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ART. I.—*On the Origin of Species.* By CHARLES DARWIN.

THAT high authority, Augustine Caxton, has told us of a learned man who prevented his brain from working by heaping too many books upon his head. This seems to have been the case with the author of this highly interesting but confused and fallacious book. When we remember that Mr. Darwin's single volume condenses the observation and reading of a whole life, and briefly epitomizes a huge unmanageable mass of facts, we do not wonder that such profuse and complicated evidence should have somewhat interfered with the clearness of the final verdict. Perhaps this result is less the fault of the individual writer, than a necessary consequence of his attempt to generalize prematurely. Whenever scientific observation accumulates facts largely in excess of our knowledge of the laws that regulate them, there will always be a strong temptation to theorize; and the theories thus prematurely formed will have moreover a strong advantage *of* position, a *natural advantage*, as we might say to Mr. Darwin, which tends to establish and perpetuate them; this, namely, that being founded on our imperfect knowledge, we cannot bring positive knowledge to disprove them. But this is a position which scientific men are generally very cautious in assuming. It is held to be speculation, not science, to put forward a theory which we cannot prove, and throw on our opponents the onus of disproof. Ancient philosophy founded its wildest speculations on the maxim that where denial is impossi-

ble, assertion is safe ; but it has been the rejection of this maxim which has led modern science to its clear and accurate deductions ; and we think it derogatory to Mr. Darwin's scientific reputation that he should have stepped back from the modern to the ancient standing-ground ; and, in support of a theory which at best must be pronounced woefully premature, should have appealed to our ignorance rather than to our knowledge. Do we say that the variation of species appears to be limited ? We are not acquainted with the laws of variation. Do we say that all we know of correlation would not serve his purpose ? Of correlation we are profoundly ignorant. Do we say that geology is against him ? Geology is confessedly imperfect. Do we say that geographical distribution is against him ? We have little knowledge of the means of distribution. In short, the chief part of his evidence amounts to this : Of all that we are ignorant I claim the possible results, even of ' principles which, though not proved to be true, can be shown to be in some degree probable.' (Page 446.) This is Mr. Darwin's position, and we think it unworthy of his reputation. Let us add that he maintains it with all the candour of a true-hearted man of science. He never evades an objection nor shirks a difficulty, even when he is obliged to confess it beyond his solution. He gives us all sides of a question, even when he only argues on one. He states all manner of facts, even while he appropriates only those that suit his purpose. No one but an honest and learned man, who could and would give to others the full evidence that had satisfied himself, would have written a book like this. Its honesty is so apparent, that, in the contradictions that again and again occur in its pages, we see nothing more than the partial forgetfulness and confusion of a writer lost in the labyrinth of his own multiplied facts. On this ground, we think, Mr. Darwin gains rather than loses by the necessity which he so often deplures, of having to curtail his evidence ; for we are more disposed to trust his candour than his reasoning, and therefore, when he says he has ample ground for his conclusions, we are inclined to believe him, whereas, if we saw his evidence, we might possibly deem it inconclusive.

Hitherto we have said nothing of the aim of this book. It is an attempt to prove that all existing plants and animals have not been created in their present sharply-defined specific forms, but have been gradually changed in the course of millions of millions of generations, under the operation of a law of unlimited variation. ' Probably all the organic beings that have ever lived on this earth have descended from some one primordial form, into which life was first breathed by the Creator.'

(Page 484.) We need scarcely say that this is rather a rude shock to our received belief. Geologists have tortured the first chapter of Genesis to suit their theories of the inorganic world, and now we have to put that unfortunate chapter again on the rack to make it confess still more. Certainly there is an immense distance between words and their ordinary meaning, if we are to understand from that chapter that God did *not* make great whales, and winged fowl, and beasts of the earth; but, rather, one primordial form, considerably lower than the lowest mollusc.

Scientific men always loudly protest against any appeal to Scripture on questions of science, and we do not mean to interfere with their creed. We only ask for received religious belief the same sort of respect that is paid to received scientific belief, namely, the respect due to established position. It has an *à priori* claim on our reverence, that is all; a claim to be honoured as truth, until beyond all question it can be proved to be error. And he who brings against religion a crude theory, unsound arguments, and carefully selected facts, stands fairly exposed to the charge of having unwarrantably trifled with things accounted sacred. Let him collect facts and study laws to his heart's content. It is not facts and laws that imperil religion, but the theories that run so far ahead of them. No one will quarrel with Mr. Darwin's facts and laws,—we only wish he had given us more of them,—but he will have to bear reproach from every quarter for the crude theory he has built on them, and the fallacious reasoning by which he has supported it.

Of the interest of the book we cannot speak too strongly. Apart from its theory, it gives us a summary of the laws and relations that connect the whole organic and inorganic world; and we greatly regret that so much observation and reflection, so much learning and candour, should have been warped to the support of a mere speculation, an unproved and mischievous theory. If Mr. Darwin would but re-write it, weed out its fallacies, and graft in more facts, it would be the most popular book of modern science; and it would, moreover, better serve his purpose, if, as we do not doubt, that purpose be the advancement of truth. For we think he would himself admit that, even if his theory be true, it is immature, and by no means clearly proved. If so, the want of proof is against it, and its immaturity will throw back its truth for years. Therefore we think he would have better served his own cause by sending into the world a mass of well-arranged facts, and leaving them to influence silently the progress of opinion. Still more, if his theory

be not true, would the cause of truth have been better aided by its suppression; for it is exceedingly plausible, and will mislead many. There is no error in argument more difficult to expose and hold up to the light, than an honest man's 'begging the question.' Very often the fallacy arises from his own deep conviction on the subject, which makes him overlook the necessity of proof: hence he is exceedingly apt to take for granted the very point at issue; and his reader, following him, acquiesces in the assumption, not perceiving that in half a sentence there may lie a fallacy in reasoning which shall vitiate the conclusions of a whole volume.

We shall give a summary of Mr. Darwin's argument, as much as possible in his own words, before we make any comment. It is contained in the first five chapters, and may be summed up in the following propositions:—

1. Established species vary. Chapters i. and ii.
2. Varieties are incipient new species. Chapters ii. and v.
3. But the world is too full to allow room for unlimited new species: therefore, in the struggle for existence, the more favoured forms will conquer, and the less favoured will gradually die out. Chapter iii.

4. The natural advantage of some forms over others, by which the best fitted are 'selected' to fill the world, is natural selection, and natural selection tends toward divergence. Chapter iv.

To go more into detail. The plants and animals that have come under man's influence have varied enormously. The descent of widely different breeds of dogs, cattle, horses, fowls, and pigeons, from a common stock, is an acknowledged fact; and so also is the mode by which such breeds are produced at man's pleasure. The cattle-breeder and the horticulturist take advantage of nature's slight varieties, and propagate from the variety, knowing that some of the offspring will probably resemble the parent. These aberrant forms are again selected to carry on the process, which is repeated through several generations, until a distinct breed is fairly established.

Species in a state of nature have also wide and permanent variations. 'The most experienced naturalist would be surprised at the number of the cases of variability, even in important parts of structure, which he could collect on good authority during a course of years.' (Page 45.) 'Compare the several floras of Great Britain, France, or the United States, drawn up by different botanists, and see what a surprising number of forms have been ranked by one botanist as good species, and by another as mere varieties. Mr. H. C. Watson has marked for me 182 British plants, which are generally considered as varieties,

but which have all been ranked by botanists as species.' (Page 48.) 'Certainly no clear line of demarcation has as yet been drawn between species and sub-species, or, again, between sub-species and well-marked varieties, or between lesser varieties and individual differences. These differences blend into each other in an insensible series; and a series impresses the mind with the idea of an actual passage.' (Page 51.) It is true we cannot detect the passage of one form into another; for nature is unaccountably slow in her operations. Instead, therefore, of proving the fact, the utmost we can do is to point out the many small analogies that subsist between varieties and species, and which seem to render their identity probable, though it does not admit of proof. In many cases, that which is true of one is also true of the other: thus, if we take any particular country we shall find, that in genera which contain many species, there will be a large proportion of species that vary, and these species will have more than the average number of varieties. This is what we should expect, if varieties were incipient species; for 'wherever the manufactory of species has been active, we ought generally to find it still in action.' (Page 56.) Again, in large genera (in which, be it remembered, there are most varieties) the amount of difference between the species is often exceedingly small; that is to say, 'many of the species already manufactured, still to a certain extent resemble varieties.' (Page 57.) Again, varieties group themselves around species, as species group themselves in sections or sub-genera. Again, varieties have restricted ranges, which also seems to be true of 'those species which are very closely allied to other species, and in so far resemble varieties.' (Page 58.) 'We can clearly understand all these analogies, if species have once existed as varieties, and have thus originated: whereas, these analogies are utterly inexplicable if each species has been independently created.' (Page 59.)

Of the laws that influence these variations our ignorance is profound. 'Not in one case out of a hundred can we pretend to assign a reason why this or that part differs, more or less, from the same part in the parents.' (Page 167.) One cause of variation may be found in the outward conditions of life, which directly or indirectly affect the functions of the parents and more remote ancestors. Another exists, perhaps, in use and disuse, which strengthens certain parts, and diminishes others. Another, in the inherent facility with which many plants and animals suit themselves to changes of climate. Another, in that mysterious affinity between different parts of an animal, (technically termed 'correlation of growth,') by virtue of which one

part becomes modified by the variation of another. But whatever be the causes of variety, it is the steady accumulation of such differences that gives rise to the more important modifications of structure in all the innumerable beings on the face of the earth. (Page 170.)

Now let us observe how varieties and species act on each other. (Chap. iii.) The lavish beneficence of the Creator's hand has given to natural increase a great excess over natural decay and death. 'Every organic being increases at so high a rate, that if not destroyed, the earth would soon be covered by the progeny of a single pair.' (Page 64.) This prodigious excess is kept in continual check by limitation of food, by change of climate or atmosphere,—wet, drought, frost, and blight; by herbaceous quadrupeds, by insects, by birds and beasts of prey, &c. Thus, all organic beings are exposed to severe competition; and the 'struggle for existence will almost invariably be most severe between the individuals of the same species; for they frequent the same districts, require the same food, and are exposed to the same dangers. In the case of varieties of the same species, the struggle will generally be almost equally severe.' (Page 75.) And 'as species of the same genus have usually, though by no means invariably, some similarity in habits and constitution, and always in structure, the struggle will generally be more severe between species of the same genera, when they come into competition with each other, than between species of distinct genera.' (Page 76.) 'Owing to this struggle for life, any variation, however slight, if it be in any degree profitable to an individual of any species, will tend to the preservation of that individual, and will generally be inherited by its offspring. The offspring, also, will thus have a better chance of surviving.....I have called this principle, by which each slight variation, if useful, is preserved, by the term of "natural selection."' (Page 61.) But as it appears that the struggle is most severe between nearly allied varieties or species, it follows that diversity has in itself an advantage. 'The more diversified the descendants from any one species become, by so much will they be better enabled to seize on diversified places in the polity of nature.' (Page 112.) But if diversity is, so to speak, always at a premium, the process carried through all time must result in unlimited divergence.

We have given this long summary of Mr. Darwin's first five chapters because his theory rests on these alone. If their facts are inconclusive, or their arguments unsound, the theory falls to the ground. But before we go into details, we must observe that it is not enough to prove that there is great variety in

existing forms, and certain unknown laws of variation, and many analogies between varieties and species: we frankly admit it all; but the real question at issue is this,—Does variety oscillate and tend to revert, or does it continually tend to diverge? Has the Creator made organic forms essentially persistent, though endowed with a limited capacity for variation, or has He made them essentially variable, destined to pass slowly but surely one into the other? If we are right, all the facts and laws of variation ought to show an excess of oscillation and reversion over divergence. If Mr. Darwin is right, those facts and laws ought to show an excess of divergence over oscillation and reversion.

Now we find under man's immediate influence certain forms which we call 'our domestic species,' and which, amidst much external variation, have remained essentially the same for three or four thousand years. Our cat and dog are the cat and dog of ancient Egypt, just as the cattle of ancient Egypt are the present wild cattle of the South American plains. Nevertheless, we can induce in these forms an enormous amount of variation, apparently far greater than many of the differences which subsist between so-called species. Hence arises the suspicion, that between our artificial varieties, or 'breeds,' and true species, there is no real difference. Yet there are three points of strong contrast between them. 1st. The changes which man can produce in plants and animals may be very rapidly effected, and, apart from man's agency, may be nearly as rapidly destroyed; but the rough material, so to speak, the original domestic stock, has been persistent for thousands of years. 2nd. While man can only keep his forms persistent by strict interbreeding, nature keeps her forms persistent in spite of the freest intercrossing. 3rd. Man's greatest care and effort cannot subdue in his artificial breeds a tendency to revert to the original stock; but this stock is nature's persistent form, it reverts no further.

With regard to the first point, Mr. Darwin admits that 'it is certain that several of our eminent breeders have, even within a single lifetime, modified, to a large extent, some breeds of cattle and sheep.' '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.' (Page 31.) 'We see an astonishing improvement in many florists' flowers, when the flowers of the present day are compared with drawings made only twenty or thirty years ago.' (Page 32.) But, on the other hand, nature's changes are so unfortunately slow, that no theorizer has yet been able to catch her in the fact.

With regard to the second point, it appears that the amount of variation which man can accumulate by careful interbreeding is kept in check by an opposing principle: *interbreeding carried to an extreme, produces deterioration*. Hence the advantage of introducing new blood into a farm stock, instead of continuing to breed in and in. But this introduction must be carefully guarded; for if the new animals be not of the same breed, or some closely allied sub-breed, the stamina imparted by the new blood will be more than counterbalanced by the mongrel character stamped upon the offspring; and individual vigour will be bought by impurity of race. This fact speaks plainly of reversion rather than of divergence. Man's utmost efforts to accumulate variety in one direction, are met by deterioration and weakness; and when, to counteract this, he introduces new blood, that introduction tends to interfere with his accumulated amount of variation. Among horticulturists, certain varieties of fruit are not expected to exist for ever, still less to diverge more and more: they die out in spite of our utmost endeavours to preserve our favourites, and we have to cultivate and select new varieties to supply their place. It would seem that though nature yields to man, and becomes plastic under his hand up to a certain point, beyond that point he can weaken and destroy, but cannot continue to mould her to his purpose.

Thirdly. Even amidst the most careful interbreeding, there is a perpetual tendency to revert to the original stock: but this is not all,—the tendency is *increased* when distinct breeds are crossed. The characters of the original rock pigeon will occasionally appear among our artificial tame breeds; but 'when two birds belonging to two distinct breeds are crossed, neither of which has any of the above-specified marks, the mongrel offspring are very apt suddenly to acquire these characters.' (Page 25.) This tendency to revert to a lost character, 'for all that we can see to the contrary, may be transmitted undiminished for an indefinite number of generations.' (Page 26.)

Now let us sum up all these facts. Man can force nature into a certain amount of divergence; but all that he can do, he can do quickly,—in a few years, a life-time; and it does not appear that he can go beyond a certain point, or that time would help him to do more; all that he can do, he does by most systematic care in the adjustment of two opposite principles, anxiously watching lest continual interbreeding should weaken individual vigour, or occasional intercrossing interfere with purity of race. Yet, in spite of his endeavours to bend her to divergence, nature invariably manifests a tendency to reversion; a tendency which she keeps undiminished for an 'indefinite number of genera-

tions,' and, whenever man strengthens her by new blood, manifests most strongly. And not only he cannot destroy this persistency, but he cannot borrow it for the lasting establishment of his artificial breeds. He has never yet succeeded in producing races so distinct that they refuse to mingle and to produce fertile offspring; but without this barrier against free intercrossing, it is plain that the very existence of artificial breeds must depend on artificial care. If we were to turn out our Durhams and Alderneys on the South American plains, every trace of the separate breeds would soon pass away, but the persistent element would remain, and the cattle would be our domestic species still. It appears, then, that just so far as man drags nature from her persistency, just so far she deprives him of its benefit, and so works out her revenge. She reclaims stragglers, she weakens or degenerates those she cannot reclaim; or when domestic animals escape from his yoke, she completely upsets his work, not building new variety upon it, but restoring it to its old persistent form.

So much for man's agency. But when we leave the sphere over which he has any control, the rapid changes which he accomplishes, and the divergence he produces, altogether disappear. We see no analogous facts in Nature's kingdom; nay, their absence is so notorious, that Mr. Darwin, in support of his theory, calls on us to exercise the Christian grace of faith in that which we do not see. He tells us in one page that nature is a thousand times more powerful than man; that she can produce mammals from reptiles, from fishes, from crustaceans, from 'one primordial form;' and, in another, that her changes are accomplished with such 'extreme slowness,' that no observer has ever yet detected the passage of one closely allied species into another. But this is an effect of time which must not pass unquestioned. Why should change be so much less rapid when nature is left undisturbed? If she requires more time for her operations, it must be because she is more persistent, more hard to change, than when she is forced to yield to man. Yet, mark the conclusion:—if her persistency baffles man in his attempt to force her occasional variety into extreme divergence, how much more will it control and guard that variety from excess when she is left to herself! It is one thing to say that nature produces varieties *rarely*, by rare combinations of circumstances acting on a limited capacity for change; it is another thing to say that she produces varieties *slowly*, by an insensible process going on for ages. We *see* her doing the first; we see modifications of structure adapted to new outward conditions; and, if the conditions change, we see the modifications disappear. But we do *not*

see any slow and gradual divergence, any trace of small ever-recurring transitions; nor is there the slightest proof that while nature checks man in his rapidly produced varieties, she imitates him slyly by a process that needs thousands of years to effect an equal amount of change. To ask us to believe this, simply because belief, without reason or proof, is necessary to establish Mr. Darwin's theory, is a most unscientific and audacious appeal from our knowledge to our ignorance.

In the second chapter Mr. Darwin should have pointed out the analogies that subsist between the changes accomplished by man, and those which he asserts are accomplished by nature; but as, unfortunately for him, there is no analogy, but wide opposition, between man's visible and nature's invisible process, between man's effort to diverge and nature's power to persist, he shifts his argument, and shows us the many analogies that subsist between natural varieties and species. We doubt if it be worth while to point out the small fallacies that run through many of these analogies; and for this reason, that if they were all strictly correct, they would not be of the least value in the argument. There is no reason why there should not be features of similarity between varieties and species. We believe that the Creator gave to fixed forms a certain elasticity, that they might better adapt themselves to new conditions of existence; and as it has pleased Him to stamp the features of one great family on all organic beings by the evident connexion that subsists between diverse species and genera; as an outlying species will approach another genus, as an erratic genus will approach another family; it was to be expected that varieties also would come under the same law of harmony, the same bond of origin and design, so that an outlying variety of one species might often be found to approach another. Analogies between varieties and species might be, as we say, part of the Creator's harmonious plan, or, as Mr. Darwin says, part of the law of identity between varieties and species: they *might* be either; therefore, to quote them as proof on one side of the question, is against every rule of fair evidence.

The struggle of all animated beings for existencē (chap. iii.) is a wide truth which may be partially stated to suit the narrowest purposes of error; indeed, we must accuse Mr. Darwin of being exceedingly apt to *argue* on one point of a question which he may have *stated* in full. This is pre-eminently the case in his chapter on the struggle for existence. He shows us fairly and ably how many causes tend to keep in check the prodigious increase of all organic forms; but when he introduces his theory, he bends his evidence to conclusions which amount

to no more than this : the world is so full, that there is no room for new comers ; therefore, if a variety is at a disadvantage, it will become extinct ; if it is on precisely the same footing as its parent, it may keep its ground beside it ; but if it has any advantage, it will multiply at the expense of its parent. The parent, and not other species, will chiefly suffer, because the struggle is greatest between nearly allied relations, 'that frequent the same districts, require the same food, and are exposed to the same dangers.' We must express our wonder at the extreme carelessness which thus strung together such opposite evidences of a struggle for existence. Certainly common food would be a ground for struggle, but common danger induces no struggle between allied species, but rather between them and the enemies that threaten them with danger. Besides, when we speak of 'the same food,' we must remember the great difference in the term as applied to animals or plants. The 'food' of plants is derived from air, water, and earth, and we doubt if it can possibly be maintained that any one species so exhausts the soil, as to struggle with its own varieties or nearly allied species for existence. We doubt exceedingly if nearly allied species of plants struggle with each other more than with all their neighbours. If we try to locate rarer species in new places, (and we *have* tried,) their struggle for existence is not with nearly allied species, but with coarse grass and hardy weeds with creeping roots. No doubt it is more correct to speak of a struggle between animals that eat the same food ; but food is only one element in the warfare ; and we must quote Mr. Darwin himself to show how complex are the relations that tend to establish one species and exterminate another :—'In Paraguay neither cattle nor horses nor dogs have ever run wild, though they swarm southward and northward in a feral state ; and Azara and Rengger have shown that this is caused by the greater number in Paraguay of a certain fly, which lays its eggs in the navels of these animals when first born. The increase of these flies, numerous as they are, must be habitually checked by some means, probably by birds. Hence, if certain insectivorous birds (whose numbers are probably regulated by hawks or beasts of prey) were to increase in Paraguay, the flies would decrease, then cattle and horses would become feral, and this would certainly greatly alter the vegetation ; this again would largely affect the insects ; and this the insectivorous birds, and so onwards in ever-increasing circles of complexity.' 'One more instance. I have reason to believe that humble-bees are indispensable to the fertilization of the heartsease ; for other bees do not visit this flower. From experiments which I have lately

tried, I have found that the visits of bees are necessary for the fertilization of some kinds of clover; but humble-bees alone visit the red clover, as other bees cannot reach the nectar. Hence I have very little doubt that, if the whole genus of humble-bees became extinct or very rare in England, the hearts-ease and red clover would become very rare, or wholly disappear. The number of humble-bees in any district depends, in a great degree, on the number of field-mice, which destroy their combs and nests; and Mr. H. Newman, who has long attended to the habits of humble-bees, believes that "more than two-thirds of them are thus destroyed all over England." Now, the number of mice is largely dependent, as every one knows, on the number of cats; and Mr. Newman says, "Near villages and small towns I have found the nests of humble-bees more numerous than elsewhere, which I attribute to the number of cats that destroy the mice." 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.' (Pp. 72-74.) Thus, after asserting and endeavouring to prove (for it makes a most important link in his chain) that the war for existence is most severe between nearly allied species, Mr. Darwin admits that 'the dependency of one organic being on another lies generally between beings remote in the scale of nature.' (Page 75.) Again: he acknowledges that climate is confessedly 'the most effective of all checks' on increase; yet its destruction does not fall on one variety or species in consequence of the dominance of a nearly allied one: on the contrary, it falls with equal force on the weakly of all species or varieties which inhabit the same district, and are exposed to the same dangers. And there is another effect of climate which Mr. Darwin has entirely overlooked. He represents the struggle as uniform, as if it always tended in one direction, as if a variety that flourished this year must continue to flourish the next and the next, always tending to further divergence. But, in fact, the struggle is not uniform, but intermittent; winter thins away the lavish abundance of summer, and spring gives a new field for a new struggle. This alternation tends to check the dominance of one form over another, by giving an oft-recurring new chance to the weaker party. For instance, if a variety had larger and more tempting seeds than its parent stock, which exposed it to be more visited by summer birds, a severe winter might destroy the birds, and give the variety fairer play another season. All living things are so dependent upon all, as Mr. Darwin has so forcibly told us, that he ought to have been the last man to attempt to limit

the complicated and unknown relations of organic beings to the narrow terms of a syllogism in logic. His proposition is this:—

Major—The world is too full for any new comers.

Minor—And the fight is keenest between near relations.

Ergo—If a variety have the slightest advantage over its parent, it will gradually conquer it, and take its place.

We should rather state it thus:—

Major—The world has room every spring for a new struggle.

Minor—And defeat is to the weak of all species.

Ergo—Destruction ministers to general vigour, not to the prevalence of particular forms.

If this conclusion is correct, Mr. Darwin's argument of extermination falls to the ground. He has asserted that the war of existence is most severe between nearly allied forms, and has utterly failed to substantiate his assertion; but without proof of *this*, he has no foundation for his next statement, that a flourishing variety does, by the fact of its flourishing, tend to exterminate its parent. We have no evidence whatever of this asserted possible superiority of the progeny over the parent; on the contrary, it is a well-known fact that varieties have restricted ranges,—a proof that they are not on the eve of conquering their parent stocks; but if variation were a perpetual and universal process, we should find them in every stage of aggression and conquest, and witness the extermination of vanquished forms.

We arrive at last at 'natural selection,' a term, in our opinion, most unfortunately and improperly chosen; a slippery term used to express much more than its first definition will warrant. The advantage which some forms of life have over others is a certain fact; some perish, some endure, some increase: and though we see something of the complex laws that bind all to each, we cannot calculate the intricate sum, nor in any case predict which shall increase and which shall perish. But we may readily grant that a variation, 'if it be in any degree profitable to an individual of any species, will tend to the preservation of that individual: the offspring also will have a better chance of surviving.' 'This principle,' says Mr. Darwin, 'by which each slight variation, if useful, is preserved, I have called by the term of "natural selection,"'—that is to say, natural selection is nothing more than the natural advantage which some forms have over others, and which tends to their preservation and increase. Is this all Mr. Darwin means? No, it is not; if it were, it would have been far better to have called it 'natural advantage;' but a coined phrase always helps out a halting argument: it is the ready means by which an honest man confuses himself, and a sophist confuses others. Under

the shelter of this term, we must accuse Mr. Darwin of having jumbled together five different things:—1st, the real fact, the natural advantage which some forms have over others; 2nd, the uncertain laws of inheritance; 3rd, the unknown laws of variation and correlation; 4th, the unproved fact of divergence; and, 5th, the hypothesis of development. First, let us look at the passage we have just quoted, (page 61,) and which we have given in full in our summary of Mr. Darwin's argument:—'Owing to this struggle,' &c. The commencement and conclusion of the sentence are connected by false logic, which involves an unproved assumption. 'Owing to the struggle, any variation,—if it be profitable,—will generally be inherited by the offspring.' Now, the inheritance of the offspring is not due to the struggle for life, (a certain fact,) nor to the advantage of some forms over others, (another certain fact,) but it is due to certain laws of inheritance which are not certain, nor uniform, nor by any means as general as this passage would imply, nor in any way connected with the profitableness of the variation. We know that inheritance sometimes continues a variety, and sometimes reverts it; but we do not know why it does either, nor can we predict which it will do, when nature is left undisturbed by man. Yet in this and the parallel passage (page 81) Mr. Darwin entangles the certain fact of natural advantage with the uncertain laws of inheritance. He speaks of natural selection making an occasional habit permanent, (pp. 219, 224,) that is to say, he assumes the certain action of the laws of inheritance, and includes them in his new phrase.

Secondly, he uses the same liberty with the laws of variation and correlation. We must quote somewhat largely to prove this. 'Natural selection will be enabled to act on and modify organic beings, at any age, by the accumulation of variations profitable at that age, and by their inheritance at a corresponding age. . . . Natural selection may modify and adapt the larva of an insect to a score of contingencies wholly different from those which concern the mature insect. These modifications will no doubt affect, through the law of correlation, the structure of the adult; . . . so, conversely, modifications in the adult will probably often affect the structure of the larva. . . . Natural selection will modify the structure of the young in relation to the parent, and of the parent in relation to the young. . . . A structure used only once in an animal's whole life, if of high importance to it, might be modified to any extent by natural selection: for instance, the great jaws possessed by certain insects, used expressly for opening the cocoon, . . . or the hard tip to the beak of nestling birds, used for breaking the egg.' (Pp. 86, 87.)

Now, does Mr. Darwin mean that the natural advantage which some forms have over others would do all this? Nothing of the sort. He first *assumes* that the laws of variation are unshackled, and will permit unlimited degrees of profitable variety, and then that the laws of correlation will connect this variety with other modifications of structure, and then that the laws of inheritance will make these variations and modifications permanent: he *assumes* all this, and then jumbles together these laws, with the advantages they would confer, under the phrase of ‘natural selection.’ Separate the advantage from the laws, and natural selection becomes a mere truism. Of course, if some forms *have* advantage, they will *gain* advantage over others; but this would not serve the purpose of a theory. Yet let us only hide under a truism something not certain, perhaps not true; let us only connect important but unknown laws with a known but unimportant fact, and we shall be able to wield both together as a most powerful weapon, lending the certainty of fact to unknown laws, and borrowing the force of laws for an unimportant fact. This is exactly what Mr. Darwin does. We fully believe he does it honestly, confused by his own slippery phrase, but he *does* do it. He assumes the certain action of uncertain laws, the known action of unknown laws; and he confounds these with the fact of natural advantage under the phrase ‘natural selection,’ making that phrase the representative of an efficient principle, which has all the certainty of fact and the force of law. Natural selection, he says, is abroad in the earth everywhere, ‘rejecting that which is bad, and adding up all that is good.’ (Page 84.) By natural selection, ‘new varieties continually take the place of, and exterminate, their parent forms.’ (Page 280.) Natural selection ‘results from the struggle for existence, and almost inevitably induces extinction and divergence of character.’ (Page 432.) Here, again, we have to assume the possible action of law. *If* the laws of variation, correlation, and inheritance acted thus and thus, *these laws* would do all that Mr. Darwin says natural selection would do. But had he used this phraseology, he would have let in light on his theory; for he is too sound and candid a man of science to base an argument on what these laws might do, while they are avowedly so complex and so little known: but, unconsciously to himself, he has embodied their existence and possible action in a set phrase, until the phrase has hidden from himself and his readers the unproved assumptions that lie beneath it.

Thirdly, under this term, he introduces the principle of divergence in variation. When we are told that Nature can effect more than man, we must be plainly informed what agency

she substitutes for man's careful judgment in the choice of mates. Were a cattle-breeder to match a slightly varying individual with one of the original form, and repeat the process with their offspring, he would soon entirely destroy the peculiarity he had wished to cultivate. It is notorious that, in domestic breeds, divergence is only produced by the careful choice of mates. Man exercises a severe discrimination, and then says, 'Like produces like;' but before nature can say this, like must choose like. A species may produce a well-marked variety; but unless this variety interbreeds, (of course this does not apply to plants,) the tendency to reversion will effectually interfere with its permanent establishment. How does nature escape this difficulty? how does she contrive to mate variety with variety? Be it observed that on her power to do this, on her possession of some contrivance which shall effect this, rests the whole question of divergence in variation; and on the fact of divergence rests Mr. Darwin's whole theory. Nothing short of this will suit his purpose. Varieties are admitted facts, which we have no need to contest; complex laws of variation are admitted, though, being unknown, they cannot fairly be quoted on either side; the struggle for existence is admitted (though not the hasty conclusions drawn from it); the natural advantage of some forms over others is admitted: but all these subsidiary questions only lead us to this final inquiry,—Has the Creator appointed laws and times and circumstances to balance each other, and to produce continual oscillations round fixed forms, or has He bent them all slightly in one direction, that they should minister to a law of divergence old as the earth itself? Mr. Darwin answers the question unhesitatingly. Yes, he says, there is in nature a principle analogous to man's choice of 'like for like,' a principle which stamps divergence on variation. We must give the whole passage, as it constitutes the very key-stone of his argument. 'I believe an analogous principle in nature does apply most efficiently, from the simple circumstance that the more diversified the descendants from any one species become in structure, constitution, and habits, by so much will they be better enabled to seize on many and widely diversified places in the polity of nature, and so be enabled to increase in numbers. We may clearly see this in the case of animals with simple habits. Take the case of a carnivorous quadruped, of which the number that can be supported in any country has long ago arrived at its full average. If its natural powers of increase be allowed to act, it can succeed in increasing only by its varying descendants seizing on places at present occupied by other animals.....The more diversified in habits and structure they became, the more

places they would be enabled to occupy. What applies to one animal will apply throughout all time to all animals; that is, if they vary; for, otherwise, natural selection can do nothing. So will it be with plants. It has been experimentally proved that if a plot of ground be sown with one species of grass, and a similar plot be sown with several distinct genera of grasses, a greater number of plants, and a greater weight of dry herbage, can thus be raised. The same has been found to hold good when first one variety and then several mixed varieties of wheat have been sown on equal spaces of ground. Hence, if any one species of grass were to go on varying, and those varieties were continually selected which differed from each other in at all the same manner as distinct species and genera of grasses differ from each other, a greater number of individual plants of this species of grass, including its modified descendants, would succeed in living on the same piece of ground.....Consequently, I cannot doubt that, in the course of many thousands of generations, the most distinct varieties of any one species of grass would always have the best chance of succeeding and of increasing in numbers, and thus of supplanting the less distinct varieties; and varieties, when rendered very distinct from each other, take the rank of species.' (Pp. 112-114.)

Is this all the evidence Mr. Darwin has to offer in support of divergence in variation? No doubt, it is true in the abstract, that there is more room in the world for diverse than for similar forms; but amidst the profuse complexity of external influences we cannot bend this abstract truth into any practical application; we cannot venture to say that a variety would find room just in proportion as it differed from its parent, when all other surrounding forms are pressing upon it, and many other elements threatening its destruction. It might easily occur, that just so far as it differed from its parent it might come more in contact with other species, or be more susceptible to external elements. Mr. Darwin only argues the question on the ground of diversity: as usual, he *states* many considerations, but *argues* from *one*; yet, on this precarious foundation he raises his final conclusion: Because diversity gives an advantage, natural advantage, i.e. natural selection, induces divergence. This is turning a resultant fact into an effective principle with a vengeance: this is arguing in a circle with credit! We might just as well say, that room for variety *makes* variation, as that room for diversity induces divergence. In either case there must be a producing cause, a *law* of variation and divergence, before any advantage could be derived from the fact of having room to vary and diverge. Let us state the case in an extreme form: If there

were more room in the world for dogs than for cats, cats would *therefore* have a tendency to produce dogs. This sounds absurd; but it would not be absurd if we took one little point for granted. *If*, in the lapse of millions of years, cats *could* gradually pass into dogs, the fact of there being more room for dogs would favour that tendency, inasmuch as any variety that more resembled a dog would have an advantage, and would flourish accordingly. But this reasoning assumes that cats *could* pass into dogs; in other words, that there is no limit to nature's variability; the very point on which the whole question rests; the very point which Mr. Darwin is required to prove. Only let us prove, first, that variation has no limit, that it *can* diverge to any amount; and, secondly, that diversity has a small advantage; and the conclusion is most legitimate that, in a long lapse of ages, the advantage given to diversity would induce accumulated divergence: but it would induce it simply by acting on a *law* of unlimited variation. Here again Mr. Darwin is guilty of confusing two ideas in one coined phrase. He entangles the very existence of such a law with the possible advantage which might result from it, and the 'natural selection,' which expresses the advantage, is stretched to include the law.

There is one consideration which may help to show more plainly the absurdity of this reasoning. We do not know the causes that influence vegetable variation, but we do know the chief cause that influences animal variation; this, namely, that variety must mate with variety: and we again ask, What is nature's substitute for man's careful choice of like for like? 'This,' answers Mr. Darwin, 'that the offspring of like and like will find room on the earth: the fact that the plant will flourish will cause it to be produced; still more, the fact that the animal will flourish will cause its parent to choose a mate that will produce it!' Mr. Darwin will object to our imputing to him this heinous flaw in reasoning: it is true, he does not say the one causes the other, but he *does* say that the fact which he so exaggerates, the fact that diversity may be profitable to the offspring, stands in the place of man's selection of mates; and as man *causes* divergence by selection, so, we presume, the profitableness of diversity *causes* it likewise. Throughout this argument, his favourite phrase fairly runs away with him; natural selection has become a powerful living principle which can do anything; natural selection includes extermination, natural selection induces divergence.

Yes, it can do anything, if it be, as we think it is, an old principle under a new name. It scarcely seems fair to impute to an author opinions which he has positively disclaimed; nevertheless,

we cannot fail to notice how many points in Mr. Darwin's statements and reasoning can only be explained by reference to a law of development. The difference between development and natural selection is this: development implies an inherent tendency to work out certain results; and one of its most certain evidences is general regularity of result: natural selection, on the other hand, stripped of the laws so often confused with it, is nothing more than that advantage of present position which gives to favoured individuals the best chance of preservation in the struggle of life. As external conditions vary, this varies; one form has the advantage at one time, another at another; so that, from the very nature of the case, natural selection can never produce any regularity of result. There can be no plan, nor order, nor necessary progress involved in mere suitability to outward conditions. If the elevation of swamps into dry land gradually moulded the reptile into a mammal; the sinking of dry land into swamps would turn the mammal back to a reptile. If certain conditions were favourable to a well-developed variety, others might be favourable to a less-developed one; and this might ascend and that descend in the scale of existence. Mr. Darwin himself admits this irregularity of result. 'I believe,' he says, 'in no fixed law of development, causing all the inhabitants of a country to change simultaneously, or to an equal degree.....The variability of each species is quite independent of that of all others.....Genera and families follow the same general rules, changing more or less quickly, and in a greater or less degree.....Both single species and whole groups of species last for very unequal periods.' (Pp. 314-318.) Yet in spite of this disclaimer, Mr. Darwin perpetually confounds the advantage derived from mere suitability of position with the advantage of improved organization, until his darling natural selection is endowed with the regularity and progression which alone belongs to a law of development.

But before we enter on this subject, we must notice the famous diagram by which he illustrates his theories of divergence and classification. (Chaps. iv. and xiii.) It is a wonderful affair. The surprising harmony between it and his theory strikes us at first with all the force of truth, until we happily remember that a theory could hardly fail to fit a diagram which had been purposely made to fit the theory. The reader may discover its fallacy on its own evidence. Mr. Darwin endeavours to show, (pages 420-422,) that however much species may vary in millions of years, they will be connected genealogically with their predecessors: all the descendants of A will inherit something in common from A, as will all the descendants of I from I; while the de-

scendants of F, who have not diverged at all, will keep their intermediate place between A and I. Yes, they do this in his diagram because he has made them do this: he has purposely kept them clear of each other by not diverging too far. As, however, he has assured us that divergence has an advantage, we will carry it a little farther. We will make the line from A, which ends at m^{10} , diverge a little more to the right, till it just crosses to the right of F^{10} , and we will bring up a left-hand line from I until it crosses to the left of F^{10} , which will give us this remarkable result,—that the family so represented will contain three genera, one slightly resembling its own progenitor F, another more like I, but descended from A, and a third, more like A, but descended from I. If, as Mr. Darwin says, variation and divergence be unlimited, this crossing and entangling of lines would be certain to happen in the lapse of millions of years, and the relation of organic beings to each other would present a scene of inextricable confusion.

We have given this extended notice to Mr. Darwin's first five chapters, because his whole argument is there contained. Henceforward he regards his own conclusions as proved, and uses them as established truths to combat objections and remove difficulties. The present sharply-defined separation of species is against him; (chap. vi. ;) the line of demarcation, caused by the sterility of hybrids, is against him; (chap. viii. ;) the negative evidence of geology is against him; (chaps. ix. and x. ;) the wide separation of allied species by geographical distribution is against him; (chaps. xi. and xii. ;) and the mysteries of instinct, if not against him, would, at least, force him back to a lower standing-ground than that which he openly occupies. How does he meet all these difficulties?

In the first place he contends that present species are sharply defined, because they have exterminated their parents and their brethren,—an assertion which we have previously dismissed as altogether unproved. But say that the case were so, we should naturally expect to find some of these exterminated parents and brethren preserved in a fossil state. It is notorious that we do not so find them; upon which Mr. Darwin remarks, that our knowledge of fossils is exceedingly limited, and that we are acquainted with a very small portion of the forms that must once have existed. That is very possible, but the supposition does not meet the difficulty; for whatever fraction of former beings has been preserved, it ought to contain a fair proportion of transitional forms, instead of presenting us with species as sharply defined as those that now exist: many transitional varieties might have perished, but *some* would have been pre-

served, and *some* would have sufficed to prove indisputably that one species does pass into another. In the total absence of any such proof Mr. Darwin is obliged to confess that the negative argument of geology is entirely against him. Nor can his theory at all explain that remarkable fact of past ages,—the simultaneous change of living forms. When he admits that the variability of each species is quite independent of that of all others,—so much so, that some Silurian molluscs are merely specifically different from our own, while others have passed onwards into the highest forms of life,—it is impossible that *his* theory of variation and divergence should account for broad simultaneous changes. The facts of geology bear very hard upon him, and he is continually obliged to remind us of the imperfection of its evidence. This, he says, is the cause of the *apparent* suddenness with which different species and groups of species appear and disappear. Doubtless intermediate beds contained evidence of gradual changes; but they have been exposed to denudation, and have been entirely swept away. Or, if we assume that most of our larger formations have been deposited on a subsiding sea-bed, a period of elevation would leave no remains, but be expressed in our geological record by the interval which separates two distinct formations. Here again we must remind Mr. Darwin that though such causes might account for *occasional* gaps, they are not sufficiently uniform to produce any general uniformity of result. There is no reason why intermediate beds should *always* vanish; nor would periods of elevation *always* fail to leave a record *somewhere*, though not, perhaps, in the immediate neighbourhood of the tract elevated. It is refreshing to hear one of the warmest advocates of the maxim, 'Existing causes always existed,' interpreting geological phenomena by assumptions which have no warrant in the present order of things. If a large tract of land were now to be slowly elevated above the sea, the degradation caused by a line of breakers would be enormous; and we might safely conclude that large new deposits would be formed *somewhere*, and would be *sometimes* preserved. It is refreshing, too, to hear a man of science, a naturalist and geologist, turning round on geology when its evidence is against him, and pointing out how insufficient that evidence yet is, in many respects, for purposes of true generalization. Had an unlucky writer ventured to say as much in defence of some cherished religious belief, he would have been scouted and utterly extinguished.

In the eighth chapter Mr. Darwin endeavours to evade the strong argument drawn from the sterility of hybrids in favour of the essential separation of species. After saying all he can in

self-defence, and almost overwhelming us by his variety of strange and interesting facts, he is forced to admit, first, that 'first crosses between varieties, or forms generally considered such, are very generally, but not quite universally, fertile;' (page 277;) and, secondly, that with regard to so-called species of plants and animals, 'some degree of sterility, both in first crosses and in hybrids, is an extremely general, but not absolutely universal, result;' (page 255;) so much so, however, that 'it is difficult, perhaps impossible, to bring forward one case of the hybrid offspring of two animals *clearly distinct* being themselves perfectly fertile.' (Page 26.) We think Mr. Darwin has yielded all we want in these admissions; yet he sums up his case thus: 'Laying aside the question of fertility and sterility, there seems to be a general and close similarity in the offspring of crossed species and of crossed varieties.....a similarity which harmonizes perfectly with the view that there is no essential distinction between species and varieties.' (Page 276.) This coolness almost strikes us dumb; for what is it we are called to lay aside? The great distinction stamped by nature on the two cases! When artificial varieties are freely intercrossed, the marks of the breed are disturbed, but the mongrel offspring are prone to revert to the original stock. When natural species are forcibly intercrossed, the marks of the species are also disturbed; but so far from there being any tendency towards reversion, nature summarily forbids them to revert.* With regard to the mongrel, she says to man, 'I bring out my laws and my persistency amidst the disturbance of your rules and your variations. I claim back my wanderers; they shall return to me.' But with regard to hybrids, she says, 'You have wantonly broken my laws, and I will not lend my persistency to your monsters. I proclaim them abnormal; they shall neither continue nor increase.' Mr. Darwin finds analogy in marks and stripes, and is blind to the utter want of analogy between the reversion of fertile mongrels and the disturbed structure of barren hybrids.

Finally, Mr. Darwin labours hard to show us by what possible combination of thousands of causes acting through millions of years, his nearly-allied species and genera, all descended from one common ancestry, were separated from each other by the wide distances of our present geographical distribution. Judging from his tone, we should be inclined to think he felt this to be the weakest point of his whole case, nor can we say that he has

* *Vide* Mr Darwin's forced analogy between pigeons and striped hybrids. (Pp. 159-167.)

successfully coped with the difficulty. Yet let every one read these two admirable chapters, not for the argument's sake, but to have some clearer idea of the multiform agencies that have been and are at work in the world, influencing the distribution of organic forms. We will not enter into any minor differences of opinion with Mr. Darwin, but there is one point on which we think he has been aided in error by the narrow words and thoughts of many who stand opposed to him. He is very fond of comparing the broad action of his general laws with little special acts of creation, as if the Creator had personally *worked* in making each separate living form. We think he has been aided in this derogatory view by those who have made it a matter of discussion whether all existing plants and animals sprung from one or many parent stocks, whether the peculiar fauna of islands and mountains were specially created where we find them, &c. It is not by such narrow phraseology that we can measure the might of creative power, and it might well present to an argumentative mind the unpleasant idea of a great Being busily at work in 'innumerable separate acts.' If the Almighty had created only one pair of each animal, and one individual plant, creation would have been the prelude to wide extermination: not a hundredth part would have escaped the instant struggle of all with all. The herbaceous quadrupeds would have eaten up the plants, and the carnivora would have eaten up the animals; nay, the bare uncovered soil would have been without shelter from rain or frost, and waste and destruction would have been the universal law. No, no: let us not think of the Creator as of a skilled artisan, who, however many forms he may make, can make but one at a time. Doubtless by His will and word He sowed vitality broadcast over His beautiful world, making life strong enough to cope at once with all destroying agencies, and then leaving it to the laws ordained to influence it.

Mr. Darwin will not have this interference of the Creator; yet he needs something in its place more uniform in its action than the mere natural advantage which varies with all varying external conditions. He needs something more, and he has found something more. We see it in the beautiful regularity of his diagram, which nothing but an inherent law of order could save from confusion. We hear it in such phrases as 'the process of perfection,' 'improved and perfected forms.' We feel its necessity in the explanation of certain facts, which, by their very regularity, imply a regular law. If we grant that intermediate forms are continually exterminated, the regularity of extermination which leaves species sharply defined is itself a law. If we

grant that the geological record is imperfect, the regularity of causes which always destroy intermediate beds, implies a law. Nay, Mr. Darwin himself admits that the simultaneous change of organic forms can only be accounted for by the operation of 'some special law.' Nor could that onward progress which he calls 'improvement' and 'perfection' ever be attained by mere suitability with outward conditions, unless those conditions were themselves under a law of development:—the inorganic and organic world alike bound onward in the path of progression. So when Mr. Darwin asks for time, only for time, to insure the progress of one 'primordial form' into the highest organizations, he forgets that time is nothing but space for the operation of law. Time is the enemy of all uniform, all stable outward conditions: it brings advance, retreat, elevation, subsidence, destruction, restoration, oscillation of every kind. If ten thousand years gave some advantage to a new form, the next ten thousand might restore it to an old one, and force back the incipient divergence to the original persistency. While all outward conditions oscillate, it is not to be assumed that organic changes can perpetually accumulate in one direction, unless there be some hidden law which acts above and beyond the influence of external conditions. Only under a law of divergence will time accumulate differences; only under a law of development will time insure progress.

Mr. Darwin will not have the Creator's interference; then whence came our present lowest living forms? He tells us whence the highest came,—from one primordial form, by the process of natural selection. But natural selection should have advanced all living beings by this time; for he has told us that higher forms could only establish themselves by some advantage of position, which would have enabled them to exterminate their parents and all intermediate varieties. How comes it, then, that our lower forms are neither advanced nor exterminated? They must have been more lately created or more lately developed. He will not hear of creation; but he is bound to tell us from what sphere these lowest forms can have been advanced, for many of them are already on the verge of organic being. We suspect he will have to retract his 'one primordial form,' to admit that one law of progression rules the organic and inorganic world, and to thrust the Creator still further into the background.

We may well speak openly of development when we turn to the chapter on instinct. Instinct is the link between intelligence and animal life; and if we can prove that it has been originated by natural selection, there can be little doubt that

intelligence is due to the same process. Mr. Darwin is careful to say that he 'has nothing to do with the origin of the primary mental powers;' yet afterwards he allows that instincts may 'be originated,'—that 'occasional strange habits might, if advantageous, give rise, through natural selection, to new instincts.' In short, he considers instincts as in no respect different from mere modifications of animal structure: as one was formed, so was the other, by mere variation and improvement, perpetuated by inheritance. Yet his illustrations drawn from the hive-bee are an outrage on all his previous conclusions. He has uniformly told us that like produces like; but here we see like producing unlike, the fertile producing the sterile. He has told us that only advantageous variety will be perpetuated; but here we see the extreme imperfection of sterility made permanent. He has told us that natural selection induces divergence; but how could natural selection possibly mate the queen and drone best fitted to produce diverging neuters? Even man, all-powerful man, can only do that by disturbing and distorting nature; but here we see nature working out perfect harmony of result, the separate relative instincts of queen, drone, and neuter, being accurately adjusted to each other. It is impossible that anything like natural selection could have accomplished this: not millions of millions of chances could have so balanced the varying conditions on which organic life depends, as to produce this complex result. Such minute and accurate adjustment implies either a creative mandate or an innate principle of development.

We think we have ample cause to say, that though Mr. Darwin disclaims development, his theory tends to it inevitably. He deems it very unsatisfactory to refer the analogies and differences that subsist between all living forms to the Creator's immediate purpose and plan. He asks, Why this, and why that? But however far he may thrust back a Personal Agent, if he recognises Him at all, he has still to face the 'why.' Mr Darwin does not trouble himself with this part of the question; but others, who have gone farther in the same path, have felt the necessity of pausing somewhere. Even the author of the *Vestiges of Creation* put in a disclaimer:—'You must not think,' he said, 'that I have the slightest intention of denying a First Cause; I am but differing on the mode of the Creator's operations. You say, He made these living forms; I say, He made the laws that formed them; and where is the peculiar impiety of my opinion?'

The impiety consists, first, in denying His express word, but still more in denying *Him*, the Personal Interposer, the Personal Judge. This system of law, this determination to look on creation as nothing but law, allows no space for the personal free

agency of man or God. Whether we go back to the first chaos, or on to the highest heaven, we see nothing but law, wonderful, harmonious, but unchangeable law; and the system which denies the interference of the Creator leaves no room for the responsibility of the creature. Mark how these truths or falsehoods hang together. Robert Chambers openly avowed that it was the prevalence of law over the inorganic world which forced him to the conviction that it must be equally prevalent over organic powers. But he did not stop there: he saw that organic powers were closely linked with instincts, and that instinct was nearly allied to intelligence; if laws produced the one, laws might produce the other: in truth, if law be the only power at work in the world, there is no escape from this conclusion. But is not this Materialism? Not so, said the author of the *Vestiges*; not so, implies Mr. Darwin; all corporeal and mental endowments may tend to perfection, and immortality itself be the medium of progress. Ay, but what then? How shall we then divest ourselves of the principle that has animated us, the atmosphere we have breathed? If for ages and ages we have seen and known nothing but law, how can we be sure that there is anything more to be known? We too, poor mortals, are but the offspring of law: will our immortality find any other parentage? Surely if earth have only borne witness to this, we may well doubt if heaven will contain aught beside. No Father, no Saviour, no Sanctifier, nothing but a First, fixed, inexorable Law, with which our developing existence will work in harmony, as the ancients deemed the universe moved to the music of the spheres.

All men do not follow out their own logic; but if we regard this world only as a scene for the manifestation of law, it is difficult to find any line of separation between the lowest result and the First Cause that produced it. The mineral presses closely on the vegetable, the vegetable on the animal, the animal on the instinctive, the instinctive on the intelligent, the intelligent on the moral, the moral on the immortal, the immortal on the Divine. But it has been the great error of men of science to look on creation as a manifestation of but one half of the Deity, forgetting that He is not only the source of law, but of freedom; and that just in proportion as His creatures approach His throne, they too become free. We do not find this principle in some fields of creation: mineral combinations are wholly without it; vegetable organisms do not possess it, though they form an intermediate link between the forces of chemistry and the movements of life. The lowest forms of animal existence are almost destitute of it; but as creatures advance in the scale of being, it begins to dawn upon them, first in freedom of motion, then in freedom

of choice. We may not be able to demonstrate that the bird, which flies here and there at its pleasure, and which chooses its own mate, and tree, and food, is not following a law as blindly as the sulphur and copper which rush into chemical combination, or the lightning that flies across half the earth: we may not be able to prove this; but we believe in the spontaneity we cannot prove. Next comes instinct, another intermediate link between law and liberty,—a shackled intelligence pointing on to the intellect that is free. And rising above instinct, there is the teachableness of domestic animals, their endeavour to understand us, their power of yielding to or resisting temptation, their consciousness of having disobeyed,—all speaking of an imperfect choice and will, which they seem to derive from their intercourse with man. Yet, in spite of all this, we cannot fail to see how little each animal's welfare depends on the exercise of choice. The brute is at best an enslaved creature; but when man comes on the scene, he comes as the ruler of his own destiny. He is not a better and wiser beast formed to conquer others by a law of natural advantage, but the appointed heir of dominion, which he is free to keep or lose at his pleasure. Look at the educated Englishman and the Australian aboriginal; the one gaining more and more mastery over the laws of this world, the other almost as helpless a victim of those laws as the brutes around him. Never in nature's kingdom do we see this immense gulf between individuals of the same species; we see it in man alone, because he alone in creation was free to rise or fall. We need scarcely say how closely this freedom in working out his own physical destiny is associated with that higher freedom which belongs to the knowledge of good and evil. We conceive that in the creation of man God's attribute of freedom and earth's law of natural sequence were accurately balanced in the fact of probation. We know the fatal result; man used his free will to destroy his freedom, and thrust himself back by deliberate choice upon that law of natural sequence, which adds to sin the fruits of sin, and leaves no room for escape. And it was because man had upset God's balance, and subordinated advancing freedom to the old law of natural sequence, that it needed a manifestation of God, in which His free agency should triumph over natural sequence, to set the matter right. Hence the whole human economy becomes a system of most gracious interposition; for what is it we call grace and mercy, but God's direct interference with natural results? He interposes no less between cause and effect when He frees His enslaved creatures, and saves them from the fruit of their own sin, than when He saved their bodies from the Red Sea by causing the waters to stand on

either side. We marvel that those who own the greater wonder should shrink to grant the less ; as if God might dare to interfere with immortal nature, yet hesitate to meddle with that of the physical world. He has not destroyed the system of natural law ;— why should He, when it reflects half of Himself?—but He has chosen to arrest its uniform action by special interference. By grace, by providence, by miracle, He proclaims our whole economy to be one of merciful interposition, even while He permits the general operation of His laws to go on undisturbed. His compassion does not shrink from the stern behests of famine and pestilence. He strikes down His most useful servants, if they neglect the laws of health. He carries retribution with a high hand over the world, to remind us that His free interference shall not always arrest the course of law. As yet, it is forcibly arrested ; the two principles are not now in harmony, but are working out their separate results in sheer defiance of each other. God saves by free interference with law, law inexorably destroys in spite of God's interference. But a time will come when the balance of law and liberty will be restored, when, standing before our just Judge, we receive the complex result of God's free mercy and our own life's doings. But whether we are advanced to the throne of God, or thrust out from His presence, the award of law will be given, not because we had been bound onward by development to either fate, but because we had been free to choose between them ; because the Son of God had interposed between man and his natural destiny, and given back to His creatures a renewed power of choice, by which, when His Spirit called, they might have followed Him and been free. More than that even the Son of God could not do ; for though it is conceivable that an Almighty Being might force men to be righteous, it is inconceivable, nay, it is a contradiction in terms, that any power could force men to be free. In our share of that essential attribute of Deity doubtless lies the whole mystery of good and evil. We catch a glimpse of moral necessity ; a 'needs must be' that the creature which rises above the enslaved brute towards the free God, shall share the attribute of freedom, not as an arbitrary gift of the Creator, but as a necessity of our nearer approach to Him. Then cometh the end. We know not yet how the union of perfect stability with perfect freedom will be secured in a higher sphere ; but this we know, that we shall share the nature of Him who is equally the source of liberty and the origin of law,—the Sovereign Ruler who is *bound* by righteousness, the Almighty One who *cannot* err.