculties of the so-called mind, as other combinations possess other active qualities.

But with this extension of science, is coming also a truer appreciation of the limits of natural causes, and thus the evil has a corrective springing from its own place of origin.

Nature's teachings with reference to the special attributes of the Deity, come, as others have argued, through man's own constitution, and the adaptation of the world to mind, to which allusion has already been made :—man's power as a cause or agent, suggesting a First Cause ; man's mind, together with the system in nature and its adaptations, an Infinite Mind over creation ; man's affections and sense of right, a Being of infinite love and righteousness ; man's free-will and self-consciousness, an Infinite Freewill :— in other words, a Personal God, infinite in power, wisdom, and love ; for the Creator must be equal to the best of his creations in their highest qualities, and, more than this, he must partake of these qualities to infinity.

If we pursue a path down the lower pole of nature, the material, we descend to the obscure starless depths of inexorable fate. If we rise along the opposite pole, the ideal, we may go on till we lose sight of the material, and reach only an empty infinite, no less cheerless. But keeping both the material and spiritual in view, as two distinct elements in combination in man, we may then begin to read nature aright, and rise to a true view of the Being above nature.

11. *Nature's Individuality.* The study of nature, as we have shown, has brought to light laws of forces, movements, and systems, among material things, and laws of progress in individual life, the kingdoms of life, and the earth's history, and it tends to establish the unity of all in one plan. But physical forces, life, and mind, still remain as three distinct uncommutable elements, the progress of research having served only to widen the gulf between them. We have reached no theory as to the mode of origin of matter, of life, or of the soul ; or of a living species, high or low. Science simply reads nature's story of herself, and interprets according to reason's established methods ; and where nature stops

The misuse of truth, is no sound argument against Science, any more than against the Bible. It proves that the only safety in the case of each, is in a thorough and faithful knowledge, proceeding from a pure love of truth ; and we would add, a love of both of these orders of truth united, the latter to preside over the whole being, and promote the right and harmonious expansion of the former.

teaching, science stops learning. It is true, then, as stated in the outset, that between the creations and the Creator, science claims to have run no paths.

The individuality science perceives is, therefore, that of a world or universe that has passed through a regular systematic course of progress, from its early chaos to its completion, under the action of ordained inorganic forces and laws, and with the institution of the kingdoms of life through the creation of living species ; the whole the work of a Being of Infinite Intelligence, whose power has sustained the forces and laws he ordained, who has guided the earth, it knows not how, with reference to its being the residence of mind, and whose connection with man and the universe it leaves among life's mysteries.

Our argument, based on nature's teachings, has given us reason to believe that the universe had a beginning, and will have an end ; that it has its limits in space ; that its progress has been a regular progress, like that of germ-development in its system and epochs, and with only such decays as were necessarily involved in its progress and the one final decay ; that, from the beginning to the end, it corresponds to but one grand cycle of progress, like one progressing individuality among living species ; that with man it reached the Day of Rest or Divine Repose, its meridian of life or finished growth, when the education of mind began. The accordance of this progress with germ-development, it should be understood, is not in any specific resemblance in the parts to those of a germ, but an accordance, only, with the two grand ideas it involves, namely, *the general before the special*, and *the triad of epochs* ; and this resemblance exists, because these are the fundamental principles in all progress under system.

If man goes beyond this study of progress, to specific methods of first origins of any kind ; to the mode of positing creative force ; to the method of germinating a plant-kingdom or an animal kingdom ; to notions of a self-working force in nature that develops more than self by reaching to higher and higher grades of results, or to hypotheses about

chemistry developing life ; and life, mind ; to the idea of an infusion of mind or soul through the gross material of the earth, in order to the origination of the earth's ingredients, arranging her features, evolving her results, and bringing out a self-made earth or nature, as if self-creation were possible for a universe any more than for a tree ; to conceptions of ideal entities back of the material, or to thoughts of a Creator throwing, now and then, the reins on the back of a rampant stupid nature ; the bold plunge in the dark is not to be charged to science. It is reason's own audacity, and let her have the credit. We may find, in nature, the cyclical law of all natures, but not the cyclical alternation of the natural and supernatural, appealed to in the "Six Days ;" this deterioration of nature at intervals, because she is left to go alone, is against all analogy in a growing individuality, and without any proof in facts.

We may here recapitulate the points which we have sought to illustrate.

1. The earth and the universe one in history.
2. A correspondence between the progress of creation and the law of germ-development.
3. A correspondence between the same progress and the epochs of germ-development, making three for the inorganic history of the earth, and three for the organic, or six in all.
4. The universe or nature finite in space.
5. The universe finite in time, both as regards the past and the future.
6. Progress involving decays or destructions throughout the earth's history, and as frequent creations ; the destructions being consequent upon the gradual change of climate and the movements in the earth's crust which were carrying forward its own development.
7. Nature's types or plans of structure, involving systems of variables upon a basis of constants ; the characteristics of a species presented in the characteristics of its line of serial developments from the germ onward ; conceptions of types, species, germs.

8. What was put into the earth and waters in the act of creation.

9. Nature's unity.

10. Nature the work of Infinite Mind, and its great end the nurturing of finite mind.

11. Nature's individuality.

It should be understood that science arrives at its conclusion through inductive reasoning, which is not, and cannot be, absolute demonstration. The conclusions are such as pure reason, under the influence of nature-truth, is persuaded, not forced, except by its own laws of action, to adopt. And we are not aware that any of the conclusions are heretical, or that science arrogates to itself the special privileges or rights of the Bible by these annunciations.

We may now compare a few of the more prominent of the views of God and nature, and see where we stand.

1. CHRISTIAN THEISM, I. *God*, infinite in wisdom, power, and love, and a moral Governor. *Nature*, a progressive work, from "the beginning," through successive original creations by God, and laws and ordained free-working forces kept in action by his power.

2. CHRISTIAN THEISM, II. *God*, as in "1." *Nature*, a work, during the interval of time preceding man, wholly by direct creations or fiats; since man, by laws and ordained forces, sustained by God's power.

3. COMMON DEISM. *God*, infinite in wisdom and power. *Nature*, a progressive work or growing individuality, set agoing by God, and left to go on alone.

4. PLATONIC DEISM. *God*, infinite in wisdom, power, and love. *Nature*, an individuality, having a world-soul, which is a præxistent immaterial representative of the sensible world, put into nature by God; sometimes for ages left to go alone, and then deteriorating and ending in decay; requiring, for revival, a new act of the Deity, and thus involving, in the course of her existence, a cyclical succession of the natural and supernatural. In the *Timæus*, nature without decays or revivings; the world eternal in duration.

5. "SIX DAYS" THEISM. *God*, as in "1." *Nature*, nearly as in "4," as to decays or "going alone" and revivings; but world-soul not included, although immaterial entities admitted as preceding material entities; also differs in making the periods of revivings and decays correspond to the successive days of Genesis; the heavens and earth and the light created long before "the beginning" mentioned in the first verse of Genesis.

6. "VESTIGES" DEISM. *God*, infinite in power, but nearly resolvable into no-God. *Nature*, an individuality, growing by inherent forces, from the first inorganic mass, to man; the animal and vegetable species proceeding from evolved monads as the first forms of life, through a series of successive developments; matter, eternal. Graduates into Atheism or Pantheism.

7. PANTHEISM. *God*, identified with nature, and having no existence as a personality. *Nature*, an individuality whose totality is God; its successive developments, successive manifestations of the divinity; finite mind, the highest evolution — these manifestations, in this last step, reaching self-consciousness.

8. ATHEISM. *God*, none. *Nature*, an individuality growing by inherent natural forces, in or over which there is nothing divine or spiritual; mind, an evolved quality of matter.

The view of nature and of the Deity which we have entertained, is the first mentioned in the above review. Precisely this, and no other, we aimed to present in our former Article; and we have regarded it as the doctrine of the Bible, and the common belief of the religious world. We doubt not that the waves and running waters move through inherent powers and not by direct Divine action; that, in a sense, nature carries forward her own work. But we believe that he who established the forces of matter and their laws, still, by his power, keeps those forces and laws as they were established; and so nature pursues His work while acting under inherent qualities.

Pantheism merges the Deity in nature, and knows no In-

finite Mind on the throne of the universe. But the God we adore, and have acknowledged in our writings, is real although incomprehensible in his personality, a beneficent Parent, a righteous Lawgiver, a merciful Redeemer. He created; and He has thus carried forward, in infinite wisdom, his plan, and continued in action the system of forces, under law, which He established by the word of his power. This is the "Logos" in nature.

After this discussion of nature's individuality, we may turn aside to notice some statements on this and related subjects in the "World-Problem."

Charge of Pantheism. There is, first, the charge of pantheism against Professor Dana. In style of language it is like the rest of the volume, as will be seen from an example. On page 338, it says:—

In his [Professor Dana's] attempt to talk piously about God in nature, and to make others atheistical, the writer, without seeming to be aware of it, runs down into sheer undiluted Pantheism."

After several pages on the subject, the point is finally demonstrated by three propositions, according to which, the "World-Problem" view of nature is the only one that is not either atheistical or pantheistical. The work then speaks of "modern physical speculation ignoring that old doctrine of the Logos in nature;" and adds (p. 352), that "until this doctrine, now hardly recognized even in theology [sufficient proof, if none else were at hand, of the author's delusion], is made a fundamental and all-pervading axiom, science must be atheistical." Ergo, science can never be theistical until it adopts doctrines hardly recognized in theology!

Nature's Blunders. The nature-theory of the "Six Days" and "World-Problem," is quite consistently carried out; and the *reductio ad absurdum*, in which it ends, would convince any one but the author, of its fallacy. In the first of these works, mushrooms or fungi seemed to be set down among nature's unaccountable mistakes or abnormalities.¹ And now, in the new book, it is a principle that, since all

¹ Six Days of Creation, p. 172.

that is finite errs, therefore nature may "blunder," and "work out her ideas badly,"¹ besides becoming weary and going into a temporary decline. The *Hyle* of the ancients, in which the ideas, that is, "immaterial entities," were placed, has done the best it could — for this would seem to be the doctrine; but inherently limited and unpliant, it gave the ideas but an incomplete expression, and was ever exhibiting its imperfectness or gross nature; and sometimes it manifested its low qualities in giving out mushrooms, in spite of the ideas of the good and beautiful that pertained to the eternal archetype, or emanated from the Infinite source of all good.

But if nature be an expression of the purpose of God, can we, with truth, speak of her blunders? His laws were sent forth; and whatever appears abnormal or normal in nature was involved in those laws; and shall we say, if that plan admitted of deserts over the land, excrescences on the oak, lice and fleas and intestinal worms about living beings, and monstrous births, that nature does her work badly? Disease and death are part of the same system of evils; are they also blunders? Are they chargeable to nature acting out, in any true sense, her own unfortunate propensities, or to God as expressing his will in nature; that is, in the system which He established? We can offer, here, but a few brief remarks in reply to these great questions.

The institution of death is universal for all life on the earth. It is in the history of every plant and of every animal; and is, therefore, in the very foundation-laws of nature. Moreover, since death is directly connected with growth, and, in a sense, grows out of it, the laws of life are, therefore, bound up with laws of decay. A single mullet has been found to contain thirteen millions of eggs, and a codfish eleven millions. These facts give no extravagant view of prolific nature. They exhibit a profusion of life to meet a profusion of death. Life is the *in-flowing* stream; death, the *out-flowing*; the *in-flow*, in such a world as ours, necessitating the *out-flow*, as much as in any current-

¹ World-Problem, p. 202.

movement. The expression, in the opening chapter of the Bible, "whose seed is in itself," therefore assures us that, on the third day of creation, *death* as well as *life* became an established ordinance in the earth's history.¹ All the conditions which these laws of decay necessarily demanded, we cannot know; and still it is plain, that they required a liability to evil from some extraneous influences; for growth itself is dependent, largely, on the external. A system of evils is, in fact, embraced under the grand principle alluded to on a former page, that throughout all nature there are mutual reactions,—a condition of one substance affecting the condition of others,—or a process going on, hindering or promoting other processes; and this for the inorganic world as well as for the organic, or rather, as the basis of the same in the organic. When crystallizing a salt, we are sure to get a bad result if the normal conditions required for the purpose are not attended to. So each development or step of growth in a living being, demands certain normal conditions for its perfect accomplishment; and if these precise conditions are not at hand, perfect results cannot take place. Besides these, there is the certain inherent decay of the finite.

Thus it was the purpose of Omniscience, in the earth's creation, both in its foundation of rocks, and its superstructure of life, that possible imperfections should be concurrent with the perfections. And the analogy runs through all things, up to man's moral nature; but with this difference, in the last mentioned, that it is connected with a power of choice and resistance in the free soul, or is voluntary, while it is involuntary in the physical world.

It should also be considered, that death is not only an appointed end of the life of individuals, but an ordained means of feeding a large part of the animal kingdom; and these carnivorous propensities were acted out in the earliest geological epochs. Death being the ordered end, what did it matter whether it came by natural decay or external agen-

¹ This topic is discussed at considerable length by Professor Hitchcock, in his *Religion of Geology* (Boston, 1855), Lecture III.

cies? whether it should be hastened or retarded in individual animals of the globe? The facts in nature reply—*nothing*, whether we are wise enough, or not, to say Amen. And of what concern to man, if true to his mission, when death but opens the gates of Paradise?¹

Deserts are due to the laws of atmospheric circulation, and are located thereby, as much as the moister forest regions; we may go deeper, and say, that they are involved in such a world as ours, in the very nature of matter or a particle of matter; and no cause short of sinking the lands, to a very great extent, in the ocean, or altering the laws of molecular forces, would rid the world of deserts. The evil may be partly averted, but not prevented. It has been so averted over far the larger part of America, by the lofty range of mountains along the *western* shores, whence flow down the great rivers that water the continent. Had those mountains been located along the *eastern* shores, the side which receives the moist winds (unlike the western), they would have condensed all the moisture of the Atlantic or trade-winds, and poured it immediately back into the sea (like the *eastern* mountains of Africa), instead of allowing them to blow, far and wide over the land, laden with continental showers. The evil is still further averted by the great Gulf of Mexico on the south, and the Lakes to the north; and, in Europe, by the Mediterranean. Who dare say that nature blundered in making the earth's deserts?

Another lesson may be learned from the rocks. We know

¹ Man, like the rest of nature, is subject to the one great law of death. And had he not fallen, the out-flow, we may believe, would still have been necessitated by the in-flow. Like other beings, he was created male and female, and commanded to multiply, and in his perfect state, the world would have had no wars or pestilences to retard the increase. From the teachings of Christ and his apostles about heaven, we know that, to enter there, a change of the earth-born body, whether corrupted by sin or not, was required; and therefore a time of change was necessitated, when, to each individual in succession, earth should cease and heaven become a reality. We may call this change death: but it would not have been death as now experienced. It would have been only a welcome beginning of a brighter life,—a waking to celestial glories. It would have little concerned man, whether, in the change, he laid himself down and slept, or were otherwise translated; whether by one process or another, the old body returned to its original elements.

that crystals are the perfect individuals in the inorganic kingdom. And yet in all rocks, crystals are rare exceptions, for irregular grains make up the mass instead of regular crystalline forms. This is abnormal as regards the true perfection of individuals; and yet the rocks are all the better for it. Here is another fact based on the fundamental constitution of matter, the very laws that have ever been at work; and they afford little evidence that nature was ever left to follow an erring course by the Deity.

All creations in the kingdoms of life, the lowest and highest, are equally parts of one system; and the most insignificant is often the mightiest agent in the great work of nature. No being, but one who can claim equality with the Deity, may play critic or draw rude erasures over lines that offend his private judgment. The spirit that thus arraigns the Creator, belongs to the tribunal that would say: "Away with him."

Let us bow humbly, and not challenge the Infinite Being with light or reproaching words on the origin of evil.

In this theory of nature, we have a key, not only to the whole philosophy of the "World-Problem" and the "Six Days," but even to all their extravagances about science. For if nature "blunders," if she sometimes does her work badly, and is only "generally" honest, is she not a contemptible subject for man's study? Is she not transient, and may not the truth we learn, be like refuse to a future age? So the work argues, in very fact. The author of the "World-Problem" charges us with interpreting his words "phenomena" and "appearances," as if he meant "phantasmata." He proves them phantasmata by pronouncing all truth but a seeming, that will turn out error,¹ like the old elephant; and should we not suppose he meant what he said?

Is the theory of nature of the "Six Days" in the Bible?
We have shown clearly that the "Six Days" theory of nature is not in accordance, either with pure reason (that is,

¹ Six Days of Creation, p. 38; Bib. Sac. for Jan. 1856, p. 89, and July 1856, p. 64.

reason with the help of the "honest, open face"), or with science (that is, reason with the aid of the out-speaking depths and all truth in nature). We now come to the special claim of the author, that it is based on the Bible.

Where is the Bible foundation? Mainly here. The word "created;" the phrases, "*Let the waters bring forth*," "*Let the earth bring forth*;" the succession of *evenings and mornings*, in the account of creation; and the recapitulatory statement, that "*God made every tree before it was in the earth*" (Gen. 2: 2).

The theory is, that nature was six times revived and set to work, by the putting in of "immaterial entities," and six times left to herself to go towards decay. It is not merely that God acted at the commencement of six periods, and then rested; but that, in these intervals, there was a great decline in nature's forces, in consequence of the withdrawal of God's hand.

Is this a fair interpretation of the words of Genesis? or is it not evidence that, while the author has avoided science, he has gone to a less truthful source for his philosophy?

Create. The meaning of the word *create*, has no necessary bearing on the question with regard to nature (except as respects the beginning, to which we allude beyond); for, the signification of evolution, framing, or developing, which the "Six Days" would give, is as well answered by the views we have presented. Moreover, the derivation of such a word, is little evidence as to its actual use.

"*Evening and morning.*" If these words, in connection with the first, imply that nature passed through a period of revival, from an efflatus of "the supernatural," followed by a period of rest, on the part of God, and decline in nature, then it was so on the fourth day, when, according to the author of the "Six Days," the creation of the sun and stars was simply a becoming visible to the earth. May we recognize, in such progressive changes, a reviving and a decline?

The Bible speaks of the creation of vegetation, on the third day. But are we to understand from what Moses, our authority here, says about the fourth day with its evening

and morning, that before the sun appeared, nature went through a period of decay, as to its vegetative and other forces?

The account does not read, *morning and evening*, but *evening and morning*. If the word *morning* came first, there would be a show of support for the notion of an evening of sleepiness and decay, after the revived work. But it is the *evening first*; as if the idea of the writer were simply that of progress. Where does he speak of a poor, limping nature, inveterately bent on sleeping after work?

Finally, the first day had also its evening and morning; and when was the period of decline corresponding to that first evening, *before* the first work?

We comprehend the grand truth, if we consider that the *darkness* of chaos, as the first day opened, was followed by *light*. The great epoch of progress was correctly described by the words *evening* and *morning*, the darkness and then the light; they denote progress to the finished work, and serve well as a general formula for all epochs. The declaration of God's pleasure over the finished work of each day, and over the whole work at its close, looks little like nature being left, at any time, to her waywardness. The seventh day is the day of rest, according to Holy Writ.

"*Let the waters bring forth,*" "*Let the earth bring forth.*" These words are regarded as sustaining the Platonic notion that "immaterial entities" were put into the waters and earth in order to the development of the kingdoms of life. But if the germs were created in the waters and the earth, with elements there present, as already suggested, the accordance is as literal as if the hypothetical entities were first put in. Moreover, in that case, also, "the trees of the field would have been created before they were in the earth, and every herb before it grew." But from the nature of the record and of human language, we still regard the fact that the life of the fifth day was mainly *marine*, and that of the sixth characterized by the *terrestrial* quadrupeds, all the accordance the text demands.

There are some other texts brought forward in behalf of the "immaterial entities," on one or two of which we add a few words.

St. Paul says, in our Bible, Heb. 11: 3, " Things that are seen, were not made from things which do appear," the thought being generally regarded as equivalent to an assertion of creation from nothing; and, in the Greek, it stands, *μη̄ ἐκ φαινομένων*. The " Six Days " makes the Greek *ἐκ μη̄ φαινομένων*, and translates it (p. 224) " Things that are seen were made (or generated) from things that do not appear," i. e. from " immaterial entities."

With regard to this reading, the " World-Problem " repeats what is stated in the " Six Days," that the reading *ἐκ μη̄ φαινομένων* is " sanctioned by the two oldest versions, the Latin and Syriac, brought out by Calvin, and sustained by the best modern German authorities;" and, in the " Six Days," the German authorities mentioned, are, Tholuck, Olshausen, and Ebrard.

Again, in Col. 1: 16, our translation reads: " For by him were all things created that are in heaven and that are in the earth, visible and invisible, whether they be thrones," etc. On this passage, the " Six Days " says, (p. 227) that " the invisible " are the " unseen dynamical entities, which are not only the *law*, but the *life*, of the phenomenal and material;" thus again making Paul a good Platonist. But are these the invisible things of God, of which Paul here, and elsewhere, speaks?

A further argument from Heb. 11: 3, is derived from the spirit of the context. It observes (p. 226), that " Faith is the evidence, not of what *is not*, but of what *is*," though unseen; and afterwards adds: " How beautifully the symmetry of the argument is presented in the Syriac and Vulgate versions—' Faith is the evidence of things unseen;' for, by it ' we understand that (in creation) the things that are seen came out of, or were born of, things that are *unseen*;' " and then argues that the faith referred to is in unseen dynamical entities (!), and not in the great facts of creation, which were equally unseen; that is, a faith in the originating forces of nature, and not in God as Creator—directly against the spirit of Paul's teachings with regard to faith.

Now the simple fact is, as we are informed by one of our profoundest biblical scholars, that not one of the known Greek manuscripts sustains the reading *ἐκ μὴ φαινόμενων*; that the two *versions* or translations referred to (the Vulgate and Syriac) are only indirect testimony that, possibly, such a text once existed, while it is as possible, and more probable, that the "ut ex invisibilibus visibilia fierent" of the Vulgate, and the corresponding phrase of the Syriac, were translations from a text like our own; and, further, that the above *ἐκ μὴ φαινόμενων* cannot be correct, as the Greeks would not use the negative *μὴ* in such a case, but the negative *οὐ*; so that this reading is not only bad Paul, but bad Greek. On this point, the best Greek authority in the country sustains, as we know (and so must all Greek scholars), the assertions of standard German commentators. We leave the rest of the argument for the criticism of others.

The phrase *invisible things*, in the Vulgate, if it were the right translation, would not mean, necessarily, "unseen dynamical entities." The second verse of Genesis speaks of *darkness* over the face of chaos, whose beginning the first verse announces; and this would meet all the requisites of interpretation without the "entities." But it is an objection to such a view that it makes Paul reckon creation from the third verse of Genesis, instead of the first.

We believe it now demonstrated, that the author of the "Six Days" brought his philosophy to the Bible, instead of taking it out of it by faithful exegesis. And if it has no foundation in the Bible, none in pure reason, none in science, how far is it worthy of commendation? How far, of reprobation?

It is not wonderful that the "World-Problem" prefers "imagination" to sober science. The same convenient assistant carries him over "the beginning" in Moses, as we have said; so that we have nature waking and sleeping *before* "the beginning," as well as after, and the heavens and earth, and light also, earlier creations. The great thought, "the creation out of nothing," which has been believed to come forth from the opening chapter of the Bible, which is

in the spirit of every fiat, and of the whole Jewish Scriptures, and which is in bold contrast with all other cosmologies, is set aside. The "World-Problem" says: "The writer [Professor Dana] really thinks that Moses, by the word 'beginning,' meant the beginning." We will not controvert the statement. The argument drawn, by the "Six Days," from the word "created," has been ably met by Professor Barrows,¹ and shown to afford no reason for audaciously staking out "the beginning" forward of the first beginning of the universe.

The blank before creation. There is another argument worthy of note. Speaking in favor of the framing of the world out of the invisible entities, and against "the beginning" as the beginning, because this presents a blank to thought, in contemplating the past, he says (p. 277) : —

"We understand, notionally and logically, the proposition — *what is, once was not*. We can carry it, thus notionally and logically, to the extreme negation of all sense-conception; but what have we left, but a blank in thought, unless the sense reacts, and images a dark nihilism, as, in some way, the material *ex quo*, out of which all things, in some way, came? We may, at any time, if we please, have this blank thought as a refuge against that apprehension of matter's eternity, which some would regard as the sum of all heresy, and which the author himself holds to be atheistical. But when we have reached such an extremely rarefied or rather nihilified negative, what is it, for strength, and vividness, and power of religious emotions, as compared with the conceptions aroused by the radical images of these Arabic and Hebrew words? [that is, a creation, or a framing, without any thought of a beginning.] If God has made the revelation in this manner, by way of "accommodation" to us, why should we not be accommodated by it?"

What is this, in effect, but an argument for the eternity of matter? Stop where we will, in going back in time, suppose any *bona fide* beginning, and we come to a "blank in thought;" and if there is reason for setting the beginning one step back, because of such a blank, why not another, and another? If the argument is not utterly puerile, it makes no stopping place possible. The author, if he please, may have this blank thought as a refuge against what *some*

¹ Bib. Sacra for November, 1856.

make the sum of all heresy ; and he, only atheistical. But what a refuge is this ?

It is surely true, as we have said, that the human mind which daringly attempts to fathom the Infinite, almost of necessity will find a God gradually fading from before it, matter stretching on through eternity, worlds going alone and blundering at times, and development-theories becoming beautiful. If the "World-Problem" stops short of the last fatal step, its system of philosophy does not. This is sufficient reason for pronouncing the teachings of the "Six Days" infidel in tendency ; and the "World-Problem" has added force to the charge. To one grubbing through the solitary depths of the Ego, the light of Heaven "grows dim" indeed, and many a rank heresy is started up. The author of the "World-Problem" speaks truly of the unknown pouring upon us fast, as we go back or on in time ; and adds, that "unless we fall back on revelation [so far, well], or some unscientific *à priori* principles, as some sneeringly call them, all becomes a guess, a fool-hardy assumption, that has not even the dignity of a conjecture." The door by which he enters his labyrinth, is thus made obvious.

Use of science in exegesis. False philosophy is prolific in the errors to which it leads. Among these errors, is the canon of Bible interpretation announced, "that the only office of science is to stimulate inquiry, and chiefly in cases where it may have already had an obscuring influence on the meaning of a text" (p. 67) ; that, in exegesis, we "must divest ourselves of science" (p. 65, 75), at least that which was unknown to the writer of the work ; that "the Bible should be interpreted of itself and by itself" (p. 59).

The canon might seem plausible, if the writers of the Bible were, in every sense, its authors, and there had been no directing Mind to guide them to language about the creative acts, or other subjects, embracing truth which they could not fully comprehend, and which should ever expand with increasing knowledge. It might seem plausible, if all knowledge of facts in nature were not knowledge of facts in sci-

ence; if man were not a part of nature and an object of scientific research; if language were divested of all reference to natural objects; if man's life had no dependence on the material things which now splice into his very existence; if truth of any kind were hurtful to the interpreter. It might have some shadow of foundation, if finite mind, the power brought to bear in interpretation, could be made a fixed, unvarying force.

But when we observe how completely man, in his thoughts, language, and necessities, is enveloped in the world, and penetrated by it, and when we consider, further, that the mind is of exceedingly diversified character in different individuals, and far more diversified through those extrinsic influences that aid in developing it, that it is liable to adopt errors of facts and philosophy, and even stand by them as Divine, we cannot admit any such exclusion of one part of knowledge from the brain or active force of the student. When we find that a mind may be so permeated with Plato's views of nature and type-essences, as to claim them to be a true result of exegesis, may we not bring up nature, God's own work, to withstand Plato, or such an exegete?

It is the wonder and glory of the Bible, to be free from all statements of scientific principles. Its truths stand forth in their majesty, little aided by human knowledge, and not contaminated by its ignorance. But exegetical operations are human, varying with the nature and furniture of the mind, and the moral character or the training of the individual. While it is plain, therefore, that the meaning of the Bible is all that should be aimed at, there is no truth that may not have its place, either in suggesting or extending thought, or warding off proposed or adopted exegetical error.

In Deut. 14:7, our translation says that the camel, the hare, and the coney were unclean animals to the Jews, because "they chew the cud but divide not the hoof." Would not a whisper from science, that the hare and coney do not chew the cud, have helped the translators?

St. Paul says: "all nature travaileth with pain until now," and an interpreter infers that, with Adam's fall, mountains

were thrown up, and deserts made, and the whole earth was stamped with horror, and joined in the wail of nature. May not evidence, gathered from the earth, be used to prove that there were mountains and deserts, and louder groanings than now, before man was created? From the same and other texts, interpreters have concluded that, with the fall, death first entered the world. But may not the proof the earth bears, that there was death among shells, corals, fish, reptiles, birds, and quadrupeds, before man, be uttered within the hearing of such an interpreter? and if he should take heed to the evidence, would he be defiling himself, or the sacred text, by receiving meat from idolaters?

If an interpreter suggests the query, after his profound and prolonged study of the first chapter of Genesis, whether the monkey were not straightened up into the body of a man, may not truth, gathered from nature, sound a gentle no in his ear? and should he not take it kindly?

Indeed the author of the "World-Problem" admits that scientific truth may sometimes be used by way of suggestion. But it must be careful not to suggest any error in his own conclusions.

The truths of Science once generally accepted among men, are not ideas which we can believe or disbelieve at will. If the evidence is appreciated, man's very nature forces him to believe and continue to believe. When geology proved that time, before Adam, was long, and that the formation of the rocks took place through natural causes, it became a truth, which evidence from no source could set aside, without unsettling faith in both God and reason.

The natural, in creation. This point — the natural in creation — the study of the earth has made clear; and, although the theological world, with a rare exception, had otherwise understood Genesis, regarding creation as a series of simple fiat, Chalmers early admitted the evidence; and now, most writers on the first chapter of Genesis receive the proof from Geology, and derive thence new views on the Mosaic narrative.¹ There are few, like the author of the "Six Days,"

¹ We refer the reader to the remarks of Prof. Barrows on this subject in the *Bibliotheca Sacra* for January, 1857.

who will adopt the conclusion and at the same time deride the source. The comparison, in our first paper, is quite apposite; and, for a reason that will soon appear, we repeat it. The "Six Days" had said of Geology (p. 98) :

"Infidel as her spirit often is," she is "driven, more and more, to acknowledge the mixture of the natural and supernatural, in the production of the earth."

To which we replied, repeating the words *geology*, *natural*, and *supernatural*, "very much, we think, as a current is driven by the boat it carries; for, *geology first* proved that the natural was involved in creation, and, with a rare exception, has always admitted the supernatural; and she has finally drawn off exegesis so completely into the same course, that some, like Prof. Lewis, as they are hurried on by the current, exclaim in great glee over their wonderful progress; and, in remarkable self-complacency, look down frowning upon the current that they imagine is trying to keep up with them."¹

We acknowledge, after re-perusing the passage in the "Six Days," that we misunderstood its exact point, for the author seems to have had the *supernatural* especially in view. But other statements in the "Six Days," and the sneers and arguments on pages 156 to 169 of the "World-Problem," aimed at the remark that "Geology first proved that the natural was involved in creation," make the criticism just. We might suspect also that he has since misunderstood us, and gathered from our sentence, above cited, the absurd idea that exegesis had been *driven* by geology to admit the *supernatural* (instead of the *natural*, our actual meaning), were it not for the arguments just referred to; for we can otherwise hardly account for his style of harangue over the boat scene. We quote a few examples:—

"There is no mistaking the meaning, or certainly the spirit, of the representation. The writer did not intend to be impious. The professed ortho-

¹ Bib. Sac., Jan. 1856, p. 93.

doxy of his literary position would lead him to speak well of "the harmonies," etc. ; but he is sometimes off his guard," etc. (p. 152.)

"There is no mistaking this language, nor the spirit from which it proceeds. It is a spirit, we say it boldly, that is more odious than the avowed infidelity that has led scientific men (some of them, perhaps, in deep sorrow) to regard the Scriptures and scientific discovery as hopelessly irreconcilable. It is a language, moreover, we say it fearlessly, which is, and ought to be regarded, as an insult to the Christian world. It was an insult to the Biblical Editors of that *Biblical Review* in which, by a circuitous route [we were not aware of this, before], he sought to obtain an influence for his criticism which it never could have had on its own merits. It was an insult to every clergyman, unless it be those who regard this mode of defending the Scriptures as better and more available than interpretation. Such are pleased, doubtless, because it so piously patronizes Moses, and makes him so much more scientific than they had imagined. But what is their occupation, not to speak of their vocation, if the above paragraph be true, either in its letter or its spirit? What are the clergy, what are orthodox Professorships, what is Yale-College or Andover theology ; what are *Biblical Reviews*, if the Bible is indeed such a nose of wax, which can be made to suit any countenance, and Biblical faith such a "floating boat" on the current of science, as this writer has so unmistakably represented it." (p. 154). "We say it fearlessly, there is no form of Bible rejection we would not respect more than the spirit of the above quoted passage ; there is no position of infidelity we would not openly avow, rather than be the author of such a declaration." (p. 155.)

"Geology," says Professor Dana, "*first* proved that the natural was involved in creation. Here there is something very sweeping. No room for modifications or exceptions. Has he traced the consequences of this far-reaching assertion? What, too, must we think of its modesty, when we keep in mind the connections in which it is said, and the references it invariably suggests? Geology *first* proved! It is a claim of priority. Against whom? against what?" etc. (p. 156.)

To all this, and the rest like it, of which there is much, a reply is unnecessary. We believe that our readers are, by this time, pretty well satisfied that the *boat*, in the scene, is not the Bible. The exegetical novelties, in "the Six Days of Creation" and the "World-Problem," are quite good evidence that exegesis, or *that* "nose of wax," and the Bible, are far from identical. The fact that geology (or readings from nature) first proved natural causes to have acted in the progress of creation, is now a part of the history of Bible interpretation itself. Even the "World-Problem,"

towards its close (150 pages nearer the end of the volume), seems to have attained to a more sober mood, and presents a somewhat modified view of what geology has done, saying (p. 304), that the thought about natural causes, after being suggested in early time, long slumbered, until Geology again awoke it.

There is another point, in the boat scene, that calls forth strong words. It is this: "with rare exceptions, she has always admitted the supernatural." The word "supernatural," it should be observed, was a repetition of his own phrase. We quote a few sentences from the many pages on the subject, to show their drift.

"This, we can not help regarding as more perilous ground than the other, although, perhaps, not so insulting to the Scriptures. If he means, by the supernatural, some far-off First Cause, brought in as a logical necessity, or some prime mover, or something like a first originating power, without which we cannot reason at all about creation, the proposition is hardly worth any serious notice. Auguste Comte, much as he has been assailed by inferior men, who are no better believers than himself, Auguste Comte would admit that. The author of the *Vestiges* would admit all that; in such a sense, and in some still nearer senses, he willingly concedes the supernatural. But if, taking it in its true, and higher, and more special sense, the reviewer means, that leading geological minds have been fond of the idea of the supernatural, that they have *not* preferred to explain everything by uninterrupted natural causality, and that the leading authority among them does not regard this natural causation, as of itself, sufficient to explain all the phenomena that science now discovers in the rocks and formations; if he means this, he could not well have made a statement more at variance with known and indisputable facts." (pp. 169, 170.)

"Admits the supernatural! he says. But what language is this for Science? Science does not '*admit*;' she proves: such is her claim. She discovers; sometimes she graciously *accepts*, as Professor Dana accepts the Mosaic account," etc. (p. 171.)

What a frenzy for nothing! His mind sees phantom after phantom, and at them he goes. Swarms of heresies arise, which common sense could never have evoked from our language. We meant simply to say, that almost all geologists *believed* in "the supernatural" precisely in the sense in which the "Six Days" had used the phrase; and,

more than this, that they believed in a personal God. We do not know of a single work on geology, in our language, that questions this. Mr. Lyell is denounced by name, in one place, in these volumes, and appears to be alluded to in the above-cited paragraph. But in his "Principles" (London, 1850, p. 774), this geologist says: "In whatever direction we pursue our researches, whether in time or space, we discover, everywhere, clear proofs of a Creative Intelligence, and of His foresight, wisdom, and power;" a sentence indicating that the "World-Problem," to use its own gentle insinuation, "is at variance with known and indisputable facts." Evidently, however, these pages were impetuously penned; for they sound like the passing of a tempest.

"*Vestiges of Creation.*" The "Six Days of Creation," in its denunciations, partly identified "infidel geology" with the theory of the "Vestiges of Creation;" and, in our reply, we observed that geology, far from sharing in the error, had proved the development-theory of that work false. Geology, we said, had found no transitional forms; and, moreover, had proved that, many a time, the thread of life had been cut by sweeping catastrophes, each one enough to blast the hopes of monad-planters; and, coupling these facts with the principle from zoology, that in all reproduction, it is *like from like*, the theory was shown to be without foundation. And it is to be noted that in consequence, mainly, of the teachings of geology, the monad-theory has no advocates in science.

But the "World-Problem" brings up the question: "Who killed the Vestiges?" "Who killed the monster?" and devotes a chapter to this discussion; and says: "*It may come, in time, to excite as much interest as the famous question of the nursery-book, with which we are all familiar,*" — Who killed Cock-Robin?

It should be remembered that the development-theory of the Vestiges was introduced into the "Six Days" with favor, though with a Personal God, to make it go, by putting "immaterial entities," at intervals, into the earth and wa-

ters. The "World-Problem" represents it as only a suggested hypothesis; yet it was propounded with favor. Moreover, it denies any force in the argument against the "Vestiges" from geology, because it is possible, it says, that after a species had gone on, for a long while, producing its like in individuals, it might at last, by some sudden change, produce a new *species*. But is it any the less true, that science gives the development-theory no scientific foundation, and no ground for belief among scientific men, even if "pure reason" has the power of breeding *such* a monster by way of setting aside science? Geology and zoology, as we have remarked above (on the preceding page), are utterly opposed to the Vestiges, root and branch. There is no end to the suppositions that unrestrained reason may make. Science claims no share in them; and it disproves, not by showing that reason cannot conceive itself to fly high, but that nature affords no basis or warrant for the flight.

After saying that the "Vestiges of Creation" has been made "a bugbear in the religious world," and evincing a leaning to some of its doctrines, the "World-Problem" brings in the following note (p. 186):—

"It is a number of years since we read this book. The impression left upon the mind, was not favorable to its piety. It appeared to us decidedly anti-Biblical in its tone and spirit. Its style, both of thought and expression, is very different from that of the Old Testament. It does not talk like Mosea. If we may judge, however, from its very confident manner, so much resembling that of certain other productions of a similar Baconian genus [this Note is to a paragraph pronouncing the science and theology of the "Vestiges" as good as that of Professor Dana], it must certainly be considered a work of respectable science."

Whether the monster was really deserving of being killed, might be questioned after so cautious an opinion from such an author. It would seem, too, that the work had not received very close attention. But that it may be seen to be a *very* bad book, we cite from a review which appeared in the American or Whig Review, for 1846, p. 525. The Article begins thus :—

"The spirit of infidelity is as malignant as ever, but it has lost the boldness and openness which formerly characterized its attacks upon revelation."

And, in the course of its illustrations of the Development-theory of the "Vestiges," it says (p. 537) :

"For example, a certain species of vegetation, after having, for one hundred million and one times produced its like, is, by virtue of a hidden law contained in its organization (but all this time concealed and inert), suddenly developed into a new species, in the first stage of animal life. * * * * In this way, the plant becomes an animal, the reptile a fish, the fish an inhabitant of the dry ground, and terrestrial animals rise, in the ascending scale, until the development reaches the Simia [monkey] tribe. From this the machine goes on, age after age, apes begetting apes, each one in his own likeness and after his own kind, until, at last, some one revolution of the wheel brings everything into that state in which the "conditions are fulfilled;" — the hidden spring is touched: the monkey loses his tail, and man comes out, No. 2762. Oh, shade of Moses! We cannot help apostrophizing thy meek spirit, thou ancient man of God! Is it for this that we are called upon, in the nineteenth century, to reject that sublime account, the superhuman grandeur and simplicity of which furnish evidence that thou couldst have derived it only from the voice of inspiration? *And God created man in his own image; in the image of God created he him; male and female created he them; and God breathed into his nostrils the breath of life, and man became a living soul.* Now, we ask again, what is gained by all this? * * * * Why not the man, directly, without the monkey? The only answer is, that there is a spurious philosophy, whose chief element is a most hearty (and yet, it may be, unconscious) dislike of the idea of a personal Deity. If it cannot bear the name of Atheism, it at least wishes a God afar off; anything but an ever-present, ever-energizing, ever-watchful moral Governor."¹

According to this account (and much of even stronger denunciation might be cited), *it is a very bad* book, beyond all doubt. The review would make *thirty-six* pages like this, and it is no hasty production. It is positive in its assertions, as if the writer had well considered, and was determined, in 1846, to kill Cock-Robin at a single blow. And who wrote this long review? The writer was the author of the "Six Days of Creation" and the "World-Problem." Besides

¹ Would not the judgment of the World-Problem pronounce this last sentence "sheer, undiluted Pantheism?" See a citation above, on p. 500.

abundant other evidence, the name Prof. TAYLER LEWIS is given in the Index of the volume.

It would not have been expected, after such an apostrophe to the "shade of Moses," and such words about a spurious philosophy, that we should so soon have had a work from the same author, suggesting the possibility that a monkey's body might have been "made to assume an erect, heavenward position, whilst it takes on that beauty of face and form which would become the new intelligence [man], and, indeed, be one of its necessary results."¹

Science has achieved its greatest triumphs in the check it has given to some forms of infidelity. It acknowledges, however, that there are creations of "pure reason," which are impregnable to her modes of attack alone. A subtle atheistic system may make nature an individuality, in which its results, even to all creations, are brought forward through some inscrutable, inherent, vital force. With such a theory, science can do little directly, beyond pronouncing it of the pure-reason breed, unless it rise to a consideration of the profounder characteristics of nature and man's position and qualities, in which case it may suggest truth, if it does not prove it. But the theory of "the Vestiges" is within its range of study.

Science makes no unrighteous claims. If it has done good, it is because it is God's appointed means of good. We would ever exclaim: "NON NOBIS, DOMINE, NON NOBIS." We read these thy works, and gather wisdom, because Thou art wise; and take strength, because Thou art strong. To thy name be the praise.

Parallelism between Geology and the Bible. On the parallelism between the Bible and the declarations of nature, we make, here, but a few brief observations. It should be understood that Geology has never assumed that the divisions between the six days of Genesis were legibly marked off in the rocks. Nearly all of its developments pertain to the fifth and sixth days alone; and there is no great V drawn

¹ The Six Days of Creation, p. 249.

over the middle and lower strata, or VI over the uppermost. It ascertains, from the rocks, a series of events or consecutive facts in the history of creation. And, in view of its enunciations, it is a natural question, with the student interested in the Bible, whether the order is the same with that in the Mosaic account? or whether there is an irreconcilable discrepancy? Should not theology ask these questions? Is it a perversion of exegesis to study out the parallelism, and attempt to reconcile seeming difficulties?

We give, concisely, the order of events in the two records, that the degree of discrepancy and doubt may be fairly seen.

GENESIS : I. creation of light ; II. firmament, separating waters above and below it ; III. dry land ; vegetation created ; IV. sun, moon, and stars ; V. marine and amphibian animals, and birds created ; VI. quadrupeds created ; MAN created.

GEOLOGY : the earth in igneous fusion ; its oceans, in vapors, over it ; partly cooled and covered with its oceans, but the atmosphere, above, still dense with vapors ; lands rising above the waters, becoming dry land (the azoic, of geology) ; traces of vegetation, in the rocks of this age, uncertain ; cooling continued, and finally a clear sky, with the sun, moon, and stars no longer obscured ; marine and amphibian animals, and birds (making up the ages of molluscs, of fishes, of coal plants, and of reptiles) ; quadrupeds created ; MAN. (The details of geological history fill out this mere list of epochs, and thus supply what the Bible does not undertake to give.)

In these accounts, the *Bible* says that MAN was the last creation. *Geology* says the same.

The *Bible* says that quadrupeds next preceded man. *Geology* says the same.

The *Bible* says, that inferior animal species, up to reptiles, were created before quadrupeds. *Geology* says the same.

The *Bible* says that there was, earlier, an age without animal life. *Geology* does the same.

The *Bible* says that, after the world had been long in formation (for its three days), the sun, moon, and stars ap-

peared in the heavens. Geology, also, makes this an event long after the earth's beginning; and it may be shown to be *probable*, though not actually demonstrated, that this occurred after the earliest dry land appeared.

The Bible says that vegetation was created with the first appearance of land, before animal life. Science gathers but indistinct records from the earth on this point; yet, plainly, has no counter-statement; and, as far as there are any indications, they favor the above.¹

The Bible says that the world had a beginning. Geology, by its very system of progress, points to a beginning.

Thus it is clear, that there is an accordance, to a considerable extent; and that facts in science are stated in the Bible, although not there recorded simply as scientific facts.

Geological science commences with the fact of the earth's fluidity, and cannot go back of this; leaving the hints respecting earlier time to be gathered from other sciences. If the nebular hypothesis be not true, and the earth was, at first, a chaotic sphere, then we should infer, from science, that the light of the *first* day was the light communicated to the chaos — and similarly, for all parts of the universe, at once. The *second* day would be that of the first appearance of the waters, as an ocean, separated from the "swaddling band" of vapors above. The *third* day would be that of the first appearance of dry land, and the creation of vegetation; the *fourth*, the appearance of the sun, moon, and stars; the *fifth*, the creation of animals, from the lowest to reptiles and birds (with some inferior quadrupeds in the latter half of the era); the *sixth*, the creation of quadrupeds (age of mammals), and, lastly, of man.²

If the nebular hypothesis be true, as supposed in Professor Guyot's exposition of the chapter, then the light of the *first* day would be the first light in the great deep or universe chaos. The *second* day would correspond, either to the evolution of worlds, including the earth, from the chaos or nebula, as suggested by Prof. Guyot; or else, the earth

¹ See our first Article, Bib. Sac. Jan. 1856.

² This is essentially the view brought out many years ago by Prof. Silliman.
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having been evolved on the first day, to the earth with the vapors about it, as in the preceding paragraph. The *third* day, and the following, as above.

We purposely avoided discussing the nebular hypothesis, in our first Article, and therefore gave an explanation (Prof. Guyot's) of the *second* day, in a note. Much ado is made about this Note, in the "World-Problem," in a manner quite like the stir about the boat-scene and the "Vestiges," and with as much appositeness. Professor Guyot, we trust will soon supply what is needed on this subject.

The author of the "World-Problem" expresses great admiration for the Nebular hypothesis, though not asserting actual belief in it; and, in the "Six Days of Creation," the "deep" or "water" of the second verse was explained as "an immense floating nebulosity, or part of some larger nebulosity." In the "World-Problem," the "water" is set down as the same that was about the dry land of the third day, and the application of the nebular hypothesis in an explanation of Genesis is pronounced absurd. The existence of these waters before the first day, is the basis for his argument for the existence of light *before* the same day; for he says: "it is not easy to conceive that the absolute origination of light was later than the constitution of the water;" and the creation of "light in itself must therefore have been before that of the grosser fluid." (p. 286.)

Now it is important to observe that the history of creation was not written by Moses, but by God himself; that the facts were unseen by man, and are both inconceivable by the human mind, and indescribable with exactness in human language; that therefore, like the prophecies relating to our Saviour, they may express more than was ever in the mind of the sacred penman; in fact, more than the accumulating knowledge of progressing mind, on this earth, will ever comprehend.

It is also to be considered, that if the nebular hypothesis be true, and if the Bible describes the beginning of our universe, the account should naturally have commenced with that beginning, whether so understood by the Jews or not.

Moreover, as our earth is but a dependent part of the universe, and since the command "Let light be," is of the most general kind, and besides, light would be the immediate concomitant of the first movement of the Spirit over the deep and the consequent action of forces in matter, there is certainly reason for giving the chapter the grandeur it may claim as the opening page of Heaven's message to man, by regarding the "Let light be" the fiat that rolled through immensity when light first entered upon its mission, and the universe of worlds its course in history.

There are many subjects, in the "World-Problem," yet untouched, that challenge criticism. But after our discussions of fundamental principles, it is unnecessary to dwell longer on its pages. There is much, also, in both works, to commend. But the "World-Problem," as a whole, only adds further reason for pronouncing the writings of the author injurious to the cause of the Bible. For, however great the author's love for its glorious revelations, which we would not question; however arduous his labors for the spread of truth and demolition of error, we still believe that infidelity may legitimately fortify itself from his philosophy; and the youth of the land be led to scorn the truth that has so unwise and uncharitable an advocacy.

We entered upon these discussions under a sense of religious duty. Unacquainted with the author of the "Six Days of Creation," and knowing, from hearsay, that his work sustained the view of long periods for the "days" of Genesis, we opened the volume with the expectation of both pleasure and profit. But with almost every page, we found truth denounced, the study of nature contemned, and God's works treated as if the Creator were some ill-natured Genius determined on deceiving man to his ruin.

It had been our sure conviction that science, in all its developments, could and would stand by the Bible; and the proofs of their harmony were daily multiplying. We had watched, with special pleasure, the fading out of seeming oppositions, the breaking down of infidel entrenchments,

and the increasing grandeur of Bible truth with every word that was deciphered in the book of nature. We had loved the latter, because it was the work of Him who, through his gospel, had declared his love in tones of infinite tenderness; and to us, nature, although not giving origin itself to such tones, seemed still to send back ten thousand echos and fill out the mighty chorus. The words of a man defying science, declaring its utter hostility to the Bible, and its baselessness, were, to our ears, words of profound infidelity; and although mingled with better thoughts, the volume appeared plainly hostile to man's best interests. The question of long or short days, discussed in it, seemed trivial compared with the spirit of the work. Adding to this, a theory of nature that was, in our view, at variance with both Bible and science, made of patches from the Development-theory of the "Vestiges," Plato's philosophy, and the Bible, and an exegesis that let "the beginning" drop out of Genesis, and made light to shine before God said "let light be," the writings appeared calculated to do valiant service for the evil one. As much as we were repugnant to controversy, it seemed a failure of duty to remain silent. With these motives we wrote, and have written again, and now offer our concluding words. And we shall feel that a life consecrated to the Bible, and to science as its tributary, has accomplished some good, if our pages shall have strengthened the faith of any in sacred truth, the exaltation of which is the end of all knowledge.

We close in the language of Bayne's "Christian Life :"
"Is it too much to predict, that when Science shall have filled its orb, it will be seen, by all nations, that the Father of spirits has had a higher design regarding it, than that of spreading man's table, or shortening his path; and that it casts a light, to reveal and demonstrate, over every pillar, down every avenue and colonnade, into every nook and crevice, of his word? Wait on the Lord; be of good courage, and He shall strengthen thy heart. Wait, I say, on the Lord."