

NATURAL SCIENCE AND THEOLOGICAL SCIENCE.

The Origin of Species by Natural Selection, or the preservation of favoured races in the struggle for life. BY CHARLES DARWIN, M.A., F.R.S., F.G.S., &c., &c. London: Murray.

WE do not take up this most charming of scientific monographs for the purpose of discussing the author's theory, but with the intention of making a few remarks in connection with it, such as properly belong to our province as a religious and theological review.

Mr. Darwin has left his own view of the bearing which his theory is likely to have on old world theology *almost* unindicated: but we believe we are right in attributing to many of his readers the supposition that, whatever the author's own views may be, his work has a very decided tendency to overturn, or to assist in overturning, the received notions which we have been accustomed to hold almost universally, till of late years, respecting the Creation. A grandson of the author of "Zoonomia" and "Phytologia" might perhaps be expected to inherit some of the dangerous kind of originality—or perhaps one should rather call it self-reliance—by which those works were characterized: but, although there are slight indications of what we cannot but consider dangerous principles in the work before us, there are at the same time indications, perhaps more unmistakeable, of a reverent spirit in subjection to which we hope and believe it has been written; and which we sincerely trust may preside over the preparation of the much larger work of which this is an epitome.

But we recognize in this and kindred works the signs of a crisis in the history of Science which may be seen to be of greater importance in the future of religion than it appears to us at present. The intellect of the scientific world is engaged in a vigorous attempt to discover the relation between the Creator's sustaining Providence and the accidents of existence, and to define the boundaries between them. It is struggling for light as to the proportion and the cases in which God has settled His work of Creation upon immutable laws which are for ever being carried out by the ministerial agents of His power or by His own Omnipotent hand; and those in which He has suffered and is still suffering His original work to be modified by the influences and reactions of its constituent parts. There is, in fact, an intellectual struggle going on in the world of Natural Science not very unlike that of which Free Will and Predestination were the subjects in that of Theology.

That a certain amount of danger must be attendant on such in-

quiries, no one who has read the history of philosophy during the last century can deny; but we are unwilling to think that the danger necessarily belongs to such studies when we consider that it is the work of God's own hand into which the research is made. The contemplation of the Heavenly bodies brought a great intellect once into a deeper sense of man's insignificance in comparison with God: the contemplation of his own physical structure led him to reverent thoughts of the awful mysteries involved in that structure: the more he penetrated into the knowledge of the manifold works of Creation, the more did he perceive the wisdom of Him Who had made them all, and the more did he see that those who pondered these things aright must understand by such studies the loving-kindness of the LORD. We quite sympathise with the quotation from the "Advancement of Learning" which Mr. Darwin has put on the forefront of his volume, and are willing to adopt Bacon's principle to its full extent, that a man cannot "search too far, or be too well studied in the book of God's Word or in the book of God's works; Divinity or Philosophy; but rather let men endeavour an endless progress or proficience in both." There has probably been a want of knowledge as to the matter and course of such studies in those who have made the loudest protests about the dangers of scepticism which attend them, and we should be sorry to number ourselves with any who would, if they could, shut up the volume of Nature, and know little more of Natural Science than is to be incidentally gathered out of the volume of Holy Writ. At the same time experience teaches that many, whose intellectual pursuits take the direction to which we are referring, do become more or less opponents of Catholic doctrine, that is of doctrine always and everywhere received in general by Christians; and however strong the conviction may be that such scepticism does not necessarily arise directly out of such studies, it becomes a question of importance how there comes to be *any* connection at all between the pursuits of knowledge seemingly calculated to show us more of God, and the clouded vision of Him which so often appears to exist with that knowledge when most highly developed.

In our remarks on this important question we shall use Mr. Darwin's volume to illustrate what we have to say, but we beg to declare, before going further, that we use it with very great respect for its author, and not without a strong conviction that his future work will be of value hardly less as a scientific addition to Christian evidences, than as possessing philosophical merit of the very highest order.

Among the vast varieties observable in the animal and vegetable world it is clear, even to the unscientific eye, that while some are so totally unlike each other that no one would ever suppose them to have had a common origin, there are others which possess a visible relation to each other in certain of their characteristic features.

The horse and the sheep, or the eagle and the pigeon, are plainly creatures which have never belonged to the same family of animals; nor would any one suppose that the oak and the water-lily, or the sunflower and the fuchsia ever belonged to the same families of plants. But if we come to compare the horse, the zebra, and the tapir; the eagle, the vulture, and the hawk; the pigeons of endless varieties; the various kinds of domestic fowls; the primrose and the cowslip; the violet and the heartsease; we see at once that there are many points of similarity between these classes of animals and plants respectively, and that the possibility of a common origin does not seem to the ordinary observer an extravagant supposition. Naturalists have hitherto however, (with a few exceptions) held the theory, that such varieties of plants and animals, although possessing certain common characteristics of structure which show them to belong generically to one "kind," have yet so many distinct points of difference as to show with equal clearness that their "kind" or genus comprised a more or less extensive number of species; and that each species derives its origin from an animal or plant exactly like itself, and created in the form which itself possesses. Thus, to take an illustration from some of the familiar instances already referred to, the old theory of species makes the primrose and the cowslip to have been always, though so much alike, two distinct plants, and each as distinctly a separate creation as the oak and the water-lily. But the difficulties attending the determination of species, so as to enable us certainly to say that the differences between one plant and another, or one animal and another, undoubtedly constitute them distinct species, have always been felt by Naturalists as a stumbling-block in the way of this theory, and hardly any two agree, even within reasonable limits, in their classifications and subdivisions of species. Mr. Darwin appears to consider that this difficulty is in itself a proof that the idea is merely arbitrary, and does not represent an actual fact.

The substance of Mr. Darwin's own theory is, that large classes of plants and animals which have been hitherto looked upon as distinct species, and by consequence, as distinct creations, are really derived from a common origin: and that the one original type has been split up into many varieties by the constant influence of what he has named "natural selection." As we read his theory, it attributes to the Creator the creation of a single one or of a comparatively small number of original plants and animals; and to the accident of natural selection the developement of that comparatively small number into the vast variety which has subsequently existed.

Mr. Darwin supports this theory first of all by a reference to the well-known power of varying the characteristics of animals or plants according to the requirements of fancy or utility. Breeders of cattle and sheep can vary the forms of these animals, increasing or diminishing peculiarities of horns, wool, and general shape, almost at

pleasure, by selecting those animals in which these peculiarities exist in the nearest degree to the required pattern for the breeding of others. These others, descended from them, exhibit more or less of the same peculiarities, and the breeder selects for further use those which exhibit them in the largest degree, and rejects those which show them least. By this continual selection in every generation, they are enabled to produce cattle or sheep much differing in form from those originally used, and this in a comparatively short space of time. Lord Somerville, speaking of what breeders have done for sheep, says: "It would seem as if they had chalked out upon a wall a form perfect in itself, and then had given it existence." That most skilful breeder, Sir John Sebright, used to say, with respect to pigeons, that "he would produce any given feather in three years, but it would take him six years to obtain head and beak." And the results which follow an analogous system of crossing or selection in the case of plants and fruit-trees—the strawberry, for example—are familiar to every one. But on Mr. Darwin's theory, this selection in the case of domestic animals and plants in use by man is not only carried on *intentionally*. He considers that there is a continual unconscious selection going on among all nations and in every generation, of those particular creatures which are most suitable to the particular wants of the locality or the time; and that by this means, while the less suitable become gradually extinct, those which are more so diverge more and more from the original type towards the required pattern.

This, of course, is a theory of development, the animal of normal character being gradually changed into one of a character more perfect for the object in view: and according as this object varies, so does the variety of animal produced for it.

When the same theory is carried beyond the range of domestic animals and the external influence of man, and applied to those in a state of nature, having no one to make the "selection" but themselves, it assumes a more startling character. The law of interdependence seems to lie at the root of Mr. Darwin's theory. Everything in Nature was made, not for itself alone, but with relation to some other being. Cats devour field-mice, field-mice feed on humble-bees, humble-bees carry the pollen from one plant of hearts-ease which is to fertilize another of the same plant: "Hence it is quite credible that the presence of a feline animal in large numbers in a district might determine, through the intervention first of mice and then of bees, the frequency of certain flowers in that district!" And thus a "struggle for existence" is going on among all creatures, which results in a balance more or less even, of one kind against another; and of each kind, the strong against the weak. This same "struggle for existence" also results in a "natural selection," by which constant peculiarities are originated that have hitherto been traced up to the first creation of those in whom they

exist. The red-grouse, e.g., is the colour of the heather which it frequents, and the black-grouse that of peaty earth, its ordinary habitat. All agree that these colours are useful to the birds in preserving them from danger, but all are not so agreed as to the way in which they came by the peculiarity of colour. On old-world principles, it was given by God in His all-perfect wisdom, by an act of creation; but Mr. Darwin considers that it is the result of "natural selection," a majority of red or black grouse escaping from their enemies in every generation, until all other colours became gradually exterminated.

It is clear that there is hardly any limit to this theory, if the principle of it is once thoroughly established, and accordingly Mr. Darwin gives us an extreme illustration of the possibility of one mammal so unlike to another as a bear is to a whale, being gradually transformed from the former into the latter by persistency for many generations in aquatic habits and the recreation of fly-catching.

But, perhaps, the clearest as well as the most beautiful illustration of Mr. Darwin's theory is given by him in a summary of the fourth chapter, which we cannot resist quoting, if only for the sake of its language.

"The affinities of all the beings of the same class have sometimes been represented by a great tree. I believe this simile largely speaks the truth. The green and budding twigs may represent existing species; and those produced during each former year may represent the long succession of extinct species. At each period of growth all the growing twigs have tried to branch out on all sides, and to overtop and kill the surrounding twigs and branches, in the same manner as species and groups of species have tried to overmaster other species in the great battle for life. The limbs divided into great branches, and these into lesser and lesser branches, were themselves once, when the tree was small, budding twigs; and this connexion of the former and present buds by ramifying branches may well represent the classification of all extinct and living species in groups subordinate to groups. Of the many twigs which flourished when the tree was a mere bush, only two or three, now grown into great branches, yet survive and bear all the other branches; so with the species which lived during long-past geological periods, very few now have living and modified descendants. From the first growth of the tree, many a limb and branch has decayed and dropped off; and these lost branches of various sizes may represent those whole orders, families, and genera which have now no living representatives, and which are known to us only from having been found in a fossil state. As we here and there see a thin struggling branch springing from a fork low down in a tree, and which by some chance has been favoured and is still alive on its summit, so we occasionally see an animal like the *Ornithorhynchus* or *Lepidosiren* which in some small degree connects by its affinities two large branches of life, and which has apparently been saved from fatal competition by having inhabited a protected station. As buds give rise by growth to fresh buds, and these, if vigorous, branch out and overtop on all sides many

a feebler branch, so by generation I believe it has been with the great Tree of Life, which fills with its dead and broken branches the crust of the earth, and covers the surface with its ever-branching and beautiful ramifications."—P. 129.

We have given a very imperfect view of Mr. Darwin's theory, but, as we have already said, it is not our intention to attempt any criticism of it in itself; nor do we see any necessity for doing so, because we do not see that *in itself* the theory of Natural Selection is less compatible with the theological theory of Creation than the established one of separate species. We should have liked, indeed, to find our author more distinctly inferring that the variations of structure and habit by Natural Selection are all subordinate to the original act of the Creator; but perhaps Mr. Darwin takes this for granted, and supposes that his readers will do so also. If so, we see no theological objection to the theory *per se*,¹ and any other objections that occur to us have probably been anticipated by the author.

But, passing from the theory itself to certain precedent theories which its author seems to consider necessary to its support, and to certain deductions which he seems inclined to suppose must necessarily be drawn from it, we find what we consider to furnish us with illustrations of the danger attending profound investigations of this kind, and which show a weakness in modern science,—showing it all the more forcibly because in one so truly philosophical as Mr. Darwin,—leading towards scepticism in religion, and probably (but with this we do not care to meddle) to very erroneous conclusions in philosophy. What we refer to we shall, for the sake of distinctness, put under two heads:—

1. A want of discrimination as to the respective value of different kinds of evidence.
2. An ignoring of certain first principles, which are established beyond power of refutation.

In respect to the first point, it is to be observed that the evidence available for any investigation of this description is of two kinds, that of testimony and that of induction. We freely allow the value of the latter, allow it to its fullest extent; but we also maintain the value of the former.

Now Mr. Darwin's theory is made to rest largely on the assumption that existing creatures form part of a series which has been living in successive generations for many thousands of years upon the globe. The changes of structure and habit which he believes to have taken place in animals and plants by means of natural selection, he considers to have been brought about in the most gradual way, so that ten thousand generations would only work a comparatively trifling

¹ Of course we except the "one primordial form" part of the theory, but this is scarcely more than hinted at, at present, by Mr. Darwin.

variation in the characteristics of the normal being. Throughout the volume he presupposes that the vast geological periods *assumed* by modern philosophers are *proved* to have elapsed; and answering the objection (p. 282) that "time will not have sufficed for so great an amount of organic change, all changes having been effected very slowly through natural selection," our author goes into an argument on the lapse of time, which shows that he considers himself justified in spreading the operation of his theory over even millions of years. In one place, moreover, Mr. Darwin speaks of "pre-Adamite man." In another he refers to Mr. Horner's discovery of pottery in the bed of the Nile, as probably proving that man in a high state of civilization existed in Egypt thirteen or fourteen thousand years ago.

These high numbers are a weakness to which the modern man of science almost inevitably falls a victim. There is a sort of charm to him in thousands and millions of years which he cannot resist. Perhaps there is a vague sense of power and supremacy of intellect in this profession of penetrating with the scan of a philosophical vision into the "deep illimitable blue" of a profound eternity, and measuring out the immeasurable by myriads of years, generations, or centuries. We say years, generations, *or* centuries, for your thorough believer in these high numbers is not particular as to the denomination of his periods. A thousand or ten thousand generations (p. 117,) seems to be a mere matter of insignificant detail; and even when it comes to a matter of millions, six or seven one way or the other goes for nothing. Mr. Darwin is illustrating the lapse of vast periods of time by a supposed phenomenon of the Southern Downs, which geologists *imagine* to give them the power of computing the time in which certain rocks with which the Weald is *imagined* to have been formerly covered have been worn away. "At this rate," he says, "on the above data, the denudation of the Weald must have required 306,662,400 years; *or say three hundred million years.*" Now what can be the value of such a calculation when six millions and more of years can be cast aside with this air of indifference? We verily believe that four, eight, nine hundred or a thousand millions of years would have had just as much *logical relation to the facts* on which this computation is based, as three hundred, or three hundred and six millions, &c.

There is something very untrustworthy in arguments which connect themselves with this reckless use of high numbers. Mr. Darwin is a clear-headed logical philosopher, and yet *he* cannot eschew the habit of coolly adding or subtracting his ciphers at his own convenience: where then shall we look for a scientific naturalist or geologist, who will impress us with the confidence that he is dealing with his high numbers on a sound basis of evidence and logic, and not making them the mere playthings of science?

Nor is the evidence on which this lapse of millions of ages as-

sumed for the present creation, or for that represented by fossilized organic remains, (if they are not a part of the present creation, as Mr. Darwin thinks they certainly are,) at all adequate to so large an assumption. It is now an old question, and no new arguments are brought to support the geologist's side of it. In reality, all the argument used is simply a false induction based on mere conjecture; the real evidence,—such, we mean, as would be accounted evidence by an unprepossessed judicial mind,—being of the weakest kind.

Take for example this discovery of Mr. Horner. Some pieces of pottery are discovered at a considerable depth below the surface of the sediment which is annually deposited by the Nile. It is known that the Nile deposits so many inches of this sediment every year, and it is calculated that it must have taken thirteen or fourteen thousand years to deposit a thickness equal to the depth at which this pottery was found. The pottery must have been the work of man: therefore man existed thirteen thousand years ago in a state of civilization equal to the manufacture of pottery. We happen to have it in our power to prove by a similar argument that Charles I. reigned almost as long ago. Having occasion, three years since to dig a gravel pit for the repair of a church, we found in the midst of this abnormal gravel a small copper token of dubious currency, but bearing that sovereign's image and superscription. When did that stratum of gravel subside? Was it about the same time as the pottery sank in the Nile bed? or earlier? Alas for theories founded on such facts! We mentioned the token to a scientific friend, and he gave us an account of a similar discovery which had come within his own experience. He acknowledged that the discovery had at first staggered him; but while he was building up a theory on the subject, a practical navvy pointed out a fine green line marking the section of the stratum near where the copper coin had lain; and this green line was traced up nearly to its surface. No doubt remained that this coin and ours too had been dropped upon the surface of the field, and that by the force of specific gravity alone they had reached their singular positions. Is it so certain that the Nile pottery did not reach its place by the same process, that we are justified in putting the two cases in a totally different category? We maintain that such a certainty is impossible: and that the evidence by itself is as conclusive in proving that Charles I. circulated brass farthings in the Eastern Counties before the Deluge as in proving that civilized man lived and made pottery in the valley of the Nile fourteen thousand years ago. We do not quarrel with these speculations or fancies so long as they keep clear from collision with our revealed knowledge of creation, which is the evidence of testimony. We do not think them wise, but that is hardly our concern. If however they are made directly or indirectly to tell against, or to supersede a theory of creation which *on independent evidence of its own* we are po-

sitively certain must be a true and correct statement of fact, then we say it is the duty of every Christian philosopher to show the slight and trivial basis on which this theory of lapsed ages rests. It is his duty to condemn unsparingly that pseudo-science which will accept as safe a pyramid built in an inverted position if built of fanciful theory, but reject as unsafe one built on the broadest of its possible surfaces, if constructed out of a material to which they have, for other reasons, ethical or intellectual, a dislike.

We must pass on quickly to a conclusion, and hasten therefore to our second sign of weakness as illustrated by Mr. Darwin's work. It is the disregard of first principles which are thoroughly and beyond refutation, established. One example must be sufficient, and that is to be found in the remarks scattered through the book respecting the origin of our own race.

"The framework of bones being the same in the hand of a man, wing of a bat, fin of the porpoise, and leg of the horse,—the same number of vertebræ forming the neck of the giraffe and of the elephant—and innumerable other such facts, at once explain themselves on the theory of descent with slow and slight successive modifications."—P. 479.

That is, man having some features in common with a bat, a horse, and a porpoise, the common derivation of the three from one original type is at once made evident. Again,

"I should infer from analogy that probably all the organic beings which have ever lived on this earth have descended from some one primordial form into which life was first breathed."—P. 484.

And since, as Mr. Darwin shows in another place, there is a trace of similarity between the swimbladder of fishes and the lungs of vertebrate animals,

"There seems to me to be no great difficulty in believing that natural selection has actually converted a swimbladder into a lung, or organ used exclusively for respiration. I can indeed hardly doubt that all vertebrate animals having true lungs have descended by ordinary generation from an ancient prototype, of which we know nothing, furnished with a floating apparatus or swimbladder."—P. 191.

Which theory Mr. Darwin considers to account satisfactorily for certain anatomical peculiarities in the air passages of the lungs of man, the highest of these vertebrate animals.

These are some of the passages in which there are indications of our author's opinion that man has a common origin with all other animals in one "primordial form," that primordial form being conceded we suppose to be the work of the Creator. It ought, on the other hand, to be a first principle with the natural

philosopher, because we have it on indubitable testimony, that man was created with the physical organization now possessed by him.¹ We recommend a study of the evidence on which the first chapters of Genesis are received as an authentic revelation from God to all who have any doubts on this subject. It is unphilosophical in the highest degree to slight this long received testimony—received on such evidence as they will see—or to propound theories of the origin of man which must necessarily rest on inductive reasoning of far inferior value, but which yet run counter to it.

A due consideration of this would show to a logical mind not prejudiced against the reception of revealed knowledge that there is a portion of Theological Science which must in reality be antecedent to Natural Science, and that *there are historical truths in Theology with which inductive conclusions in Biology can only come into collision at their own peril.*

And after all the discoveries of the age, and the triumphs of mind by which it is characterized, it seems to us that an honest and logical mind must acknowledge that there is a domain into which human knowledge can have no hope to penetrate. There is no doubt a continual elimination of mystery going on in all branches of natural science, but there are yet mysteries, such as those of reproduction and the origin of life, which will never be eliminated by any power of unveiling the secrets of creation possessed by man in this stage of his existence. We are no nearer the explanation of these mysteries, even in our present advanced stage of knowledge than we were in the days of Sir Thomas Brown and Sir Kenelm Digby. And not only so, but the further our discoveries go, the more improbable does it seem that we shall ever find out by human intelligence those mysteries of God's handiwork. It may be they are reserved for that higher state of intellect which will in truth be developed hereafter in the New Creation yet to come; but in this world they form still a sealed volume.

If our students of natural science will only convince themselves of these truths, and be logical, we shall have little fear that they will be led into scepticism by their study of the works of God. If they will believe that One possessed of the most exact knowledge of every fact and event from the most distant eternity has communicated a portion of that knowledge to us: if they will believe that He is absolute Truth, and could not possibly in that communication give us information which is not exactly true, they will have at least two canons on which to base their researches into the mysterious depths of the natural world in its present condition and

¹ If there is the least warrant for supposing a change in his physical constitution, it is a change to a lower character, through the Fall, and not a development to a higher.

its past history. And when such researches are undertaken by those who will reverently give their due weight to these canons (and we think Mr. Darwin is such an one) we have little fear of any final divergence between Natural and Theological Science: but rather conclude that the perfect consistency of truth will be more and more established, whether that truth is arrived at by Revelation, or by inductive reasoning.

REVIEWS AND NOTICES.

1. *Marriage with a Deceased Wife's Sister Unlawful.* A Letter to the Rev. Dr. M'Caul, by JOSEPH FRANCIS THRUPP, M.A., late Fellow of Trinity College, Cambridge. Macmillan and Co.
2. *Church Rates.* By the Rev. JOHN COBBOLD ALDRICH, M.A., Incumbent of S. Lawrence, Ipswich. Masters.
3. *Plain Spoken Letters to Dr. Dodge, on the Revision of the Liturgy.* J. H. Parker.

WE have here three pamphlets, indicating the three chief points from which the Church is now suffering attack. And if they betoken a coming season of trial, experience shows that such seasons bring many blessings indirectly in their train.

1. Mr. Thrupp's letter is satisfactory as far as it goes; but Dr. M'Caul demands a further reply, and we are glad to hear that such an answerer may shortly be expected in Dr. Pusey.

2. Mr. Aldrich treats the question of Church Rates mainly in its social and practical aspect; and his pamphlet will perhaps be more popular than if it took a higher flight.

3. The tone of Mr. "Philip Plain Spoken," is altogether that of banter, which seems to us more suitable for the pages of a newspaper, where these letters originally appeared, than to a pamphlet on a very grave subject proceeding from an Oxford theological publisher.

Sermons preached during the Octave of the Dedication in All Souls Church, Halifax. Halifax: Whitley and Booth.

THESE Sermons, both as regards the subjects selected and the treatment of them, are upon the whole a worthy commemoration of an event very noticeable in the annals of the northern Church.

The Bishop of Oxford's is really a noble sermon; and we can say of it and of all with which it is associated—including one by the Dean of Chichester and one by Mr. Alfred Barry—that there is less of exaggeration and of a controversial spirit, than is usually met with in popular sermons. Taken as a whole, the sermons form a pamphlet which is well suited for circulation among the middle classes of society.