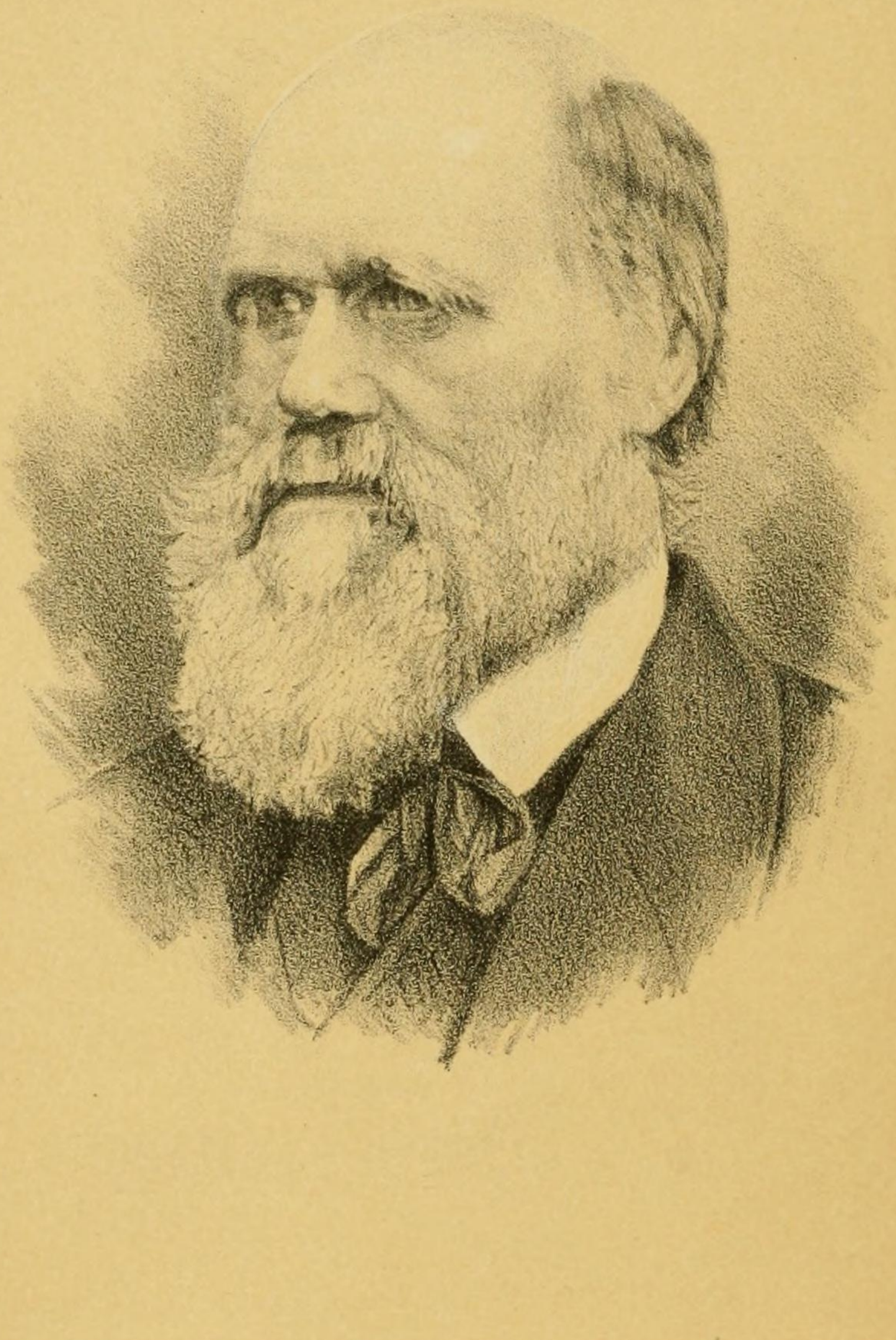

Vincent Brooks, del. et lith.

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I. DARWIN AND HIS TEACHINGS.

(Illustrated.)

It may seem strange to many thinking men, and to posterity it will doubtless appear inexplicable, that at this era in his history Man should still be obliged to approach with hesitation and reserve a subject so matter-of-fact as the Origin of Species, and that the publication of his views concerning his own animal nature and origin should always be accompanied by grave misgivings. But when we remember how few there are who can dissociate such inquiries from their religious creed, and with what reluctance such persons venture upon investigations that might have a tendency to shake the faith in which they have been educated; when we consider that many professors of theology conceive it to be their duty to foster these misgivings on the part of their "flocks," and to denounce men of science as instruments of the Evil one; then indeed it is not surprising that great courage should be needed for the exercise of unfettered thought and for the expression of what may be regarded as heterodox opinions. These checks upon the intellectual development of the human race, and this slow growth of free inquiry, are not, however, entirely without their advantages, nay, paradoxical as it may seem, they are in some degree essential to the steady progress of truth. The wisest men frequently err, and there are many who would have been thankful if an unfriendly critic had nipped some well-matured theory in the bud; the enterprising and impetuous reformer stands in greatest need of controlling agencies and adverse judgments; and the masses would remain stagnant and uninfluenced by men of thought and observation if these were continually pushing onward heedless of the difficulties and disdaining the shortcomings of the multitudes, whom they should seek to lead, and not to drive along the tortuous and thorny paths of discovery. Nothing, indeed, would be more unfortunate than if, at the present day, when man's thoughts outstrip his power of locomotion, there should be too great leniency in the judgment of new dogmas, for

there would soon be a transition from liberty to licence, which would inevitably be succeeded by a reaction fatal to progress. It appears wholly unnecessary to seek examples of the truth of these propositions, for who that will be at the trouble of thinking over the names of men conspicuous for their attainments in any department of human knowledge, in science, politics, or literature, can fail to alight upon numerous apt illustrations; but nowhere, we think, could a more perfect exemplification of what has here been advanced be found, than in the publication, reception, and influence of the teachings of Charles Darwin.

In one place we find the author and his theories vehemently denounced as subversive of all religious and moral truth; in another, he is held up as the founder of a new faith, and is almost deified by men who can see in nature nothing but a self-acting machine, whilst in Darwin, who is an apt student of nature, they manage to perceive a master-mind!

It has been chiefly urged against his theory of "Natural Selection," by persons otherwise disposed to adopt his Zoological doctrine, that he attributes too much to "Nature," and too little to God. "It has been said," he himself remarks,* "that I speak of natural selection as an active power or Deity, but who objects to an author speaking of the attraction of gravity as ruling the movements of the planets? Everyone knows what is meant and implied by such metaphorical expressions; and they are almost necessary for brevity." But this and other explanations or justifications which appear in the later, but not in the early editions of his master-work,† do not seem to remove what is decidedly the objectionable portion of his theory, nor to strengthen its weak points. We are not now speaking of the religious or irreligious tendency of the omission, but simply of the defect in his biological dogma, for, as we shall endeavour to show, "Natural Selection" is of itself not sufficient to explain the phenomena, past and present, of nature. Or, lest we should be met on the threshold of our inquiry by the objection that the illustrious naturalist does not claim for "Natural Selection" any such power, let us rather say that all the causes denoted by him, whether clearly, or (as it appears to us in some cases) ambiguously, are insufficient to produce even the phenomena included by him within the limits of his law, much less to accomplish those results which some of his disciples have justly stated, must follow as a matter of course from its admission, although he studiously avoids their nearer observation or discussion.

In these and other remarks upon Darwin's views, let it be clearly

* 'Origin of Species,' p. 85. (Murray.) Unless otherwise stated, our references will always be to the third edition, 1861.

† Compare, for example, 'Origin of Species,' first edition, p. 81, with third edition, pp. 84 and 85, where a paragraph is inserted; also, first edition, p. 83, with third edition, p. 87, where "natural selection" is substituted for "nature."

understood that we have no ambition to be reckoned among his censors; but whilst we admit his right of free speech, and applaud his fearless exercise of it, we feel quite justified, without rendering ourselves subject to the imputation of disrespect towards a great thinker and (judging from his works) a good man, in handling his dogmas without ceremony or reservation.

Whilst it is impossible not to perceive in his writings the dictates of a heart naturally reverential towards God and full of sympathy for his fellow-men,* there can be no doubt that the general body of his readers, whether lay or clerical, scientific or popular, must necessarily have received the impression that he endeavours to force the Deity out of sight, and to endow "Natural Selection" with Omnipotence and Omniscience. Take, for example, the following sentences from among many similar ones, which may be found even in the later and corrected edition of his work on the 'Origin of Species:'

"As man can produce, and certainly has produced a great result by his methodical and unconscious means of Selection, what may not *Natural Selection* effect? Man can act only on external and visible characters; Nature (*if I may be allowed thus to personify the natural preservation of varying and favoured individuals during the struggle for existence*) cares nothing for appearances, except in so far as they are useful to any being. She can act on every internal organ, on every shade of constitutional difference, on the whole machinery of life. Man selects only for his own good—Nature only for that of the being which she tends. Every selected character is fully exercised by her, and the being is placed under well-suited conditions of life."†

In the earlier editions, the word "Nature" stood for "Natural Selection," underlined in the foregoing extract, and the italicised sentence, intended to be explanatory of the latter term, was omitted altogether. Here, and in many other parts of his work, where the desire for "brevity" cannot be pleaded as an excuse, the author manifestly endows "Nature" with the intelligent faculty of designing and planning, and when it is remembered how rapidly (often indeed too rapidly) public criticism now follows the publication of new works; how these are *devoured* on their first appearance by literary gourmands before they can be carefully digested by experienced and thoughtful men of science, it will be clear that the new doctrine of Darwin must have borne with it an element far more antagonistic to its own universal acceptance than any that have since been associated with it by the more impetuous and indiscreet of

* See his 'Naturalist's Voyage round the World' (tenth edition, Murray, 1860), pp. 158, 500, 503; 'Origin of Species,' pp. 515, 525; 'On the Contrivances by which British and Foreign Orchids are Fertilized by Insects' (Murray), p. 2.

† 'Origin of Species,' p. 87.

his disciples, or than any obstacles that literary conservatism or sectarian intolerance may have thrown across its path.

And this is, indeed, much to be regretted on many grounds, not the least important being, that at the time when his views on the "Origin of Species" were first promulgated, the state of the public mind rendered great caution advisable in the publication of physical theories apparently opposed to religious tradition. The pruning-knife had been very ruthlessly applied to the tree of knowledge during the few years previous to the appearance of Darwin's book, and we know how at least one noble mind sank under the pressure of dogmas at variance with his previous theological beliefs. True, the large majority of thinking men, first savans, next laymen, and finally clergymen, had become reconciled to the new light which shone upon a world, now admitted to have been in existence ages of ages instead of a few thousand years, and the period of man's advent had also been removed to an earlier date than that assigned to it by tradition; but there were millions whose minds were still encrusted with the old doctrine, and thousands ready to seize upon any indiscretion on the part of natural philosophers, and to strangle the new-born infant of Science at its birth. But whilst all those facts which led to the revolution in men's minds concerning the six days' creation were clearly engraved upon the works of nature, and carried conviction to all who chose to observe and reflect, there is undeniably mixed up with the new law, or we should say, the recently revived doctrine of the transition of species a sufficiently large amount of speculation to preclude its acceptance otherwise than as a well-founded hypothesis. Many able men who have relinquished the biblical version of the creation, still, consciously or unconsciously, take their biological and zoological doctrines from the sacred writings, and some of these contend that the words "after his kind," and "after their kind," which so frequently occur in the first chapter of Genesis, mean the special creation, by a supernatural or miraculous intervention of the Almighty, of each new species, and of course to such reasoners there is no difficulty in accounting for the origin of man in conformity with the traditional account of his creation. Others, again, who are opposed to Darwin's views, do not base their opposition upon Scripture alone, but they say, and truly, that no new species has ever been known to come into existence either by natural or by artificial selection within the historic period, notwithstanding that experimentalists have, with one purpose or another, succeeded in breeding or producing innumerable widely divergent *varieties* of existing species.

But although the twofold nature of the argument against Darwin's views has told heavily against their acceptance, we believe reflecting men will soon find that the opposition on theological grounds cannot hold its place, and that it resembles in its character

all the preceding cases of antagonism to innovations of a like nature; indeed, it would be idle to conceal the fact, that Darwin already reckons amongst his disciples many scientific clergymen and ministers of the different religious denominations. The scriptural account of the creation of plants and animals presents as many difficulties one way as the other. The *literal* translation of Genesis i. 2, runs thus—"And God said, the earth shall sprout forth sprouts, herb yielding seed, fruit-tree yielding fruit after its kind, whose seed (is) in itself, upon the earth; and it was so." And of v. 20, thus—"And God said, the waters shall bring forth abundantly the prolific creation, a living soul, and fowl (that) may fly above the earth on the face of the expanse of heaven."*

Excepting for those who still believe in the doctrine that all plants and animals took their rise at one time, when the command was given, and were created in two days, we cannot conceive how this account can be held to convey any scientific exposition of the mode in which species were produced. We may be in error, but it does not appear to us to affirm more than the grand truth—that the Almighty created plants and animals, and that the former contained seeds "after their kind," or for their propagation; and (naturally enough when we consider to what class of minds it was addressed) it does not even hint at the mode in which animals were to be perpetuated. If, however, the reference to the earth and waters bringing forth plants and animals, presents any special evidence on the subject, it is rather in favour of their production through secondary agencies, than by a direct miraculous interposition for the purpose of making species. But suppose the account is meant to indicate (which, however, we do not for a moment believe) that all species were created as they stood or moved, by one grand miracle, how are we to explain the subsequent production of varieties by "nature" or by man? Those who hold the "orthodox" view must supplement it by an original doctrine of their own, and must believe that after having created species Himself by miraculous intervention, the Almighty must have deputed "Nature" and man to make varieties; or if (as we are fully convinced is the case) He has been as directly instrumental in the production of varieties as in that of species, what becomes of the miraculous creation of the former? As far, then, as the abstract theological bearing of the question is concerned, it becomes, as in most similar cases, a matter of individual opinion; but, on the other hand, it will be found presently, that if we were to admit the entire correctness of Darwin's theory, as expounded by himself, we should find ourselves involved in difficulties quite as grave and perplexing as those presented by the miraculous version, and we will now direct our attention more immediately to his teachings.

* Dr. A. Benisch's 'Translation of the Pentateuch.'

Before the publication of his views, the large majority of naturalists believed that "species" were distinct creations, chiefly on the ground that, when crossed, they are unable to produce fertile offspring; but that varieties which are fertile when crossed, are the modified descendants of species by generation. A considerable minority, who saw the difficulty of defining the limits of species and varieties, felt convinced that both are modified descendants of preceding species—in fact, that there has been a gradual progression from lower to higher forms of life, and that the terms "variety," "species," "genus," "family," &c., however convenient for classificatory purposes, are arbitrary designations invented by Man, and have no actual existence in Nature.

But then the question arose—how were these modifications brought about? It is true that many species were found to be very closely allied in their external characters through intermediate living varieties, or through fossil representatives; but the existence of those did not suffice to account for the change from one species to another, for it was a well-established fact that whilst there seemed to be hardly any limit to the production of fertile varieties, as soon as it was attempted to cross two species, either they refused to breed or they produced an infertile offspring. Many and ingenious were the theories of progression or transmutation propounded by various authors, either openly or anonymously, as in the case of the 'Vestiges of Creation;' but the doctrine which presented the most philosophical aspect was that of Lamarck, the celebrated French naturalist, who, about fifty or sixty years since, enunciated the theory that the different types of animals became modified during the ordinary succession of generations through the influence of their desires and wants, which compelled them to exercise certain organs and members in such a manner as to induce an extension, growth, or development of those organs in preponderance over others.* Lamarck also believed in an unknown law of progressive development. At first, his theory took naturalists by surprise, but it soon appeared to assume a somewhat ludicrous character, for it seemed absurd to suppose that by any such process of modification the neck of a deer-like animal should have been stretched to that of a giraffe, or the snout of a tapir into the trunk of an elephant; just as we find persons in the present day who laugh at Darwin's theory, as they cannot conceive it possible that some lovely companion, or intellectual savant, to whom they are showing a stuffed gorilla, should be the descendant, however remote, of so hideous an animal as stands before them. It must be remembered, however that since Lamarck published his views, many fossil types interme-

* The best reference on this subject will be found in Darwin's 'Historical Sketch of the Recent Progress of Opinion on the Origin of Species,' p. 13, 3rd edit.

diate between allied recent ones, have been found which, had they been known at that time, would, to a great extent, have removed these difficulties, and would probably have secured a larger share of popularity for his doctrine.

But what appears the strangest of all is that it has been the fashion of late with some of the disciples of Darwin, in their zeal for the establishment of his theory, to decry or under-estimate the value of Lamarck's doctrine. Not so with the illustrious naturalist himself, as any one may find, who refers to his introduction to the third edition of his 'Origin of Species;' and we think he has exhibited a sound judgment in giving full credit to the labours of his eminent predecessor. One of his most ardent admirers, however, Professor Huxley, told the working classes of London, shortly after Darwin's great work had appeared, that "when people tell them that Mr. Darwin's strongly-based hypothesis is nothing but a mere modification of Lamarck's, they would know what to think of their capacity for forming a judgment on the subject."*

Why the eminent physiologist in question should thus visit with his denunciations those who venture to differ from him on this interesting and obscure subject, we are at a loss to understand; but we cannot help admitting that we are guilty of this indiscretion. In several portions of Darwin's work, especially in his paragraphs on 'The Effects of Use and Disuse' (first edition, p. 134—third edition, p. 151), we cannot help seeing a resuscitation of Lamarck's doctrine; and as to his 'Law of Progressive Development,' it appears to us about the same as Darwin's 'Law of Variation;' and a more legitimate mode of expressing a mysterious influence than Professor Huxley's 'Tendency to Variation.' "The tendency to reproduce the original stock," says Mr. Huxley, "has, as it were, its limits; and side by side with it, there is a tendency to vary in certain directions, as if there were two opposing powers working upon the organic being—one tending to take it in a straight line, the other tending to make it diverge from that straight line first to one side and then to another."† And again, "This tendency to variation is less marked in that mode of propagation which takes place asexually; it is in that mode that the minor characters of animal and vegetable structures are most completely preserved."‡

No one who reflects upon these observations, and the phenomena of conjugation, generally, can fail to be less strongly impressed with its mysterious influences than were Lamarck, Darwin, Professor Huxley, and others; and yet men either deny the constant operation of the Deity, or are seeking in the past for miracles to glorify him, whilst they fail to perceive them in the results of those generative processes with which they have become familiarized

* 'Lectures to the Working Men' (Hardwicke), p. 150.
† Ibid., p. 89. ‡ Ibid., p. 89.

through their every-day occurrence, and whose effect in the modification of species has never yet been properly considered.

Notwithstanding that the doctrine of "progressive development" was (and for that matter is still, by many thoughtless persons) branded as atheistical, and although it had been supported only by the imperfect observation of a few biologists, and the still more imperfect records of nature, it had been gaining ground rapidly for some time before Darwin ventured to revive it, endorsed by the results of an extensive experience, a long-continued course of study and reflection, and the honest convictions of a sincere lover of truth. Darwin was no apprentice in science when he gave publicity to his views. In the winter of 1831, when he had attained his twenty-second year, having been educated and taken his B.A. degree at Christ's College, Cambridge, he volunteered his gratuitous services as naturalist on board of H.M. surveying ship 'Beagle,' Captain Fitzroy, R.N., and made a voyage, or it would be more correct to say a continuous series of voyages, in that vessel to Bahia, thence to Rio Janeiro, Monte Video, Ports Desire, St. Julian, and Santa Cruz; the Falkland Islands, Terra del Fuego, Valparaiso, Chilöe, Lima, some of the islands of the South Pacific, New Zealand, Sydney, Van Dieman's Land, Mauritius, St. Helena, Bahia, Pernambuco, and back to England, where he arrived on the 2nd October, 1836, having been absent nearly five years, and making various exploring expeditions along the coast, into the interior or to the islands adjacent to the ports where the 'Beagle' stopped. As ten thousand copies of the Journal of his researches during the lengthy voyage had been printed in 1860, we may safely infer that most of our readers are well acquainted with the contents of the volume, and few will be disposed to deny it the merit of being one of the most charming and attractive books of travel ever given to the world. But irrespective of its undoubted merit in this regard, and irrespective, too, of its value as a record of the scientific and social history of the lands and peoples visited by the illustrious naturalist, it now possesses a fresh value, inasmuch as its re-perusal, after the study of his book on the 'Origin of Species,' materially aids the inquirer in arriving at a correct estimate of the value of his new biological doctrine. Whilst we find in the 'Journal' that vast store of information which served as the starting-point for his further researches and the basis of many of his subsequent arguments, we cannot help being struck with the fact that his views must have undergone great modification between the time of his arrival in England in 1836 and the first publication of his great work on Species in 1859. When he wrote or published the 'Journal,' in 1845, he could hardly be regarded as a very staunch believer in the progressive theory; we are justified in coming to this conclusion by the opening remarks in his 'Origin of Species,' where he tells us

that during his voyage "certain facts in the distribution of the inhabitants of South America," &c., &c., "seemed to throw some light on the origin of species." Strangely enough, even as late as 1860, we find in his 'Journal of Researches'* the following expression concerning his predecessor: "Lamarck would have been delighted with this fact, had he known it, when speculating (probably with more truth than usual with him) on the gradually-acquired blindness of the aspalax—a gnawer, living underground, and of the proteus, a reptile living in dark caverns filled with water;" whilst in the introduction to his new edition of the 'Origin of Species,' published the following year, he speaks of Lamarck and his theory in such terms as would lead the general reader to suppose that he regards them with the highest admiration. Moreover, although the theories enunciated in his 'Origin of Species' are foreshadowed in his 'Journal,'† we cannot anywhere find a decided expression of opinion as to the origin of species by descent, although there seems to be a kind of vague idea pervading the whole work, that new species must have originated through some such process. This piece of evidence is of itself valuable to a student seeking to measure the mind of an author who propounds a doctrine widely at variance with popular views, for the published opinions of such a man, in fact, his whole *public* character necessarily guide the investigator in forming an estimate of his doctrines. Darwin's 'Journal' shows him to have possessed at that time traits which peculiarly adapted him to enter upon such an inquiry as he subsequently undertook. From his 'Journal,' he appeared naïve and truthful, thoroughly alive to the value and influence of religion,‡ a wonderfully close observer of every phenomenon, whether in natural history or social life and customs. His reasoning on the phenomena of nature—as, for example, with regard to the origin of coral reefs—is irresistible; he seems to weigh carefully everything that he or anyone else has observed before taking a single step in advance and to repeat his observations before he takes another. And through all his reasoning there appears to be no want of confidence in his readers. "Think for yourselves," he seems to say, "but I feel pretty confident my way of thinking will be yours." In fact, on reading his 'Journal,' one seems to travel with him; his graphic descriptions of men and countries, extreme and startling as they often are, never awaken a doubt, and he has no need of

* 'Journal of Researches into the Natural History and Geology of the Countries visited during the Voyage of H.M.S. "Beagle" round the World.' Tenth thousand. Murray, 1860. P. 52.

† See 'Journal of Researches,' 1860, pp. 131 and 132, 145 to 147, 173 to 176, 327, 377, *et seq.*; and especially as to the "struggle for existence," p. 435, beginning at line 1.

‡ Ibid., p. 300, beginning "With no particular zeal for religion," &c., p. 428, second and third par.; p. 430, "Neither is the country itself attractive. I look back but to one bright spot, and that is Waimate, with its Christian inhabitants."

photographs beyond those of his pen, nor of any witnesses besides himself.

And there are certain phenomena connected with the nature of the lower animals and of man which appear at that time to have made a remarkable impression upon the young traveller. One of these was the "tendency to variation," by slow degrees, in some species. Speaking, for example, of a certain venomous snake in Patagonia, a Trigonocephalus, he says—

"Cuvier, in opposition to some other naturalists, makes this a subgenus of the rattlesnake, and intermediate between it and the viper. In confirmation of this opinion I observed a fact, which appears to me very curious and instructive, as showing how every character, even though it may be in some degree independent of structure, has a tendency to vary by slow degrees. The extremity of the tail of this snake is terminated by a point which is slightly enlarged, and as the animal glides along it constantly vibrates the last inch, and this part striking against the dry grass and brushwood produces a rattling noise, which can be distinctly heard at the distance of six feet. As often as the animal was irritated or surprised, its tail was shaken, and the vibrations were extremely rapid. Even as long as the body retained its irritability a tendency to this habitual movement was evident. This Trigonocephalus has, therefore, in some respects, the structure of a viper, with the habits of a rattlesnake; the noise, however, being produced by a simpler device."*

Another phenomenon, illustrating in a conspicuous manner his subsequent law concerning the preservation of favoured races and the extinction of others,—a most important feature in his theory of natural selection,—presented itself to his notice during his stay in Banda Oriental. It was connected with a peculiar breed of cattle in that country, and we will extract his account of it:—

"Don F. Muniz, of Luxan, has kindly collected for me all the information he could respecting this breed. From his account it seems that about eighty or ninety years ago they were rare, and kept as curiosities at Buenos Ayres. The breed is universally believed to have originated amongst the Indians southward of the Plata; and it was with them the commonest kind. Even to this day, those reared in the provinces near the Plata show their less civilized origin, in being fiercer than common cattle, and in the cow easily deserting her first calf if visited too often, or molested. It is a singular fact, that an almost similar structure to the abnormal one of the niata breed, characterizes, as I am informed by Dr. Falconer, that great extinct ruminant of India, the Sivatherium. The breed is very true, and a niata bull and cow invariably produce niata calves. A niata bull with a common cow, or the reverse cross, produces offsprings having an intermediate character, but with the niata characters strongly displayed. According to Señor Muniz, there is the clearest evidence, contrary to

* 'Journal of Researches,' pp. 96–7.

the common belief of agriculturists in analogous cases, that the niata cow when crossed with a common bull, transmits her peculiarities more strongly than the niata bull when crossed with a common cow. When the pasture is tolerably long, the niata cattle feed with the tongue and palate as well as common cattle; but during the great droughts, when so many animals perish, the niata breed is under a great disadvantage, and would be exterminated if not attended to; for the common cattle, like horses, are able just to keep alive, by browsing with their lips on twigs of trees and reeds; this the niatas cannot so well do, as their lips do not join, and hence they are found to perish before the common cattle. This strikes me as a good illustration of how little we are able to judge, from the ordinary habits of life, on what circumstances, occurring only at long intervals, the rarity or extinction of a species may be determined."*

We have extracted these two paragraphs at length, from his 'Journal,' to show that more than twenty-five years before the appearance of his great work on the 'Origin of Species,' Darwin's attention had been directed to, or, we should say, arrested by phenomena similar to those which he imported into that work in which we find no mention of either phenomenon although both would well have served to aid him in proving his theory; and we believe our zoological readers will agree with us that facts stated so unpremeditatedly are far more valuable than others selected by the author for the purpose of proving a point. Again, our readers will find, if they take the trouble to refer to his 'Journal,' that it contains much valuable information bearing upon the changes which have been effected in animals through migration, for throughout there are repeated evidences of variation in structure and habit being favoured by this cause.

One striking instance of this unconscious accumulation of evidence in favour of his subsequent convictions and, at the same time (if we rightly interpret his meaning), of his unbelief at that time in the transmutation theory, will be found in his account of the variation of species on either side of the Cordillera.† He shows that the species on the two opposite sides of this range are distinct but allied, although the climate, soil, and longitude and latitude may vary but little, and he attributes this variation to the barrier thus opposed to the migration of all but a few animals. In a note he says:—"This is merely an illustration of the admirable laws first laid down by Mr. Lyell, on the geographical distribution of animals as influenced by geological changes. The whole reasoning, of course, is founded on the assumption of the immutability of species, otherwise, the difference in the species in the two regions might be considered as superinduced during a length of time."

Of course, in his new doctrine, he does believe that the

* 'Journal of Researches,' pp. 146–7.

† Ibid., pp. 326–7.

difference in species is superinduced "during a length of time;" and if we turn to his later work, we find that "neither the similarity nor dissimilarity of the inhabitants of various regions can be accounted for by their climatal and other physical conditions,"* but *that barriers of any kind*, or obstacles to free migration are related in a close and important manner to the differences between the productions of various regions.† He exemplifies this law by showing that whilst there is a very slow and gradual variation of species as one travels north and south on the continent of South America, the land barrier of the Andes causes us to find *abrupt* changes in species on the opposite sides of those mountains, though the actual longitudinal distance between the two regions may be small. Thus he seeks to prove that, in both cases, *time*, and not miracle, has been the cause of the change in species, either in permitting migration to regions with different physical conditions, or in raising a barrier which impeded migration and so left the inhabitants nearly but not immediately allied.

But if we find in the 'Journal of Researches' a very large store of information, which might have been successfully employed, had the author been so minded, in the establishment of his later theories, we cannot help being struck by the significant fact that there are many data which we should naturally have expected to find in his 'Origin of Species,' if his theory were founded on a sound and immutable basis. The young naturalist was not content to observe living plants and animals, rocks and fossils, but he directed a large share of his attention to men and manners, and had the opportunity so rarely afforded to naturalists of seeing, side by side, the very lowest and the highest types of mankind; and yet, to quote the words of one of his most enthusiastic and eminent disciples, "Mr. Darwin has said nothing about man in his book;" but, "if Mr. Darwin's views are sound, they apply as much to man as to the lower animals."‡

Now it is a circumstance which has more than once come under our own observation, that persons who have traded on the west coast of Africa, and have come into contact with the savages there (although the latter have, to some extent, enjoyed the advantages of European intercourse), have been almost irresistibly led to embrace Darwin's views, on the ground that the untutored beings whose habits they have been compelled to observe approximate so closely to the brutes. But the great naturalist has witnessed even more striking contrasts than they, and yet practically he is silent as to the origin of man.

* 'Origin of Species,' p. 376. † Ibid., p. 376.

‡ Professor Huxley: 'Lectures to Working Men.' It is, however, only fair to Darwin to add that this must not be taken literally, for he does say that he expects to see light thrown on the origin and history of man, should his theory be confirmed.—'Origin of Species,' 1st edition, p. 489, l. 3 and 4; 3rd edition, p. 523, l. 33, 34.

In Tierra del Fuego, he says he saw the most abject and miserable creatures he anywhere beheld.* On one occasion, all the men and women were naked, and the rain was pouring down upon them; on another, a woman, suckling an infant, "came alongside the vessel, and remained there, out of mere curiosity, while the sleet fell and thawed on her naked bosom, and on the skin of her naked baby." These poor creatures were "stunted in their growth, their hideous faces bedaubed with white paint, their skins filthy and greasy, their hair entangled, their voices discordant, and their gestures violent." Their wants and habits of life needed no faculties higher than those of an ape;† their capacity for improvement stood at zero; their language "scarcely deserves to be called articulate," and "certainly no European ever cleared his throat with so many hoarse, guttural, and clicking sounds:‡—

"One's mind hurries back over past centuries, and then asks, could our progenitors have been men like these? men whose very signs and expressions are less intelligible to us than those of the domesticated animals; men who do not possess the instinct of those animals,§ nor yet appear to boast of human reason, or at least of arts consequent on that reason, ... and part of the interest in beholding a savage is the same which would lead every one to desire to see the lion in his desert, the tiger tearing his prey in the jungle, or the rhinoceros wandering over the wild plains of Africa."‖

We are compelled to curtail this, and to omit many other passages of a like tenor, but have we not quoted enough to justify our surprise that, notwithstanding the revelations of bone-caves and of the drift, which prove that our progenitors have been "men like these,"¶ the ablest living exponent of the transmutation theory, and the founder of the doctrine of natural selection, should never so much as refer, directly or indirectly, to the origin of man?

Of course our readers are nearly all aware of the nature of that doctrine. His work on the 'Origin of Species' was published towards the end of the year 1859, about twenty years after the first appearance of his 'Journal of Researches,' the author having, in the interim, conferred great services upon the scientific world by his later treatises on the 'Voyage of the Beagle,' on 'The Structure and Distribution of Coral Reefs,' 'Geological Observations on Volcanic Islands,' 'Geological Observations on South America,' and other minor publications; indeed, he had already raised himself

* 'Journal of Researches,' p. 213. † Ibid., p. 216, par. 1.

‡ Ibid., pp. 205–6, last and first paragraphs.

§ He gives examples of unfeeling brutality towards their offspring of which animals are not capable.

‖ 'Journal of Researches,' p. 504.

¶ See, as a striking illustration of this truth, the remarks of Mr. Laing, M.P., in his work on the 'Pre-historic Remains of Caithness' (Williams & Norgate), especially at p. 56, where he compares the Caithness aborigines with the inhabitants of Terra del Fuego, as described by Darwin.

to the rank which he continues to hold, of one of the greatest naturalists the world has ever produced.

When Darwin's hypothesis concerning the origin of species is compared with that of Lamarck, that is to say, when we consider the evidence brought forward by our illustrious contemporary in support of his theory, as compared with the reasons adduced by the eminent French naturalist, who may be regarded as the original exponent of that theory,* we cannot help being astonished, first at the large amount of experience and information which had been accumulated by all classes of naturalists between the periods at which the two observers wrote; and, secondly, with the immense amount of original thought and observation that Darwin has brought to bear upon the question. This is most strikingly exhibited in the Introduction to the last edition of his work, where the author unintentionally groups around himself as writers in favour of his views, Lamarck, Geoffroy St. Hilaire, the Hon. and Rev. W. Herbert, Dean of Manchester, Prof. Grant, the Author of 'The Vestiges of Creation,' Prof. Owen (!), (he had not read the Introduction to Owen's 'Comparative Anatomy of the Vertebrata,' just published, or we think he might, perhaps, have omitted this celebrated palæontologist), Isidore St. Hilaire, Schaafhausen, the Rev. Baden Powell, Mr. Wallace, Prof. Huxley, Dr. Hooker, and others. We say "unintentionally" because he does not call them believers in *his* theory, but in that of the modification of species, of which he is the latest and most able exponent; and he might with propriety have added half-a-score of highly-respected and well-known naturalists (in the widest sense of the term), who, not unwisely, delayed the expression of their views until they should have had an opportunity of forming a clear and well-founded judgment upon his theory, and some of whom may be called his disciples, with a certain amount of reservation.

He bases his opinion that living species are the modified descendants of other pre-existing species on various observed facts in nature. First, because it is possible to produce, and he has himself succeeded in producing, such a degree of variability in species under domestication as almost to amount to the creation of a new species, and he thinks that what he and others have been able to effect imperfectly, in a brief period of time, could easily be completely brought about by "Nature" in a practically indefinite period. Man, he says, does not actually himself produce variability, but this is accomplished by the conditions in which he places the creatures acted upon; and if they can produce it in one case (under domestication), they can in another (in nature). Let us inquire into the accuracy of these views as we proceed, and observe that whilst we are prepared to give him the full benefit of his *effects*, we

* Buffon had some vague ideas concerning the transmutation of species.

must demur to his construction of causes. It is true that man does not produce variability himself, in one sense, but he does so in another, and in the highest sense. Speaking of selection by man, the author says:—

"If selection consisted merely in separating some distinct variety and breeding from it, the principle would be so obvious as hardly to be worth notice; but its importance consists in the great effect produced by the accumulation in any direction, during successive generations, of differences absolutely inappreciable by an uneducated eye; differences which I, for one, have vainly attempted to appreciate. Not one man in a thousand has accuracy of eye and judgment sufficient to become an eminent breeder. If gifted with these qualities, and he studies his subject for years, and devotes his lifetime to it with indomitable perseverance, he will succeed, and may make great improvements; if he wants any of these qualities he will assuredly fail. Few would readily believe in the natural capacity and years of practice requisite to become even a skilful pigeon-fancier."*

If it necessitates such an amount of judgment, such indomitable perseverance, and so practised an eye to detect the slight differences needed for artificial selection, that even our illustrious experimenter and observer admits that he is unable to appreciate and avail himself of them, is it not at least a rational, or let us rather say a scientific inference, looking at the phenomena of Nature, that an Intelligence beyond our conception, but still acting in Nature as Man does in artificial breeding (for if it be otherwise, Darwin's theory falls to the ground), that such an omniscient Intelligence, we say, is ever and ever watching, directing, and employing each minutest change, producing cause and effect, co-adapting and co-arranging all things to perfection? But we shall have occasion to show hereafter that the author does not believe that the changes referred to are brought about "by means superior to, though analogous with, human reason," and if he has intended in some other manner to acknowledge his belief in an *ever-active* Providence, his volume has failed to convey such an impression.

And believing that "Natural Selection" is the agency in modifying species, the author considers that it acts by seizing upon, and transmitting it to its progeny, any slight differences which distinguish the individual from its parent, and which may be conducive to the welfare of that individual. In other words, if a change is taking place in external nature ("the conditions of existence"), and if a particular individual happen to possess an attribute, be it structural or instinctive, which better adapts it to that change, then "Natural Selection" marks that individual for its own purposes, just as man selects his ram or his ewe, his dog, his horse, or his pigeon, and the law which the author calls "the hereditary transmission of peculiarities" perpetuates the

* 'Origin of Species,' pp. 32–3.

distinctive and beneficial feature in the offspring, and a new variety is formed. The gradual accumulation of such differences, transmitted from generation to generation, at length forms, according to Darwin's view, a new species, then a new genus, a new "family," &c. The varieties, species, genera, or families not possessing these advantageous modifications, die out in "the struggle for existence," from their unfitness to cope with new natural obstacles, and to live under the changed conditions by which they are surrounded.

Now it will at once strike the reflecting reader, that before "Natural Selection" can lay hold of any divergences of character (physical or instinctive), those divergences must have made their appearance, and the inquiries naturally suggest themselves: How do these differences originate? And how does it happen that the new features have been of such a nature as to render their fortunate possessor better adapted for the conditions of existence? (Of course, we do not lose sight of the fact that changes injurious to the animal or plant may also present themselves, and these, the author tells us, are neglected or unheeded by "Natural Selection," which only seizes upon *advantageous* peculiarities, "favouring the good and rejecting the bad."*)

That there may be no misunderstanding, we will hear what the author himself says on the subject: 1. "Natural Selection" cannot *produce* any variation in structure or instinct;† and it can only act for the good of each being,‡ by the preservation and accumulation of inherited modifications, each profitable to the preserved being.§ It acts only by "very short and slow steps," and cannot produce any great or sudden modification.‖

Here we must stop to inquire: If no visible external influence can give rise to fresh variations in structure, what other natural or secondary cause *can* do so? The answer is, "sexual causes," or sexual phenomena; for such terms as "tendency to variation" or "laws of growth" do not indicate causes, but imply ignorance of them.

What, then, does the author tell us about sexual causes? With him it is "sexual selection," and he thinks, 2. That "a change in the conditions of life," by specially acting upon the reproductive system, *causes* or increases variability.¶ But is this not reasoning in a circle, or, worse still, is it not a direct contradiction of his own proposition, that "natural selection" cannot *produce* variability? We are not splitting hairs, nor cavilling about words, for he tells us distinctly in one place that natural selection "can act on every internal organ, on every shade of constitutional difference, on the whole machinery of life."** And again, in another place: "It

* 'Origin of Species,' p. 502, par. 2; and in many other parts of the work.
† Ibid., p. 107, par. 2, "Unless favourable," &c; p. 84, par. 2; p. 100, par. 2.
‡ Ibid., p. 86, par. 2. § Ibid., p. 151, par. 1; and p. 492, par. 2.
‖ Ibid., p. 504, par. 2. ¶ Ibid., p. 86, par. 2. ** Ibid., p. 87, par. 2.

(Natural Selection) can modify the *egg*, *seed*, or young, as easily as the adult.* The more one reads and reflects, the more puzzled he becomes as to the powers attributed by the author to "Natural Selection." At one time it is "Nature," and is compared to Man,† that is to say, to Man's *mind*, for it acts intelligently. Again, the "Conditions of life" are not the same as Natural Selection, for "Indirectly, these" (the conditions of life) "seem to play an important part in affecting the reproductive system, and thus *inducing* variability; and Natural Selection will *then* accumulate all profitable variations, however slight, until they become plainly developed and appreciable to us.‡ Here it is "the Conditions of life,' something distinct from "Natural Selection," that *begin* the work of modification; and yet, as we have been told, "Nature," or "Natural Selection," can itself act on every internal organ, on every shade of constitutional difference, on the seed, and on the egg; in fact, she, or it, *can* commence the work of variation as well as complete it. A very easy mode of solving the difficulty would be the omission of "Nature" (which, if it means anything, means the visible world), and the substitution of "an intelligent Deity," availing himself of His knowledge and power, and acting through His material world, to bring about all those changes to which the author refers.

But, unfortunately, we are precluded from substituting such an "hypothesis" on the authority of the author, for, as we have already stated, he tells us distinctly that he does not believe the more complex organs and instincts to have been perfected "by means superior to, though analogous with, human reason, but by the accumulation of innumerable slight variations, each good for the individual possessor." §

Is not this the same as though he were to tell us that he does not believe the perfected steam engine to be the product of human intelligence, but the gradual accumulation of slight improvements in and additions to its various parts?

But let us set aside for the present the cause, and by that we mean the active, intelligent agency, which is always modifying living beings, whether that agency be the Almighty in nature, or man by art; and let us confine ourselves to the simple propositions that all beings are and have been the modified descendants of pre-existing ones, and that if we were fully acquainted with the biological history of the globe, we could trace all living races of plants and animals back through their ancestry to the "few forms or one" into which Darwin believes "the Creator originally breathed life with its several powers;"‖ and also that the conditions of life in

* 'Origin of Species,' p. 144, par. 2.
† Ibid., p. 87.
‡ Ibid., p. 151, par. 1.
§ Ibid., p. 492, par. 2.
‖ Ibid., p. 525.

which the various living tribes have been placed, were such as favoured, or conduced to the calling forth, popularly speaking, of new powers and instincts. Thus limiting our inquiry, we find in his great book a mass of evidence almost sufficient to establish the hypothesis of Lamarck, and quite enough to justify naturalists in assuming that new species have so arisen, until some still more amplified rule is presented to them. Neither can we deny their right to adopt Darwin's theory as their guide in classification, as the nearest approach that has yet been made to a scientific method of explaining the leading biological phenomena of nature.

One great objection that has been raised against his mode of accounting for the origin of species is, that he has not himself been successful in breeding a new variety, which, when crossed with others from the same parent stock, produced a sterile offspring; in short, that he himself has been unable to make a new species. This fact has, we think, been unfairly weighed and treated both by the eminent investigator and his opponents. The former seeks to prove that infertility is not the infallible rule with crossed species in nature; and he takes great pains to make light, as it were, of the phenomenon as an objection to his theory. If he had succeeded in this better than he has done, he would simply have shown his unprejudiced readers that the exceptions prove the rule; but it would, as it appears to us, have lent additional strength to his cause if he had fully admitted this well-established law of nature. For it is quite natural and completely in agreement with the view that the Almighty slowly changes the instincts and structures of living beings in accordance with the changing surface of the globe, that those instincts and structures should, by becoming more and more divergent, cease to render the possessors attractive to and conformable with each other. This plain mode of regarding the question causes the presence of a new species to assume quite a fresh significance; and this aspect of the case appears to us well worthy of consideration. The controlling influences of external nature, although analogous to hybridism,* may not be sufficiently rapid in their operation to serve as a check upon the production of new beings, and therefore it would appear that Providence has applied hybridity as a special check,† a kind of ratchet, as it were, upon the revolving wheel of life; and thus appears to be prevented that reversion to the original stock which might otherwise take place through uncontrolled inter-crossing, and also a too rapid production of individuals on the surface of the globe. The appearance of a new species is, according to this view, to be considered as the result of an impeditive or conservative influence, rather than one of the progressive phenomena in nature.

* See 'Origin of Species,' p. 299, last paragraph.
† In this Darwin does not believe. See ibid., p. 299, par. 2.

As to the opponents of the theory, their readiness to employ the author's inability to create a new species, has rarely been the result of honest scepticism, for they have rather sought to show what he has *not* been able to effect, than ready to estimate the value of what he *has* accomplished. Upon his line of argument, however, there can be little doubt that hybridism becomes a much graver objection to the theory of transmutation, than if we consider it as a special check applied by Providence (probably in the process of fertilization) and in the manner and for the purposes specified; and this is another weak point in an otherwise well-founded theory.

The most striking data in favour of descent with modification, and those which are likely to be multiplied from year to year, relate to the geographical distribution of plants and animals, and to their paleontological history. We have already touched upon some of the facts observed by Darwin before he was a believer in his own doctrine, whilst still on his travels; and if our readers wish to study the subject fully, we would refer them more especially to his account of the Galapagos Islands,* and of the geographical distribution of American animals,† and would recommend a comparison of these his earlier researches with the chapter in his 'Origin of Species' upon geographical distribution. But here, it will be more useful if we bring before our readers an example of the mode in which the theory is silently working its way amongst those naturalists who are directing their attention to this phase of the subject.

In Numbers II. and IV. of this Journal (April and October, 1864), there appeared two papers, one by Dr. Sclater, a general zoologist, "On the Mammals of Madagascar;" another by Mr. Trimen, of Cape Town, a lepidopterist, on the Butterflies of the same island. Of the experience and abilities of these, our contributors, it would be superfluous, perhaps unbecoming, on our part, to make any comment. From the two papers, it would appear, that while the mammals of Madagascar are almost entirely peculiar to that island, having but slight affinities with those of Africa and the East Indies (chiefly with the latter), the butterflies of the same island are almost the same as those of the nearest mainland, Africa. Dr. Sclater seeks to explain the peculiarities of the Mascarene fauna, 1st, by assuming the truth of the theory of the "Derivative Origin of Species;" and 2nd, by supposing that anterior to the existence of Africa in its present shape, a large continent, which he proposes to call "Lemuria," occupied parts of the Atlantic and Indian Ocean; that this continent "was broken up into islands, of which some became amalgamated with the present continent of Africa, and some, probably, with what is now Asia," and that in Madagascar and the

* 'Journal of Researches,' p. 393. † Ibid., pp. 131 and 326.

Mascarene Islands we have existing relics of this great continent, which he regards as "the original focus" of the Lemuridæ, the characteristic Mascarene group of animals.

But Mr. Trimen could not see the necessity for the creation of this vast continent, so promptly conjured up and baptised by Dr. Sclater, finding, as he did, in Madagascar, "eighty-one species of diurnal Lepidoptera, of which forty-seven are known to be natives of Africa, while the great majority of the remaining species exhibit unmistakeable affinity to African forms." Had such a continent existed as that believed in by Dr. Sclater, "how is it," he asked, "that the same divergence of species has not taken place between Mascarene and African insects (which are numerous in individuals and rapid in succession of generations), as we find between Mascarene and African mammals?" In concluding his article, Mr. Trimen just hints at the possibility of butterflies flying or being wafted across a barrier impassable for mammals!

Now, as these curious phenomena present a direct bearing upon our inquiry, we have been seeking as much information as possible upon the past history of the localities referred to; that is to say, upon the paleontology of the east coast of Africa and the west coast of Madagascar, hoping that that would throw some light on the subject; but to our regret, we find that nothing is known of either. In the course of our inquiries, however, we received a note from one of those whom Darwin may justly reckon amongst the "young and rising men" of science, to whom he looks for the complete establishment of his theory, from Mr. H. M. Jenkins, the Assistant Secretary of the Geological Society, and this correspondent demolished Dr. Sclater's continent of "Lemuria" almost as unceremoniously as it had been brought into existence, and substituted the "infinitely more likely hypothesis," based upon known laws of paleontology, that "a connection had doubtless existed between Africa and Madagascar at some more or less remote tertiary period," but that "the tide of emigration or chain of affinity (between the Mascarene mammals and those of other continents) passed through Europe, *southwards* into Asia, Africa and America, in Eocene or Miocene times."* We are not aware whether Dr. Sclater considers himself a disciple of Darwin, as does our correspondent last referred to; nor can we observe in the facts before us that either reasons strictly upon the Darwinian hypothesis, for according to the views of the great naturalist, there should be a nearer affinity between the mammals of Madagascar and those of Africa, which is separated from the island by a narrow ocean channel, than between the former and the mammals of India, which is much further removed, whilst the contrary appears to be the case; but one thing

* Of course we are authorized by our correspondent to publish his views.

is quite clear, namely, that however much these naturalists may differ from one another, two out of three agree with Darwin as to the "derivative origin of species;" and as it appears to us, the third (Mr. Trimen) unconsciously adds another link to the strong chain of evidence in favour of his theory presented by the geographical distribution of animals.*

But the plain facts of paleontology, as well as its empirical laws, tell forcibly in favour of a slow and gradual modification of species. Before Darwin's views on the subject were published, Vogt, a well-known German systematizer, had already interlinked into his graphic account of recent forms, the fossil species which serve in some degree to bridge over the structural gaps that occur amongst the former; and from every portion of the world, as the soundings of its crust are taken, we receive fresh accounts of missing links in the chain of beings. One grave difficulty in the way of the acceptance of the new theory, which would have sufficed to daunt many an ardent investigator, has of late been partially removed. Darwin, of course, does not believe in the miraculous creation of new species, and expresses his surprise at the credulity of those authors who imagine "that at innumerable periods in the earth's history, certain elemental atoms have been commanded suddenly to flash into living tissues;"† but when he asks himself, "How far do I extend the doctrine of the modification of species?"‡ he is, or rather was, necessarily unable to give anything like a satisfactory reply; for when he sought to trace the origin of life in the rocks, he was arrested apparently at the extremes of the palæozoic strata by fossil forms, lowly, indeed, as compared with the vertebrates, but still far higher than many that now swim our seas and streams, and it was just as difficult to explain how these were created without ancestors of a still more primitive type, as it would be to account for the Origin of Man under similar conditions. Scarcely, however, had the first sounds of the violent controversy which followed the publication of his work died away, when the intelligence reached us from Canada, that in the primitive rocks there, which had been deemed void of life, the remains of a type resembling one of the lowliest living organisms had been discovered, and naturalists, in their accustomed haste to generalize, have termed it Eozoon—the first or earliest living being. Darwin frequently refers to the imperfection of the geological record, and although it is hardly probable that we shall ever have a perfect record whilst a large portion of our globe is covered with water, still we recognize in the discovery of the humble type alluded to, an augury that a

* *Vide* 'Origin of Species,' p. 416, beginning "Sir Charles Lyell;" and p. 427, par. 2, as to the whole question between Dr. Sclater, Mr. Trimen, and Mr. Jenkins.

† Ibid., p. 517, l. 19, 20.

‡ Ibid., p. 518, l. 4.

sufficiently extensive collection of data will be presented to us to enable us—or we should rather say, to enable posterity—to form an accurate judgment as to the order and succession of living beings in ancient times and their relations to living species.

So far, these data are all in favour of the theory of the origin of species through modified descent; and a few would-be orthodox naturalists, who seek to explain the facts of paleontology otherwise, prefer to trump up absurd and, as it appears to us, irreverent theories of their own, rather than to accept the simple truth as it has pleased the wise Creator to engrave it upon his enduring tablets of stone.

The investigation of the origin of life on the globe hardly comes within the limits of this inquiry, and Darwin scarcely mentions it. At present it is still very obscure, and many generations may pass away before we are enlightened with regard to the mode in which living beings originate—possibly that may be an inscrutable problem for ever—but a far more relevant and striking feature in our inquiry is the origin of Man himself. There seems to have been an impression amongst naturalists, including many of the most able, that if the doctrine of transmutation be correct, man must necessarily be a direct descendant from some ape; but why this should be, it is difficult to understand. If any unprejudiced inquirer will take before him the table that illustrates Darwin's book,* and with that for his guide, will carefully consider all the leading facts which have of late been so largely debated in connection with Man and the Simiæ, we venture to think that he will not be disposed to admit the necessity of Man's ape-origin, be he ever so firm a believer in Darwin's theory; but, on the contrary, that he will regard it as more probable, that whilst the highest ape stands at the head of one succession of types, about to become extinct, Man is at present placed at the highest pinnacle of another; though it is highly probable, looking at his present condition and his faculty for improvement, that his past lineage is brief when compared with its future extension.

There are many obscure points connected with the 'Origin of Species,' on which it may be said that we have expressed ourselves with uncertainty, but there is one, respecting which we desire to be very explicit. We have no sympathy with the aversion manifested by some men towards the development theory on the ground of feeling. It was doubtless as offensive to the dignity of our forefathers, when they were told that they were not the denizens of a world around which the universe revolved, as it is to some persons in the present day to hear that we cannot "go with the angels" here, as long as our animal nature adheres to us. But will anyone maintain that the earth has lost any of its dignity, or is less noble,

* 'Origin of Species,' p. 123.

because it revolves around a luminary from which it has derived its being (physically speaking), but which is probably of a lower cosmical nature than it is; and should it in like manner be shown (as will probably be the case) that our animal frame is derived by the usual generative succession "from some lower stock" of animal, will anyone hereafter venture to say that man is less noble on that account?

But certain well-ascertained facts appear to militate strongly against the assumption that man is descended in a direct line from the apes. 1. Although very degraded types of mankind exist amongst us to-day, and traces of similar beings have been discovered in the later geological formations, it is admitted that no form has yet been revealed, which serves as the approach to an intermediate link. The most impetuous followers of Darwin are the most positive on this point. 2. Although we find at the present day savages almost as untutored and undomesticated as any *animal* "Man," of which we can form a conception—indeed, in some cases almost below the highest domesticated animal in their mental character—and although these beings must have existed through untold ages, often exposed to every state of the weather in absolute nakedness, there has been no reliable case of a tribe reverting to the hairy type, nor any trace of such a variety of the human race having existed as aborigines in former times. And 3. Whilst the intelligence of the apes cannot be said to have advanced in proportion to the complexity of their organization, but to have reached its climax before we approach those forms nearest to Man; the intelligence of Man appears to be of a different nature to that of the apes, which are even less capable of sympathizing with man than some of the domestic quadrupeds; and this intelligence, *sui generis*, appears just to have entered upon the dawn of its development, and to present an unlimited future.

But whilst the problems of the origin of living beings and of Man present no serious obstacles to a belief in the simple doctrine of the transmutation of species, they do offer fatal objections to Darwin's version of that theory. If his law of natural selection is valid in one case of animal progress, it must hold good in all, and he has no more right to pass over the consideration of "the first steps in the advancement, or in the differentiation or specialization of parts," in "looking at the dawn of life"* (in the lowest types of animals) as an inscrutable problem, than he would have to select any other phenomenon difficult of reconciliation with his law. And then what has he to say concerning the origin of the sexes themselves? It is true, he tells us that "he is strongly inclined to suspect that the most frequent cause of variability may be attributed to the male and female reproductive elements having been *affected* prior to the act of conception;"† but we would appeal to readers

* 'Origin of Species,' p. 137. † Ibid., p. 8.

of every shade of opinion, whether this is not what the illustrious naturalist himself so often calls, when he refers to the theories of his opponents, a restatement of facts. And where was the necessity for the very existence of the sexual elements at all? What "law" of nature created these? We know that many of the lowest types of animals can and do multiply rapidly and effectively by fission (subdivision of their bodies) and gemmation (budding); and we know, too, not the least so from the wonderful array of facts collected by this most untiring observer, that the pivot upon which the whole question of animal progress turns, is just this one of sexual peculiarities! From the very commencement of life up to the present hour, there are evidences of an *immediate* designing power—or, to use a term which is looked upon with disfavour by many Darwinians, an *ordaining* Power; an occult influence in the production and modification of the sexual elements, and consequently of the beings springing from them, totally distinct from the "conditions of existence," "natural selection," or whatever else the force may be called, which influences the embryo and the born creature. How often is it that the deceased *father* is resembled by his posthumous offspring? Had it been the mother, this might be explained by the conditions of gestation; but to what is it to be attributed in the case of the father? Is there anything in Darwin's law—is there not something beyond "atavism," or "the hereditary transmission" of peculiarities (phrases themselves implying ignorance, not knowledge, of natural laws and operations), which causes this constantly-recurring miracle connected with the conception of living creatures?

But the facts of embryology afford very striking evidence in favour of the origin of species by modified descent, and undoubtedly the surrounding conditions of existence have great influence upon the growth of the embryo. The resemblances between the fœtal stages of the individuals of different species, too, lend additional probability to the same doctrine; but whoever has the smallest acquaintance with Comparative Embryology must know that whatever value its facts may present in enabling us to judge the question under consideration, they apply equally to Man and to the lower animals.

It is not surprising that when Darwin comes to treat of instincts, he should find in their study but little in favour of his theory of Natural Selection. Still he believes that the latter has the power "of accumulating slight modifications of instinct to any extent in any direction;"* and judging by analogy, that is, when we compare this with similar language relating to the modification of the structure of animals, we should be justified in inferring that he believes natural selection to be capable of framing the minds of animals. On

* Origin of Species,' p. 229, par. 3; p. 265, par. 2.

the other hand, we can hardly believe that he assumes so much for his favourite theory, for elsewhere he says, "I do not pretend that the facts given in this chapter strengthen in any great degree my theory, but none of the cases of difficulty to the best of my judgment annihilate it." * That visible nature, in some cases, limits and retards, in others stimulates the physical as well as the bodily activity of living beings, no one will deny, and that such an influence is as applicable to Man as to the lower animals, is just as obvious; but that nature has been, or is, a power, in the well-understood acceptation of the term, acting upon the mind of animals, or of man, or anything but an unconscious agent, very few will admit, and we can hardly believe that the illustrious naturalist himself holds such a creed.

Sometimes, indeed, the "conditions of existence" are all-powerful in evoking the nobler qualities of animals and men. For Man these "conditions" may be a forest glade, a range of towering peaks, a well-stocked library, a few tuneful sentences; any of these may fan the latent spark of genius, which has lain smouldering for years, and cause the flame to burst forth suddenly. But there are cases where, notwithstanding that the "conditions of existence" may have a repressive tendency, the "instincts"—or in Man the soul—will assert its supremacy, and will mock all Darwin's laws and theories. See, for example, the ungainly peasant, who, under the law of the "hereditary transmission of peculiarities," should have pared his turnips, chewed his bacon, and guided his plough, as did his ancestors before him—how he, encircled by the same "conditions of existence" as surrounded them, spurns their grovelling pursuits, dives down into the depths of physical truth and brings up some pearl of inestimable price, which his "highly educated" fellow-men have in vain been seeking on the surface; or soars upwards to the sky, and descends again with other truths, less pleasing to the sense, perhaps, but serving as another link in the bright golden chain uniting Earth and Heaven.

In this review of some of Darwin's labours, we have been led into many digressions, for which the eminent author is to some extent responsible, for a more suggestive series of works than his has rarely been published; and this we conceive to be one of their most valuable elements. The objection to his theory of "natural selection"—and it is a grave one for the reason already assigned—is, that he refers all the perfect operations of Nature to an imperfect law. Then we may be asked, Why should such a law be regarded? Simply, because it is the best extant. Why, we would ask, is society ruled by imperfect laws? Why is honesty in trade, to a large extent, maintained by clumsy and defective mercantile codes?

* 'Origin of Species,' p. 265, par. 2.

Because it pleases God to give scope for the exercise of the human intellect by reserving a portion of the truth for man to search out, and thus stimulating each successive generation to reform itself.

As far as we are able to judge, after many years' careful and unprejudiced observation, Darwin is right as to effect, and as to cause, he is partially so. In other words, the Ruler of the universe does use the means so beautifully described by him to bring about certain phenomena in nature, but He appears to employ other and still unexplained means as well. Until, however, some naturalist, possessed of larger powers of observation and comparison, and of a courage equal to that of Darwin, shall arise to complete the theory of "natural selection," or, what will more probably be the case, shall substitute a more perfect theory just as this one is more complete than that of Lamarck; until then, we say, "Darwin's law" will continue to guide naturalists of every order in their biological inferences and zoological classifications.

But we cannot help expressing our surprise that so able and observant an inquirer as Darwin can fail to see in the wonderful array of facts collected in his great work, "one long argument" in favour of a constant, ever-watchful, ever-designing, and ever-active Providence. He can perceive the immediate intervention of that Providence in the "original inbreathing of life" "into a few lowly forms, or one," and yet (limiting ourselves strictly to the boundaries defined by him) in the instinct of the bee, which deftly builds its nest, or unconsciously fertilizes the insensient orchid;* in the remarkable powers of climbing plants, which possess the faculty of moving in conformity with the requirements of plant-life, † and equally in the affectionate intelligence of the domestic animals, he can see only the action of "secondary causes," and fails to perceive in all these and a thousand other phenomena of nature and of mind, the *continuous* application of an Almighty Power acting with design. Have too close reasoning and observation drawn a veil across the scene so long admired and watched by our great naturalist, or what has caused this curious obscuration?

This is the great defect pervading Darwin's work; but it is not the weakness of an imbecile, nor yet the foible of an obstinate dogmatist; it is, we hope, the unconscious and, let us trust it soon will be the conscious demerit of a great work, undertaken and partly accomplished by one of the noblest, most exalted, and most brilliant intellects of our age.

* 'On the Various Contrivances by which Orchids are Fertilized by Insects,' (Murray, 1862), p. 2.

† 'On the Movements and Habits of Climbing Plants' (Taylor & Francis, 1865), p. 118.