GENERAL CONSIDERATIONS

RESPECTING

THE ORIGIN OF THE ANIMATED TRIBES.

THUS concludes the wondrous chapter of the earth's history which is told by geology. It takes up our globe at the period when its original incandescent state had nearly ceased; conducts it through what we have every reason to believe were vast, or at least very considerable, spaces of time, in the course of which many superficial changes took place, and vegetable and animal life was gradually developed; and drops it just at the point when man was apparently about to enter on the scene. The compilation of such a history, from materials of so extraordinary a character, and the powerful nature of the evidence which these materials afford, are calculated to excite our admiration, and the result must be allowed

to exalt the dignity of science, as a product of man's industry and his reason.

If there is any thing more than another impressed on our minds by the course of the geological history, it is, that the same laws and conditions of nature now apparent to us have existed throughout the whole time, though the operation of some of these laws may now be less conspicuous than in the early ages, from some of the conditions having come to a settlement and a close. That seas have flowed and ebbed, and winds disturbed their surfaces, in the time of the secondary rocks, we have *proof on the yet preserved surfaces of the sands* which constituted margins of the seas in those days. Even the fall of wind-slanted rain is evidenced on the same tablets. The washing down of detached matter from elevated grounds, which we see rivers constantly engaged in at the present time, and which is daily shallowing the seas adjacent to their mouths, only appears to have proceeded on a greater scale in earlier epochs. The volcanic subterranean force, which we see belching forth lavas on the sides of mountains, and throwing up new elevations by land and sea, was only more powerfully operative in distant ages. To turn to organic nature, vegetation seems to have

proceeded then exactly as now. The very alternations of the seasons has been read in unmistakable characters in sections of the trees of those days, precisely as it might be read in a section of a tree cut down yesterday. The system of prey amongst animals flourished throughout the whole of the pre-human period; and the adaptation of all plants and animals to their respective spheres of existence was as perfect in those early ages as it is still.

But, as has been observed, the operation of the laws may be modified by conditions. At one early age, if there was any dry land at all, it was perhaps enveloped in an atmosphere unfit for the existence of terrestrial animals, and which had to go through some changes before that condition was altered. In the carbonigenous era, dry land seems to have consisted only of clusters of islands, and the temperature was much above what now obtains at the same places. Volcanic forces, and perhaps also the disintegrating power, seem to have been on the decrease since the first, or we have at least long enjoyed an exemption from such paroxysms of the former, as appear to have prevailed at the close of the coal formation in England and throughout the tertiary era. The

surface has also undergone a gradual progress by which it has become always more and more variegated, and thereby fitted for the residence of a higher class of animals.

In pursuing the progress of the development of both plants and animals upon the globe, we have seen an advance in both cases, along the line leading to the higher forms of organization. Amongst plants, we have first sea-weeds, afterwards land plants; and amongst these the simpler (cellular and cryptogamic) before the more complex. In the department of zoology, we see zoophytes, radiata, mollusca, articulata, existing for ages before there were any higher forms. The first step forward gives fishes, the humblest class of the vertebrata; and, moreover, the earliest fishes partake of the character of the next lowest sub-kingdom, the articulata. Afterwards come land animals, of which the first are reptiles, universally allowed to be the type next in advance from fishes, and to be connected with these by the links of an insensible gradation. From reptiles we advance to birds, and thence to mammalia, which are commenced by marsupialia, acknowledgedly low forms in their class. That there is thus a progress of some kind, the most superficial glance at the geological

history is sufficient to convince us. Indeed the doctrine of the gradation of animal forms has received a remarkable support from the discoveries of this science, as several types formerly wanting to a completion of the series have been found in a fossil state.*

It is scarcely less evident, from the geological record, that the progress of organic life has observed some correspondence with the progress of physical conditions on the surface. We do not know for certain that the sea, at the time when it supported radiated, molluscous, and articulated families, was incapable of supporting fishes; but causes for such a limitation are far from inconceivable. The huge saurians appear to have been precisely adapted to the low muddy coasts and sea margins of the time when they flourished. Marsupials appear at the time when the surface was generally in that flat, imperfectly variegated state in which we find Australia, the region where they now live in the greatest abundance, and one which has no higher native mammalian type. Finally, it was not till the land and sea had come

* Intervals in the series were numerous in the department of the pachydermata; many of these gaps are now filled up from the extinct genera found in the tertiary formation.

into their present relations, and the former, in its principal continents, had acquired the irregularity of surface necessary for man, that man appeared. We have likewise seen reason for supposing that land animals could not have lived before the carbonigenous era, owing to the great charge of carbonic acid gas presumed to have been contained in the atmosphere down to that time. The surplus of this having gone, as M. Brogniart suggests, to form the vegetation, whose ruins became coal, and the air being thus brought to its present state, land animals immediately appeared. So also, sea-plants were at first the only specimens of vegetation, because there appears to have been no place where other plants could be produced or supported. Land vegetation followed, at first simple, afterwards complex, probably in conformity with an advance of the conditions required by the higher class of plants. In short, we see everywhere throughout the geological history, strong traces of a parallel advance of the physical conditions and the organic forms.

In examining the fossils of the lower marine creation, with a reference to the kind of rock in connexion, with which they are found, it is observed that some strata are attended by a much greater abund-

ance of both species and individuals than others. They abound most in calcareous rocks, which is precisely what might be expected, since lime is necessary for the formation of the shells of the mollusks and articulata, and the hard substance of the crinoidea and corals; next in the carboniferous series; next in the tertiary; next in the new red sandstone; next in slates; and lastly, least of all, in the primary rocks.* This may have been the case without regard to the origination of new species, but more probably it was otherwise; or why, for instance, should the polypiferous zoophyta be found almost exclusively in the limestones? There are, indeed, abundant appearances as if, throughout all the changes of the surface, the various kinds of organic life invariably *pressed in*, immediately on the specially suitable conditions arising, so that no place which could support any form of organic being might be left for any length of time unoccupied. Nor is it less remarkable how various species are withdrawn from the earth, when the proper conditions for their particular existence are changed. The trilobite, of which fifty species existed during the earlier formations,

* See paper by Professor Edward Forbes, read to the British Association, *1839*.

was extirpated before the secondary had commenced, and appeared no more. The ammonite does not appear above the chalk. The species, and even genera of all the early radiata and mollusks were exchanged for others long ago. Not one species of any creature which flourished before the tertiary (Ehrenberg's infusoria excepted) now exists; and of the mammalia which arose during that series, many forms are altogether gone, while of others we have now only kindred species. Thus to find not only frequent additions to the previously existing forms, but frequent withdrawals of forms which had apparently become inappropriate—a constant shifting as well as advance—is a fact calculated very forcibly to arrest attention.

A candid consideration of all these circumstances can scarcely fail to introduce into our minds a somewhat different idea of organic creation from what has hitherto been generally entertained. That God created animated beings, as well as the terraqueous theatre of their being, is a fact so powerfully evidenced, and so universally received, that I at once take it for granted. But in the particulars of this so highly supported idea, we surely here see cause for some re-consideration. It may now be inquired,—In what way was the creation

of animated beings effected? The ordinary notion may, I think, be not unjustly described as this,—that the Almighty author produced the progenitors of all existing species by some sort of personal or immediate exertion. But how does this notion comport with what we have seen of the gradual advance of species, from the humblest to the highest? How can we suppose an immediate exertion of this creative power at one time to produce zoophytes, another time to add a few marine mollusks, another to bring in one or two conchifers, again to produce crustaceous fishes, again perfect fishes, and so on to the end? This would surely be to take a very mean view of the Creative Power—to, in short, anthropomorphize it, or reduce it to some such character as that borne by the ordinary proceedings of mankind. And yet this would be unavoidable; for that the organic creation was thus progressive through a long space of time, rests on evidence which nothing can overturn or gainsay. Some other idea must then be come to with regard to *the mode* in which the Divine Author proceeded in the organic creation. Let us seek in the history of the earth's formation for a new suggestion on this point. We have seen powerful evidence, that the construction of this

globe and its associates, and inferentially that of all the other globes of space, was the result, not of any immediate or personal exertion on the part of the Deity, but of natural laws which are expressions of his will. What is to hinder our supposing that the organic creation is also a result of natural laws, which are in like manner an expression of his will? More than this, the fact of the cosmical arrangements being an effect of natural law, is a powerful argument for the organic arrangements being so likewise, for how can we suppose that the august Being who brought all these countless worlds into form by the simple establishment of a natural principle flowing from his mind, was to interfere personally and specially on every occasion when a new shell-fish or reptile was to be ushered into existence on *one* of these worlds? Surely this idea is too ridiculous to be for a moment entertained.

It will be objected that the ordinary conceptions of Christian nations on this subject are directly derived from Scripture, or, at least, are in conformity with it. If they were clearly and unequivocally supported by Scripture, it may readily be allowed that there would be a strong objection to the reception of any opposite hypothesis. But

the fact is, however startling the present announcement of it may be, that the first chapter of the Mosaic record is not only not in harmony with the ordinary ideas of mankind respecting cosmical and organic creation, but is opposed to them, and only in accordance with the views here taken. When we carefully peruse it with awakened minds, we find that all the procedure is represented primarily and pre-eminently as flowing *from commands and expressions of will, not from direct acts.* Let there be light—let there be a firmament—let the dry land appear—let the earth bring forth grass, the herb, the tree—let the waters bring forth the moving creature that hath life—let the earth bring forth the living creature after his kind—these are the terms in which the principal acts are described. The additional expressions,—God made the firmament—God made the beast of the earth, &c., occur subordinately, and only in a few instances; they do not necessarily convey a different idea of the mode of creation, and indeed only appear as alternative phrases, in the usual duplicative manner of Eastern narrative. Keeping this in view, the words used in a subsequent place, "God *formed* man in his own image," cannot well be understood as implying any more than

what was implied before,—namely, that man was produced in consequence of an expression of the Divine will to that effect. Thus, the scriptural objection quickly vanishes, and the prevalent ideas about the organic creation appear only as a mistaken inference from the text, formed at a time when man's ignorance prevented him from drawing therefrom a just conclusion. At the same time, I freely own that I do not think it right to adduce the Mosaic record, either in objection to, or support of any natural hypothesis, and this for many reasons, but particularly for this, that there is not the least appearance of an intention in that book to give philosophically exact views of nature.

To a reasonable mind the Divine attributes must appear, not diminished or reduced in any way, by supposing a creation by law, but infinitely exalted. It is the narrowest of all views of the Deity, and characteristic of a humble class of intellects, to suppose him acting constantly in particular ways for particular occasions. It, for one thing, greatly detracts from his foresight, the most undeniable of all the attributes of Omnipotence. It lowers him towards the level of our own humble intellects. Much more worthy of him it surely is, to suppose that all things have been commissioned by him from the first,

though neither is he absent from a particle of the current of natural affairs in one sense, seeing that the whole system is continually supported by his providence. Even in human affairs, if I may be allowed to adopt a familiar illustration, there is a constant progress from specific action for particular occasions, to arrangements which, once established, shall continue to answer for a great multitude of occasions. Such plans the enlightened readily form for themselves, and conceive as being adopted by all who have to attend to a multitude of affairs, while the ignorant suppose every act of the greatest public functionary to be the result of some special consideration and care on his part alone. Are we to suppose the Deity adopting plans which harmonize only with the modes of procedure of the less enlightened of our race? Those who would object to the hypothesis of a creation by the intervention of law, do not perhaps consider how powerful an argument in favour of the existence of God is lost by rejecting this doctrine. When all is seen to be the result of law, the idea of an Almighty Author becomes irresistible, for the creation of a law for an endless series of phenomena —an act of intelligence above all else that we can conceive—could have no other imaginable source,

and tells, moreover, as powerfully for a sustaining as for an originating power. On this point a remark of Dr. Buckland seems applicable: "If the properties adopted by the elements at the moment of their creation adapted them beforehand to the infinity of complicated useful purposes which they have already answered, and may have still farther to answer, under many dispensations of the material world, such an aboriginal constitution, so far from superseding an intelligent agent, would only exalt our conceptions of the consummate skill and power that could comprehend such an infinity of future uses under future systems, in the original groundwork of his creation."

A late writer, in a work embracing a vast amount of miscellaneous knowledge, but written in a dogmatic style, argues at great length for the doctrine of more immediate exertions on the part of the Deity in the works of his creation. One of the most striking of his illustrations is as follows:— "The coral polypi, united by a common animal bond, construct a defined form in stone; many kinds construct many forms. An allotted instinct may permit each polypus to construct its own cell, but there is no superintending one to direct the pattern, nor can the workers unite by consultation

for such an end. There is no recipient for an instinct by which the pattern might be constructed. It is God alone, therefore, who is the architect; and for this end, consequently, he must dispose of every new polypus required to continue the pattern, in a new and peculiar position, which the animal could not have discovered by itself. Yet more, millions of these blind workers unite their works to form an island, which is also wrought out according to a constant general pattern, and of a very peculiar nature, though the separate coral works are numerously diverse. Still less, then, here is an instinct possible. The Great Architect himself must execute what he planned, in each case equally. He uses these little and senseless animals as hands; but they are hands which himself must direct. He must direct each one everywhere, and therefore he is ever acting."* This is a most notable example of a dangerous kind of reasoning. It is now believed that corals have a general life and sensation throughout the whole mass, residing in the nervous tissue which envelops them; consequently, there is nothing more wonderful in their determinate general forms than in those of other animals.

* *Macculloch on the Attributes of the Deity, iii. 569.*

It may here be remarked that there is in our doctrine that harmony in all the associated phenomena which generally marks great truths. First, it agrees, as we have seen, with the idea of planet-creation by natural law. Secondly, upon this supposition, all that geology tells us of the succession of species appears natural and intelligible. Organic life *presses in*, as has been remarked, wherever there was room and encouragement for it, the forms being always such as suited the circumstances, and in a certain relation to them, as, for example, where the limestone-forming seas produced an abundance of corals, crinoidea, and shell-fish. Admitting for a moment a re-origination of species after a cataclysm, as has been surmised by some geologists, though the hypothesis is always becoming less and less tenable, it harmonizes with nothing so well as the idea of a creation by law. The more solitary commencements of species, which would have been the most inconceivably paltry exercise for an immediately creative power, are sufficiently worthy of one operating by laws.

It is also to be observed, that the thing to be accounted for is not merely the origination of organic being upon this little planet, third of a series which is but one of hundreds of thousands

of series, the whole of which again form but one portion of an apparently infinite globe-peopled space, where all seems analogous. We have to suppose, that every one of these numberless globes is either a theatre of organic being, or in the way of becoming so. This is a conclusion which every addition to our knowledge makes only the more irresistible. Is it conceivable, as a fitting mode of exercise for creative intelligence, that it should be constantly moving from one sphere to another, to form and plant the various species which may be required in each situation at particular times? Is such an idea accordant with our general conception of the dignity, not to speak of the power, of the Great Author? Yet such is the notion which we must form, if we adhere to the doctrine of special exercise. Let us see, on the other hand, how the doctrine of a creation by law agrees with this expanded view of the organic world.

Unprepared as most men may be for such an announcement, there can be no doubt that we are able, in this limited sphere, to form some satisfactory conclusions as to the plants and animals of those other spheres which move at such immense distances from us. Suppose that the first persons of an early nation who made a ship and ventured

to sea in it, observed, as they sailed along, a set of objects which they had never before seen—namely, a fleet of other ships—would they not have been justified in supposing that those ships were occupied, like their own, by human beings possessing hands to row and steer, eyes to watch the signs of the weather, intelligence to guide them from one place to another—in short, beings in all respects like themselves, or only shewing such differences as they knew to be producible by difference of climate and habits of life. Precisely in this manner we can speculate on the inhabitants of remote spheres. We see that matter has originally been diffused in one mass, of which the spheres are portions. Consequently, inorganic matter must be presumed to be everywhere the same, although probably with differences in the proportions of ingredients in different globes, and also some difference of conditions. Out of a certain number of the elements of inorganic matter are composed organic bodies, both vegetable and animal; such must be the rule in Jupiter and in Sirius, as it is here. We, therefore, are all but certain that herbaceous and ligneous fibre, that flesh and blood, are the constituents of the organic beings of all those spheres which are as yet seats of life. Gra-

vitation we see to be an all-pervading principle: therefore there must be a relation between the spheres and their respective organic occupants, by virtue of which they are fixed, as far as necessary, on the surface. Such a relation, of course, involves details as to the density and elasticity of structure, as well as size, of the organic tenants, in proportion to the gravity of the respective planets—peculiarities, however, which may quite well consist with the idea of a universality of general types, to which we are about to come. Electricity we also see to be universal; if, therefore, it be a principle concerned in life and in mental action, as science strongly suggests, life and mental action must everywhere be of one general character. We come to comparatively a matter of detail, when we advert to heat and light; yet it is important to consider that these are universal agents, and that, as they bear marked relations to organic life and structure on earth, they may be presumed to do so in other spheres also. The considerations as to light are particularly interesting, for, on our globe, the structure of one important organ, almost universally distributed in the animal kingdom, is in direct and precise relation to it. Where there is light there will be eyes, and these, in other spheres,

will be the same in all respects as the eyes of tellurian animals, with only such differences as may be necessary to accord with minor peculiarities of condition and of situation. It is but a small stretch of the argument to suppose that, one conspicuous organ of a large portion of our animal kingdom being thus universal, a parity in all the other organs—species for species, class for class, kingdom for kingdom—is highly likely, and that thus the inhabitants of all the other globes of space bear not only a general, but a particular resemblance to those of our own.

Assuming that organic beings are thus spread over all space, the idea of their having all come into existence by the operation of laws everywhere applicable, is only conformable to that principle, acknowledged to be so generally visible in the affairs of Providence, to have all done by the employment of the smallest possible amount of means. Thus, as one set of laws produced all orbs and their motions and geognostic arrangements, so one set of laws overspread them all with life. The whole productive or creative arrangements are therefore in perfect unity.