

THE CONTINUITY OF THE SCHEMES OF
NATURE AND OF REVELATION.

2574

A SERMON

PREACHED, BY REQUEST, ON THE OCCASION OF THE

MEETING OF THE BRITISH ASSOCIATION

AT NOTTINGHAM.

WITH REMARKS ON SOME RELATIONS OF MODERN
KNOWLEDGE TO THEOLOGY.

BY

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APPENDIX.

NOTE A.

ON THE ORIGIN OF SPECIES BY NATURAL SELECTION.

I HAVE taken the liberty of expressing my admiration of Mr. Grove's philosophical acumen in grouping together the plan and operations of nature under one felicitous term. He is, I am sure, far too candid—in his address to the British Association; he has travelled over far too wide a field, and he is too conscious of the difficulties attending physical researches, not to be prepared for objections to at least some of his remarks.

He appears to have accepted the Darwinian Hypothesis as explaining the origin of that Continuity which undoubtedly exists in the natural world. I, for one, am unable to accept that Hypothesis in its length and breadth without great reserve. As an illustration of the general nature of the objections which I entertain, I will take an instance from that branch of physics with which it is my lot to be most familiar—the Optical Structure of the Human Eye. From the cornea to the retina the eye is an Optical Instrument. But what an Instrument! The computation of the curves and distances of the refracting surfaces in this instrument, and the assigning of the proper law of density for the several layers in its principal lens, would require the application of a mathematical analysis, such as I hesitate not to say was never yet possessed by a human geometer. The mechanism required for instantaneously changing the forms and distances, and in one instance the magnitude, of its com-

ponent parts, would require a handiwork such as never yet was possessed by a human mechanic. I say nothing of the chemistry required for the composition of the several constituent media. I presume Mr. Darwin would admit that this description is not exaggerated. Now let us attend to the process of "natural selection," by which this marvellous organ is said to have come into being. "I can see," says Mr. Darwin,* "no very great difficulty (not more than in the case of many other structures), in believing that natural selection has converted the simple apparatus of an optic nerve, merely coated with pigment and invested by transparent membranes, into an optical instrument as perfect as is possessed by any member of the great Articulate Class," *i. e.* as perfect as the human eye. And next comes the mode after which this simple apparatus of the coated nerve, by insensible additions gradually but *accidentally* made, is said to be converted at length into the eye of man. "We ought in imagination to take a thick layer of transparent tissue with a nerve sensitive to light beneath, and then suppose every part of this layer to be continually changing slowly in density, so as to separate into layers of different densities and thicknesses, placed at different distances from each other, and with the surfaces of each layer slowly changing in form. Further, we must suppose that there is a power always intently watching each slightly *accidental alteration* in the transparent layers, and carefully selecting each alteration which, under varied circumstances, may, in any way, or in any degree, tend to produce a distincter image. We must suppose each new state of the instrument to be multiplied by the million; and each to be preserved till a better be produced, and then the old ones to be destroyed. Let this process go on for millions on millions of years. . . ." Now we must here ask, What is this "power always intently watching each slightly accidental alteration?" A few lines further down in Mr. Darwin's page we read: "NATURAL SELECTION will pick out with unerring skill each improvement." But what is

* *Origin of Species*, edit. 1, pp. 188, 189.

this "Natural Selection?" We must here take Mr. Darwin's own definition: "This preservation of favourable variations, and the rejection of injurious variations, I call Natural Selection."*

Now to me there appear three objections, which indispose me to accept the above description of the processes by which the human eye could have been formed, and I will state them as succinctly as I can. First, consistently with such knowledge of optical combinations as I happen to possess, I cannot understand how, by any series of *accidental* variations, so complicated a structure as an eye could possibly have been successively *improved*. The chances of any accidental variation in such an instrument being an *improvement* are small indeed. Suppose, for instance, one of the surfaces of the crystalline lens of the eye of a creature, possessing a crystalline and cornea, to be accidentally altered, then I say, that unless the form of the other surface is simultaneously altered, in one only way out of millions of possible ways, the eye would not be optically *improved*. An alteration also in the two surfaces of the crystalline lens, whether accidental or otherwise, would involve a definite alteration in the form of the cornea, or in the distance of its surface from the centre of the crystalline lens, in order that the eye may be optically better. All these alterations must be simultaneous and definite in amount, and these definite amounts must coexist in obedience to an extremely complicated law. To my apprehension then, that so complex an instrument as an eye should undergo a succession of millions of *improvements*, by means of a succession of millions of *accidental* alterations, is not less improbable, than if all the letters in the "Origin of Species" were placed in a box, and on being shaken and poured out millions on millions of times, they should at last come out together in the order in which they occur in that fascinating and, in general, highly philosophical work.

But my objections do not stop here. The improvement of an organ must be an improvement relative to the new circum-

* *Origin of Species*, p. 81.

stances by which the organ is surrounded. Suppose, then, that an eye is altered for the better in relation to one set of circumstances under which it is placed. By-and-bye there arise a second set of circumstances, and the eye is again, by Natural Selection, altered and improved relatively to the second set of circumstances. What is there to make the second set of circumstances, such that the second improvement (relative to them) shall be an improvement or progress *in the direction of* the ultimate goal of the human eye? Why should not the second improvement be a retrogression *away from* the ultimate organ now possessed by man, and necessary to his well-being? But all this suiting of the succession of circumstances is to go on, not once or twice, but millions on millions of times. If this be so, then not only must there be a BIAS in the order of the succession of the circumstances, or, at all events, in the vast outnumbering of the unfavourable circumstances by the favourable; but so strong a bias, as to remove the whole process from the accidental to the *intentional*. The *bias** implies the existence of a Law, a Mind, a Will. The process becomes one not of Natural Selection, but of *Selection by an Intelligent Will*.

In considering the state of things just described, we must also take into the account, that the successive variations of the eye are said to be *accidental*. What, then, but a *constantly exerted* Intelligent Will, could cause the occurrence of new circumstances so as to meet these accidental variations, and concur ultimately to produce a certain definite result, that is to say, an instrument possessing the necessary and truly wonderful contrivances of the Human Eye? But is such a process to be called Providence, or Miracle, or the Inversion of Providence?

Further still. Mr. Darwin considers that the process of natural selection must have gone on for millions on millions of years, in order to have produced the results which surround us. It is difficult to assign any approximate limitation to the meaning

* On this subject of bias, see a highly philosophical review of 'Quetelet on Probabilities,' in Sir John Herschel's 'Essays.'

of the term millions on millions of years. But in turning to page 287 of the "Origin of Species," I find the author considers that the denudation of the World must have required some three hundred millions of years! This denudation is but a trivial process, indeed, compared with the mighty geological evolutions which have occurred between that denudation and the present time; and inconceivably trivial compared with other evolutions which preceded it. Mr. Darwin says, page 489, "As all the living forms of life are the lineal descendants of those which lived *long before* the Silurian epoch, we may feel certain that the ordinary succession by generation has never once been broken, and that *no cataclysm has desolated the whole world*.* Hence we may look with some confidence *to a secure future of equally inappreciable length*."

If then we assign a period of one million of millions of years to have elapsed, during which natural selection has worked for the production of a human eye, we may presume we are within the limits contemplated by Mr. Darwin.

Now, I do not hesitate to say that this assumption is entirely out of harmony with the existing state of knowledge.

For during the deposition of the Silurian strata, there must have been a deep ocean, and terrestrial things were then proceeding, Mr. Darwin says, on pretty much the same quiet model as at present. But it has been rendered extremely probable by the researches of Adams, Hansen, Delaunay, Airy,† and some others, that owing to the combined action of the ocean and the moon, the length of the day has been, and is now, undergoing a constant increase, and this effect has been going on in all time since there has been an ocean surrounding this solid earth. Now, in accordance with the calculations of the above most cautious and most eminent astronomers, what would the reader suppose must have been the length of a day on the earth, *if* the earth had existed with a continent and an ocean, one million of millions of years ago? I do not think he will be prepared for the result.

* The Italics here and elsewhere are mine.

† See *Monthly Notices Royal Ast. Soc.* Feb. 1866.

Before I venture to state it, I request him to bear in mind Mr. Darwin's very necessary caution, relative to what Butler calls "that forward, delusive faculty," the imagination, viz., "*his reason ought to conquer his imagination.*"

One million of million years ago, if the solid earth could then have been provided with an ocean, the length of the day would probably have been less than the flash of the hundredth of a second of time !!

Moreover, if, as the author of the "Origin of Species" conceives, "we may look with some confidence to a secure future of equally inappreciable length," then, in forming our estimate of the security of that future, we must take into our account the consideration that—

One million of million of years hence the duration of the day will exceed eighty years !!

Unless, indeed, for certain physical reasons the Earth, like other satellites, at length shall rotate round its own axis, in the same time as it takes to revolve round the Sun, that is, unless the day become a year. Nor is it from astronomical investigations alone that we are compelled greatly to shorten the heretofore supposed excessive duration of terrestrial things, but other physical considerations unconnected with astronomy point to the same conclusion. Professor Thompson,* in his researches on the "Dissipation of Force," assigns what appear to be conclusive reasons for believing that the Earth has not been, nor will continue to be, in a condition suited to the existence of known organised beings for any thing approaching the time which Mr. Darwin has assigned to the denudation of the Weald alone. It is, however, only fair to Mr. Darwin to observe, that the astronomical and physical researches referred to, have been completed subsequently to the publication of the "Origin of Species."

* Proceedings of the Royal Society of Edinburgh, 1865, and Rede Lecture, 1866.

On reading Mr. Darwin's enchanting volume, we seem to be, as it were, in the hands of a great magician, who leads us up and down the Elysian fields, pointing out to us on this side and on that new aspects of things which, though true, were beyond the reach of our expectations; nevertheless, when as we hope, we are nearing the hill-top and getting a sight of the primordial genesis of organised beings, the chariot on which he has mounted us rolls down the hill like the stone of Sisyphus.

"With hands and feet struggling, he shoved the stone
Up a hill-top; but the steep well-nigh
Vanquished, by some great force repulsed, the mass
Rushed again obstinate down to the plain.

Tall trees, fruit laden, with inflected heads
Stooped to us; pears, pomegranates, apples bright,
The luscious figs, and unctuous olive smooth,
Which, when with sudden grasp we would have seized,
Winds whirled them high into the dusky clouds."

ODYSSEY, Book xi.

Thus baffled, nothing that I can see remains but that we take our refuge in the magnificent old words,—

IN THE BEGINNING GOD CREATED THE HEAVENS AND THE EARTH. HE SPAKE THE WORD AND THEY WERE MADE; HE HATH GIVEN THEM A LAW WHICH SHALL NOT BE BROKEN.

NOTE B.

ON PRAYER.

"In it did he live,
And by it did he live; it was his life.
His mind was a thanksgiving to the power
That made him; it was blessedness and love!"

WORDSWORTH.

Some months have now elapsed since Professor Tyndal, in the public journals, put a question regarding prayer, which at