sence of the King of Martyrs can make even of us, weak and unused to danger, shrinking and soft to pain, confessors as inflexible, and martyrs as glorious, as they who won their crowns in the Flavian amphitheatre or the sunless prisons of Corea. He speaks to us as with the voice of the great martyr of Africa,—'O beatam Ecclesiam nostram, quam sic honor divinæ dignationis illuminat, quam temporibus nostris gloriosus martyrum sanguis illustrat. Erat ante in operibus fratrum candida. Nunc facta est in martyrum cruore purpurea. Floribus ejus nec lilia nec rosæ desunt. In cœlestibus castris et pax et acies habent flores suos; quibus miles Christi ob gloriam coronetur. Opto vos, fortissimi et beatissimi fratres, semper in Domino bene valere, et nostri meminisse.'—Valete."—Pref. pp. xiv., xv., xvi.

ART III.—*On the Origin of Species, by means of Natural Selection; or the Preservation of Favoured Races in the Struggle for Life.* By Charles Darwin, Fellow of the Royal, Geological, Linnæan, &c., Societies, author of "Journal of Researches during H.M.S. Beagle's Voyage round the World." London: John Murray, Albemarle Street, 1859.

WHERE is that story to be found which delighted us in our boyish days, of the tiger that sprang at a man, and as he fell affrighted, bounded over him into the open jaws of a crocodile? We Catholics not unfrequently experience somewhat similar escapes. We are reminded of Mr. Squeers's new boy, whom a violent blow on his left ear would have sent flying off the stool on which he was perched, if an equally violent cuff on the right had not restored the equilibrium. What wonder if at times we are tempted to resort to the process of a Cambridge man, whom a friend of ours one day visited when he should have been reading hard for his degree, and whom he found with a savage looking equation lying uneliminated on his table, but himself comfortably ensconced in his arm chair, reading Punch. "But, my dear fellow, how on earth can you take the world so easily?" "Hush, hush! don't you see?" was the reply, "they are cancelling one another on the table."

If the voice of science were always such as that which

spoke by Sir Roderick Murchison when, even before the treasures of California had been discovered, he pointed to the gold fields of Australia as the El Dorado of the future; or if it were as that which showed where the telescope should be pointed that the planet might be seen, which, though human eye had not yet rested on it, had been even accurately weighed; then indeed it would be a tremendous thing to hear it said that Science was in contradiction to the Revelation of which the Church is the depository. But *soi-disant* Science is too often of another character for us to be much moved whenever it pleases to raise a cry of "Lo, here!" or "Lo, there!" That which one school accepts is looked on as thoroughly fallacious by another; and what is regarded as demonstrated by one generation of men who have made profession of philosophy is exploded by another, perhaps its immediate successor. Well, then, for us that our faith is from above, resting on supernatural evidences of a Revelation, and that it is not at the mercy of every fresh theorist in the mysteries of creation. If we but remain tranquil such enemies devour one another; and thus we are sometimes supposed to be indifferent to the progress of science, because we are quietly waiting for opposing theories to "cancel one another on the table." It is not so very long since we were most learnedly told, with great ingenuity of argument and apparently a goodly basis of anatomical knowledge, that the variations of the human frame amongst the different members of our race are so important and radical, that it is impossible that the Mosaic narrative can be true, or that we can all be descended from a single pair. Τόνδ' ἀπομειβόμενος, Mr. Darwin makes reply and says, that not only is there no difficulty in believing that an Ojibbeway, a Hottentot, and an Australian, have descended from a common parent with a Chinese and an Englishman, but that "he believes that animals have descended from at most only four or five progenitors, and plants from an equal or lesser number:" and, much further still, that he would "infer from analogy that probably all the organic beings which have ever lived on this earth have descended from some one primordial form, into which life was first breathed," or in other words, "that all animals and plants have descended from some one prototype." (p. 484.) Truly the oscillations of Science are somewhat alarming.

We should, however, be extremely sorry to leave the impression that we consider Mr. Darwin's book as empirical or unscientific. He has the misfortune not to believe in Adam and Eve, and he has filled up the gap thus left in his mind by substituting in their place some prototype of far more venerable antiquity, though it must be confessed, of rather a humiliating character to one who would fain believe himself as coming directly from the Hand of God "a little lower than the angels;" and he looks back through a bewildering number of years to his simple progenitor, a worm perhaps, or a bit of sponge, or some animated cellule. He would say with Job, but in a sense that would have surprised the Patriarch, *Putredini dixi, pater meus est; mater mea et soror mea, vermibus.* But his book is not occupied with this. It is introduced into a few lines at the close of the volume, and if it were not for a paragraph which it will be necessary for us subsequently to quote, we should not have thought that the idea was in the writer's mind while the main topics of his book were under discussion. The work itself, in the main, we will say frankly, seems to us so valuable, and approves itself to us individually as so genuinely scientific; the basis of facts is so unusually broad and comprehensive, the reasoning is so dispassionate, and the writer shows himself throughout so keen-sighted to every objection, that we cannot say how grieved we are that the book should be marred by the introduction of so gratuitous and so repulsive an idea, or that the theory should be carried to such unreasonable lengths. The present work is but an abstract of a much larger undertaking, on which Mr. Darwin has been engaged for many years. We most sincerely trust that when this great book shall appear, for which we shall look as anxiously as any, we shall find that he has withdrawn this preposterous conclusion, which, if it were but a true deduction from his previous positions, would be a most arrant *reductio ad absurdum.*

We will commence our account of the theory maintained in this remarkable book by a case which is dismissed by Mr. Darwin in a single line. (p. 30.) In 1791,* one of the ewes on the farm of Seth Wright, a grazier in

* Phil. Trans, 1813, p. 164. Brit. and For. Med. Rev. Apr. 1839, p. 377.

Massachusetts, produced a male lamb, which, from singular length of body and shortness of legs, attracted attention. It was amongst the sheep much what a Skye terrier is amongst dogs. The peculiarity of its shape incapacitated the animal from leaping fences, and therefore it was considered desirable that the same shape should be given to all the members of a flock. Wright determined to try whether this could not be effected by breeding with this ram, and in the first year he succeeded in obtaining two lambs of the same peculiar conformation. In subsequent years the numbers increased, and by causing them to breed with one another, a strongly marked variety of sheep, before unknown to the world, was thus established. It was first called the *otter* breed, and from the curvature of the forelegs, which had the appearance of elbows when the animal was walking, Dr. Shuttack gave the variety the name of the *ancon* sheep. So strongly was the transmission of this peculiarity by inheritance shown, that a common ewe has been known to produce, by an *ancon* ram, one lamb of the usual shape, and one a marked specimen of the long-backed and short-legged variety.

In one or two particulars, certainly, this is not a common case. It is a rare thing for a striking variety to spring as suddenly as this into existence, and it is singular that the peculiarity should be preserved unmixed in the cross or half-breed; but in other respects the story is common-place enough, and only represents what men do every day with their cattle, poultry, horses, and dogs, and what is done by every nursery gardener in rearing plants. Whenever a breeder sees any peculiarity appear amongst his animals which he considers valuable, he carefully preserves the individual that shows it, and by pairing with other individuals that manifest a tendency towards it, and selecting such of the offspring as have most perfectly inherited it, he succeeds in perpetuating and greatly improving it.

That such is the case to a certain extent every one knows: the very talk about thoroughbred horses and dogs, and pedigrees, and the reports of cattle shows, all prove it. But the extent to which it is true, and the enormous power of changing the organization of an animal which results from a careful selection in breeding, few people who have not had much personal experience can fully appreciate.

"Youatt, who was probably better acquainted with the works of agriculturists than almost any other individual, and who was himself a very good judge of an animal, speaks of the principle of selection as 'that which enables the agriculturist, not only to modify the character of his flock, but to change it altogether. It is the magician's wand, by means of which he may summon into life whatever form and mould he pleases.' Lord Somerville, speaking of what breeders have done for sheep, says: 'It would seem as if they had chalked out upon a wall a form perfect in itself, and then had given it existence.' That most skilful breeder, Sir John Sebright, used to say, with respect to pigeons, that 'he would produce any given feather in three years, but it would take him six years to obtain head and beak.' In Saxony the importance of the principle of selection in regard to merino sheep is so fully recognised, that men follow it as a trade: the sheep are placed on a table and are studied, like a picture by a connoisseur; this is done three times at intervals of months, and the sheep are each time marked and classed, so that the very best may ultimately be selected for breeding."—p. 31.

The same thing may be quite unconsciously but as efficaciously done, simply by the preference that every one naturally gives to the best animals or plants, by which, without any direct intention of modifying or improving the breed, the better sorts are alone permitted to reproduce. No amount of cultivation suddenly bestowed upon a wild plant would produce our garden fruits or flowers. It is the continued influence of care on many generations, and the preference for the best specimens for preservation, that have produced such an impression upon our domesticated plants, that in a vast number of cases their wild parent stocks cannot be recognized.

Of domestic animals those of which the varieties are the most remarkable, both on account of the immense number and strikingly divergent characters of the variations, and from the universal occurrence of the rule that like produces its like, are dogs and pigeons. What can be more unlike than a Newfoundland, or Mount St. Bernard, a common and Italian greyhound, a Skye terrier and a King Charles's spaniel or a Blenheim? Yet there is no perceptible tendency in one sort of dog to produce young resembling those of another breed. On this a very strong argument could be founded, if we were assured that all domestic dogs sprung from the same wild stock; but this is an instance in which Mr. Darwin shows his superiority to ordinary theorists, and the trustworthiness we may attribute to the facts he adduces in favour of his system,

for he tells us that it is his belief "that our dogs have descended from several wild stocks." (p. 254.) At any rate the changes that have taken place in them since they first became man's companions, must be very great, for no wild dog resembles a bloodhound, a terrier, or a spaniel, more nearly, or perhaps as nearly, as it does the wolf, or even the fox.

As there seems no reason to doubt the descent of all our domestic pigeons from the same wild stock, and as their variation from the ancestral form, and from one another, is wonderfully great, they form a very interesting group, and Mr. Darwin has most judiciously chosen it for accurate examination. This is his account of these birds.

"The diversity of the breeds is something astonishing. Compare the English carrier and the short-faced tumbler, and see the wonderful difference in their beaks, entailing corresponding differences in their skulls. The carrier, more especially the male bird, is also remarkable from the wonderful development of the carunculated skin about the head, and this is accompanied by greatly elongated eyelids, very large external orifices to the nostrils, and a wide gape of mouth. The short-faced tumbler has a beak in outline almost like that of a finch; and the common tumbler has the singular inherited habit of flying at a great height in a compact flock, and tumbling in the air head over heels. The runt is a bird of great size, with long, massive beak and large feet; some of the sub breeds of runts have very long necks, others very long wings and tails, others singularly short tails. The barb is allied to the carrier, but, instead of a very long beak, has a very short and very broad one. The pouter has a much elongated body, wings, and legs; and its enormously developed crop, which it glories in inflating, may well excite astonishment and even laughter. The turbit has a very short and conical beak, with a line of reversed feathers down the breast; and it has the habit of continually expanding slightly the upper part of the œsophagus. The jacobin has the feathers so much reversed along the back of the neck that they form a hood, and it has, proportionally to its size, much elongated wing and tail feathers. The trumpeter and laugher, as their names express, utter a very different coo from the other breeds. The fantail has thirty or even forty tail feathers, instead of twelve or fourteen, the normal number in all members of the great pigeon family; and these feathers are kept expanded, and are carried so erect that in good birds the head and tail touch; the oil-gland is quite aborted. Several other less distinct breeds might be specified.

"In the skeletons of the several breeds, the development of the bones of the face in length and breadth and curvature differs enormously. The shape, as well as the breadth and length of the ramus

of the lower jaw, varies in a highly remarkable manner. The number of the caudal and sacral vertebræ vary ; as does the number of the ribs, together with their relative breadth and the presence of processes. The size and shape of the apertures in the sternum are highly variable ; so is the degree of divergence and relative size of the two arms of the furcula. The proportional width of the gape of mouth, the proportional length of the eyelids, of the orifice of the nostrils, of the tongue (not always in strict correlation with the length of beak), the size of the crop and of the upper part of the œsophagus; the development and abortion of the oil-gland ; the number of the primary wing and caudal feathers ; the relative length of wing and tail to each other and to the body ; the relative length of leg and of the feet ; the number of scutellæ on the toes, the development of skin between the toes, are all points of structure which are variable. The period at which the perfect plumage is acquired varies, as does the state of the down with which the nestling birds are clothed when hatched. The shape and size of the eggs vary. The manner of flight differs remarkably; as does in some breeds the voice and disposition. Lastly, in certain breeds, the males and females have come to differ to a slight degree from each other.

"Altogether at least a score of pigeons might be chosen, which if shown to an ornithologist, and he were told that they were wild birds, would certainly, I think, be ranked by him as well-defined species. Moreover, I do not believe that any ornithologist would place the English carrier, the short-faced tumbler, the runt, the barb, pouter, and fantail in the same genus ; more especially as in each of these breeds several truly-inherited sub-breeds, or species as he might have called them, could be shown him.

"Great as the differences are between the breeds of pigeons, I am fully convinced that the common opinion of naturalists is correct, namely, that all have descended from the rock-pigeon (Columba livia), including under this term several geographical races or sub-species, which differ from each other in the most trifling respects. As several of the reasons which have led me to this belief are in some degree applicable to other cases, I will here briefly give them. If the several breeds are not varieties, and have not proceeded from the rock-pigeon, they must have descended from at least seven or eight aboriginal stocks ; for it is impossible to make the present domestic breeds by the crossing of any lesser number: how, for instance, could a pouter be produced by crossing two breeds unless one of the parent-stocks possessed the characteristic enormous crop ? The supposed aboriginal stocks must all have been rock-pigeons, that is, not breeding or willingly perching on trees. But besides C. livia, with its geographical sub-species, only two or three other species of rock-pigeons are known ; and these have not any of the characters of the domestic breeds. Hence the supposed aboriginal stocks must either still exist in the countries where they

were originally domesticated, and yet be unknown to ornithologists; and this, considering their size, habits, and remarkable characters, seems very improbable; or they must have become extinct in the wild state. But birds breeding on precipices, and good fliers, are unlikely to be exterminated; and the common rock-pigeon, which has the same habits with the domestic breeds, has not been exterminated even on several of the smaller British islets, or on the shores of the Mediterranean. Hence the supposed extermination of so many species having similar habits with the rock-pigeon seems to me a very rash assumption. Moreover, the several above-named domesticated breeds have been transported to all parts of the world, and, therefore, some of them must have been carried back again into their native country; but not one has become wild or feral, though the dovecot-pigeon, which is the rock-pigeon in a very slightly altered state, has become feral in several places. Again, all recent experience shows that it is most difficult to get any wild animal to breed freely under domestication; yet on the hypothesis of the multiple origin of our pigeons, it must be assumed that at least seven or eight species were so thoroughly domesticated in ancient times by half-civilized man, as to be quite prolific under confinement.

"An argument, as it seems to me, of great weight, and applicable in several other cases, is, that the above-specified breeds, though agreeing generally in constitution, habits, voice, colouring, and in most parts of their structure, with the wild rock-pigeon, yet are certainly highly abnormal in other parts of their structure; we may look in vain throughout the whole great family of Columbidæ for a beak like that of the English carrier, or that of the short-faced tumbler, or barb; for reversed feathers like those of the Jacobin; for a crop like that of the pouter; for tail-feathers like those of the fantail. Hence it must be assumed not only that half-civilized man succeeded in thoroughly domesticating several species, but that he intentionally or by chance picked out extraordinarily abnormal species; and further, that these very species have since all become extinct or unknown. So many strange contingencies seem to me improbable in the highest degree."—pp. 21-24.

It was well worth while to extract the whole of this passage, although lengthy, as it supplies us with a key to Mr. Darwin's entire system. That which we see occurring, consciously or unconsciously, amongst men, and with domesticated animals, he supposes must also happen in nature. A pigeon with a crop slightly distended may have attracted the attention of its owner, and by a careful choice of mates, and a selection amongst the young of the birds more remarkable for the same peculiarity, by degrees, and after the lapse of a long term of years, the breed of pouter pigeons has been established.

"No one would ever have thought of teaching, or probably could have taught, the tumbler-pigeon to tumble,—an action which, as I have witnessed, is performed by young birds, that have never seen a pigeon tumble. We may believe that some one pigeon showed a slight tendency to this strange habit, and that the long-continued selection of the best individuals in successive generations made tumblers what they now are; and near Glasgow there are house-tumblers, as I hear from Mr. Brent, which cannot fly eighteen inches high without going head over heels. It may be doubted whether any one would have thought of training a dog to point, had not some one dog naturally shown a tendency in this line; and this is known occasionally to happen, as I once saw in a pure terrier: the act of pointing is probably, as many have thought, only the exaggerated pause of an animal preparing to spring on its prey. When the first tendency to point was once displayed, methodical selection and the inherited effects of compulsory training in each successive generation would soon complete the work; and unconscious selection is still at work, as each man tries to procure, without intending to improve the breed, dogs which will stand and hunt best."—pp. 214-15.

But what is there in nature that can supply the place of the judgment and will in the fancier, who pairs birds or dogs with the express intention of perpetuating a modification of the original form? According to our author one thing and one thing alone can do it. The multiplication of creatures on the face of the earth is out of proportion to their means of subsistence; this produces what he styles in his title "The Struggle for Life;" and those will survive and multiply that have some advantage over their competitors in the struggle. Every little variation, therefore, if it be advantageous to the individual, and in that case only, will be perpetuated. This involves, it need not be said, the extraordinary powers of inheritance, the singular property that all creatures possess of transmitting their own properties to their progeny. And the moment that we advert to this we are conscious of the very limited nature of our knowledge of the laws that govern inheritance; for if the offspring inherits the parent's qualities, it inherits what the parent received: it has thus the tendency to have and to impart the image of the aboriginal parent, as well as the variations by which the successive generations have diverged from that standard, and, more mysterious still, the tendency to vary more or less has been transmitted also. What causes one of these tendencies to prevail at one time or under one condition rather

than another, so that now the progeny, retaining certain variations in other characters reverts to the ancestral type, now exactly represents its immediate parent, now again shows rather the inherited tendency to vary, we are profoundly ignorant.

That what Mr. Darwin has well called the Struggle for Life must be very severe, no one who remembers the extraordinary fertility of all nature, can possibly doubt.

> "Linnæus has calculated that if an annual plant produced only two seeds—and there is no plant so unproductive as this—and their seedlings next year produced two, and so on, then in twenty years there would be a million plants. The elephant is reckoned the slowest breeder of all known animals, and I have taken some pains to estimate its probable minimum rate of natural increase: it will be under the mark to assume that it breeds when thirty years old, and goes on breeding till ninety years old, bringing forth three pair of young in this interval; if this be so, at the end of the fifth century there would be alive fifteen million elephants, descended from the first pair."—p. 64.

And this struggle will be felt most severely by those who are nearest of kin, for they feed on the same food, and are liable to the same casualties; and thus the tendency throughout nature will always be for those who have an advantage slowly to supplant their congeners, who have to work their way through the same difficulties, but under some less favourable condition. Thus, an increase of one variety will be at the expense of another variety of the same species, and the prevalence of one species will have been effected by the diminution of other species of the same genus, when, as is almost always the case, the field is already fully occupied. And the more numerous a species becomes, the better chance it will have in competition with its congeners; for the greater probability there will be of the appearance of advantageous variations, and the greater strength will be derived from the interbreeding, not too close, but with individuals in slightly varying conditions of life. This gives a decided advantage to the variety over the species, and to the specific form over the generic, giving thus, it is plain, a tendency to variation to all organic beings that are subject to severe competition. With nature, then, it is as with society. As the population increases, there is a greater number of claimants for every employment, and those who

are the best fitted for them, or have some other advantage over their rivals, obtain them, while sharp wits are at work devising some change or variety which may tell in their favour.

But it is not only with neighbours and kindred that the struggle prevails, but all nature acts and reacts upon its different parts. If an insect multiplies, it will be at the cost of some animal or plant, and to the benefit of some bird, and its prey or its enemies increasing or decreasing, will in their turn affect those with which they come in contact. A circle of this description is well worthy of quotation.

"From experiments which I have lately tried, I have found that the visits of bees are necessary for the fertilisation of some kinds of clover; but humble-bees alone visit the red clover (Trifolium pratense), 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 heartsease 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 the 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. 73-74.

By the way, Mr. Darwin takes the opportunity of handling this portion of his subject to insert a most gratuitous sneer at the Flood, or rather at those who believe that the Scripture account of the Flood is true; for they, not knowing the causes of extinction, "invoke cataclysms to desolate the world." We suppose his idea is that, because the mutual dependence of organic beings is very perfect, and that a comparatively trifling accident could cause the undue predominance of one part, and consequent extinction of another, which extinction again will react and cause other extinctions, therefore the Deluge never occurred. It would be as true to say that because the organization of man is very delicate, that but a little will

disorder him, and but a little more will kill him, that therefore such wholesale destructions as the plague of Athens or of London never happened.

Mr. Darwin teaches that in producing variation, the *direct* effect of climate, food, and other external conditions of life, is not very great. But the indirect effect he considers to be exceedingly important. Sometimes it is difficult to know to which we are to attribute the change we see produced. For instance, animals of the same species have thicker and better fur in climates that are severely cold, and it is not easy to say how far the climate itself has improved the fur, or how far rather it has been that the warmest clad animals were best able to withstand the severe cold, and thus were the most likely to perpetuate their race, transmitting to their progeny their own peculiarity. But although the direct action of climate has probably not much further effect than that the sea air will render birds less bright coloured, shells brassy or lurid, and leaves in some degree fleshy, its indirect effect is powerful to an unknown degree. It influences parents to produce offspring, varying in some way from themselves, and of the laws of this influence we are quite ignorant. It can only be by an induction from a very large number of facts that we can hope to come to any knowledge on this most interesting subject. It is, in fact, not only of great theoretical but also of practical importance, for it is the problem, the solution of which will enable us to domesticate many most useful creatures. What is it that affects the reproductive system? What are the causes throughout nature of fertility and sterility? These are secrets that nature will never entirely disclose, but we may learn much more than we already know; and as Mr. Darwin promises us in his forthcoming work "a large body of facts" which he has collected, bearing on the divergence from natural conditions which affects reproduction, we, together with, we should suppose, the Société d'Acclimatation and the Zoological Societies, and indeed with all friends of the farmyard and the cover, must look forward to its appearance with considerable interest.

Our author goes on to another cause of variation,—use and disuse. This, though by no means unimportant, seems to us to play a very inferior part in the plans of nature to that which we have just mentioned. Use, no doubt, is apt to strengthen and enlarge a member. With

most people the right hand is larger than the left, from this cause alone. The eye or the ear will, from constant use improve most astonishingly, and this we quite expect in persons who, like the blind or the deaf, have been obliged to rely more on one sense than others do. In the domestic duck, Mr. Darwin found that "the bones of the wing weigh less, and the bones of the leg more, in proportion to the whole skeleton than do the same bones in the wild duck." And disuse has also its physical effect upon the frame. "Not a single domestic animal can be named which has not in some country drooping ears; and the view suggested by some authors, that the drooping is due to the disuse of the muscles of the ears, from the animals not being much alarmed by danger, seems probable." (p. 11.) The description of the insects of Madeira, given from Mr. Wollaston, (p. 135) is most instructive. Out of the 550 species of beetles inhabiting the island, 200 are so far deficient in wings that they cannot fly; and of the twenty-nine endemic genera, no less than twenty-three genera have all their species in this condition. This Mr. Darwin thus explains: "During thousands of successive generations, each individual beetle which flew least, either from its wings having been ever so little less perfectly developed, or from indolent habit, will have had the best chance of surviving, from not being blown out to sea; and on the other hand, those beetles which most readily took to flight will oftenest have been blown to sea, and thus have been destroyed." Mr. Wollaston "suspects" that those insects which are not ground feeders, and which must habitually use their wings to gain their subsistence, have those members larger than usual. This our author accounts for on the score that the best fliers would most successfully battle with the winds. It is true that it is not easy to reconcile this with the "extraordinary fact of the almost entire absence of certain large groups of beetles, elsewhere excessively numerous, and which groups have habits of life almost necessitating frequent flight;" for one would have supposed that in such groups those with the strongest wings would have survived, and would have perpetuated a strong-winged race. Mr. Darwin should, we think, have told us more clearly whether, in this remarkable exemplification of a portion of his theory, any of the 200 species that in Madeira do not fly, have better wings, and fly more freely elsewhere, or whether it is only

that the proportion between the beetles that do, and do not fly, is different in the island to what is found elsewhere, which would be simply because the species that were best adapted for the situation flourished there the best.

Rudimentary organs are attributed by Mr. Darwin, in the main, to inheritance. They have been transmitted by an ancestor, to whom they were useful, to a successor to whom they are quite useless; and the process will have been that they have gradually become disused. "Nothing can be plainer than that wings are formed for flight, yet in how many insects do we see wings so reduced in size as to be utterly incapable of flight, and not rarely lying under wing-cases, firmly soldered together!" (p. 451.) But that such is the origin of all rudimentary organs we cannot possibly admit. Our author speaks of the *mammæ*, which in male mammals retain their potentiality, and are merely not developed. We should be curious to see how, by his theory of disuse and inheritance, so singular a result has been produced. To us it seems not unnatural that, in the Creation, such an organ was given to the male ancestor that by him it might be transmitted, equally perfect potentially, to all his descendants, although it was to be of practical service only to his daughters. And in like manner we must say in reply to the needlessly offensive question flung by Mr. Darwin (p. 483.) at all believers in the Mosaic account of Creation, as to whether mammals "were created bearing the false marks of nourishment from the mother's womb," that such a conformation may have been created in the first instance that the rule might be established which was afterwards to be followed, and that thus, through the first parent a given tendency might be imparted to his offspring. Habit is ordinarily the sequel of many acts on the part of the individual, but the same tendency that habit confers can be inherited. It is hardly more wonderful that man should have been created in that state to which his posterity were to attain when they should have reached maturity, and with the marks about him indicating previous processes to which in fact he had not been subjected. Disuse, we should not have much difficulty in supposing to be a sufficient cause for the rudimentary character of the eyes of moles and other burrowing rodents, aided by the advantage that freedom from the irritation of the eye might give an individual or a family over its competitors; and so too "of the wings

of birds inhabiting oceanic islands, which have seldom been forced to take flight, and have ultimately lost the power of flying;" (p. 454.) and of the beetles we have mentioned: but Mr. Darwin must excuse us for asking for further proof that the whale is a lineal descendant of some mammal that needed teeth, besides the very singular "presence of teeth in fœtal whales, which, when grown up, have not a tooth in their heads;" (p. 450.) and even besides the black bear in North America, which "was seen by Hearne swimming for hours with widely open mouth, thus catching, like a whale, insects in the water." (p. 184.) This is a rare instance with Mr. Darwin, of a wish to accept a fact because it suits his theory. It is unconscious unfairness, for we have already said that he deserves the highest praise for fairness of argument, but surely he must see that in this case the evidence is flagrantly insufficient to establish so improbable an event. It is not that the stomach of the bear was found on dissection to contain sea insects, but simply that an animal which swims as readily as the bear does, was believed to be swimming "with widely open mouth!" How could it possibly have fed on such sea insects, when its mouth is not furnished with the beautiful apparatus which enables the whale to retain its tiny food while it ejects the water that contained it?

Now that we have entered on this subject, earlier indeed than we had intended, we cannot help remarking upon Mr. Darwin's doctrine concerning tails. In those cases in which the tail is of absolute service to the animal, as a fly-flapper, considering the incalculable injury that flies, if unchecked, can inflict on large quadrupeds, he thinks that the individuals with the most useful tails would have had an advantage over their congeners; and in this there is nothing unreasonable. But he adds:

"Seeing how important an organ of locomotion the tail is in most aquatic animals, its general presence and use for many purposes in so many land animals, which in their lungs or modified swimbladders betray their aquatic origin, may perhaps be thus accounted for. A well-developed tail having been formed in an aquatic animal, it might subsequently come to be worked in for all sorts of purposes, as a fly-flapper, an organ of prehension, or as an aid in turning, as with the dog, though the aid must be slight, for the hare, with hardly any tail, can double quickly enough."—p. 196.

This is repeated a little further on. "We may also believe that a part, formerly of high importance, has often been retained, (as the tail of an aquatic animal by its terrestrial descendants,) though it has become of such small importance that it could not, in its present state, have been acquired by natural selection—a power which acts solely by the preservation of profitable variations in the 'Struggle for Life.'" (p. 205.) So the bear slips into the water, and becomes the parent of whales, and the fish gets out of the water, and is represented in after years by dogs and cats! It is not our purpose at this moment to discuss the extent of the applicability of Mr. Darwin's theory; but surely he must feel that enormous and most improbable conclusions are not to be regarded as proved on such scanty demonstration. His argument is that the lung is a developed swim-bladder, and that it could not have come into existence except by improvement upon the swim-bladder; therefore, all creatures that now have lungs, once swam; in their fishy state they wanted tails, and therefore we must not be astonished to find animals that have lungs also having tails. A further argument for the fishy origin of the human race our author gives, and we have already promised to produce it later. But is it not astonishing that it should be easier for Mr. Darwin to believe in this transmutation of terrestrial into aquatic animals, and of fish into beasts, than to believe that an animal was created with both lungs and tail?

To return, however, for the present, to the effects of use and disuse in producing variation. It is necessary for the validity of the theory, which we are quite prepared to adopt with Mr. Darwin, that use or disuse should produce an effect on the individual, and that the principle of inheritance should have the power to transmit the habit, which in the first instance may be called artificial rather than natural. This power of inheritance is very strong indeed, and it is our belief in its efficiency that leads us to assent to what Mr. Darwin has laid down regarding instincts. Some authors have said that those habits alone are transmitted which assist the animal in its natural pursuits. This is quite contrary to fact. The instance of the pointer seems to us to be conclusive. Mr. Darwin says he has seen a young pointer point and back other dogs the first time that it was taken out, (p. 213.) and a more artificial habit can hardly be imagined. Most peo-

ple also could corroborate his statement that even "the oddest tricks" are inherited. In the very room in which we write there is a dog which was taken from its mother without having once seen her perform certain antics for which she had a fancy, but the puppy has inherited the tricks, and very droll they are, as well as useless to the dog itself. It is, then, nothing beyond belief that a habit should be inherited that has been strong enough to produce a physical effect, or that that habit should continue to have the same power of affecting the organization.

Taking this idea of inherited uses in a broad sense, it seems to us to include the various cases of instinct that Mr. Darwin has argued so skilfully, and with such success. His examination into the instinct of the bee is very interesting, but too lengthy for us to extract. We will content ourselves with a single instance, which is an example, in one view, of use, and in another of disuse.

We do not remember to have seen in any of the numerous works that put before us in a popular manner the natural history, and especially the entomology of the British Islands, any account of the slave-making ant, *Formica sanguinea,* so called from its red colour, captures a little black ant, *(f. fusca)* when in the pupa state, and, when they are fit for work, employs its captives as household slaves. One thing that is very singular in this "extraordinary and odious instinct" is, that males and fertile females of the slave species are found in their own communities alone. Perhaps, as with the bee, so with the ant, the larva of the male is deposited at a different time from that of the female, and the difference of treatment alone decides whether the female shall be fruitful or unfertile, which latter are the workers, and as they are often called, the neuters of the species. Instinct may tell the captor when the pupæ are to be taken, in order that they may be working members of the community. The slaves make no attempt to escape, for when the nest is disturbed, they work as actively as their masters in transporting the larvæ and pupæ into a place of safety. When a migration becomes necessary, the masters, who are twice the size of their slaves, carry the latter in their mouths to their new habitation. Mr. Darwin relates this to us as an eye-witness, (p. 219.) and it would be

difficult for us to find a naturalist on whose observation and accuracy we should more willingly rely.

On one occasion when the slaves were more numerous than usual, Mr. Darwin noticed that a few slaves were mingled with their masters in their out-door occupations. "In Switzerland the slaves habitually work with their masters in making the nest, and they alone open and close the doors in the morning and evening; and as Huber expressly states, their principal office is to search for aphides. The difference in the usual habits of the masters and slaves in the two countries, probably depends merely on the slaves being captured in greater numbers in Switzerland than in England." (p. 221.)

Now, what should we expect as the probable results of a habit of this description, if it were exemplified, not in ants, but in men? We should say that it would certainly produce indolence and luxury; that it would sharpen skill and cunning in the method of capture, but that it would result in all the labour of the community being performed by those who have thus come to be unnaturally forced to be members of it. And are we to look amongst the ants, to whom the Wise Man sends the sluggard, for an example of such deterioration? Whether the British *formica sanguinea* will ever come to possess so many slaves as to be able to delegate to them its labours, we cannot foretell. The slaves, being all workers or unfertile females, cannot give their master the services of their offspring, and thus the slave-making ant is entirely dependant on the cargo of the slave ship. But, as the young of one of our migratory birds may be taken from the nest and separated from its kindred, and yet when the time of migration shall have come, is restless and uneasy, and if liberated would certainly follow its brethren across the sea: so the *formica sanguinea* has inherited the desire to make, and the knack of making slaves. How it originated who can say? But Mr. Darwin's conjecture is very plausible that the pupæ of the *formica fusca* were originally taken for food, and some having come to maturity were useful to their captors. Thus the brood that possessed them would thrive more than their neighbours, and the ant that inherited most strongly the desire to bring home pupæ, would have an advantage over other ants in the race for life.

If this be so, the taste for rearing slaves would be likely

to grow stronger as it was derived by inheritance from a greater number of generations, and thus the nest of the species that had so aristocratic an heir-loom, would become better provided with workers, and except in this matter of slave-making, less and less inclined to work.

Formica rufescens furnishes us with this precise parallel to a degenerate community of men.]

"This ant is absolutely dependent on its slaves; without their aid, the species would certainly become extinct in a single year. The males and fertile females do no work. The workers or sterile females, though most energetic and courageous in capturing slaves, do no other work. They are incapable of making their own nests, or of feeding their own larvæ. When the old nest is found inconvenient, and they have to migrate, it is the slaves which determine the migration, and actually carry their masters in their jaws. So utterly helpless are the masters, that when Huber shut up thirty of them without a slave, but with plenty of the food which they like best, and with their larvæ and pupæ to stimulate them to work, they did nothing; they could not even feed themselves, and many perished of hunger. Huber then introduced a single slave (F. fusca), and she instantly set to work, fed and saved the survivors; made some cells and tended the larvæ, and put all to rights."—p. 219.

We do not say, nor does Mr. Darwin say, that *formica rufescens* is the descendant of *sanguinea;* but it does not seem improbable that *rufescens* was once as active as *sanguinea* is now, or that the time may come when *sanguinea*, that now on a migration carries its slaves in its jaws, may condescend to be carried by them. It will be seen, therefore, that we are willing so far to assent to Mr. Darwin's reasoning as to say that an instinct may have received grave modifications, or even have entirely originated by degrees, and as exemplifications of the rule which our author pithily lays down (p. 244.) in the words, "multiply, vary, let the strongest live and the weakest die."

We do not see how the intrinsic distinction between instinct and inherited habit can be maintained by Mr. Darwin and his friends. Habits would be perpetuated in consequence of the advantages accruing from them, and so become instincts. A habit utterly valueless to the individual, as pointing in the dog, might be inherited in a state of nature, but unless it were advantageous it would soon die out. But when the habit greatly promoted the

good of the species, those that had it most strongly would flourish the most, and would verify the rule, "let the strongest live." The quails that crossed the Mediterranean would have had such an advantage over other quails that the habit of migration would come to be hereditary and instinctive.

Passing on to another portion of the subject which Mr. Darwin has felt to contain a very serious difficulty on his theory, we hope that in giving in our adherence to his position we are influenced by the validity of his argument, and are not led away by the attractive candour with which he admits the weight of the difficulties he has to encounter. He carefully examines into the case of neuter or unfertile insects, which are of course unable to perpetuate their own peculiarities; and he comes to the conclusion that even in the striking instances in which the working ants differ from one another so much as to be divided into two or even three castes, the principles of variation that he has laid down will be found to apply. In other words, those families where nature first instituted "the division of labour," by confining the operation of certain inmates of the hive or nests to active work only, leaving to others the propagation of the species, would be the most flourishing communities, and thus would excel and outlast their competitors. The idea is not more difficult than that nature should confine the operation of an organ, which originally fulfilled two functions, for the future to the discharge of one function only. Thus fertile parents would produce fertile and sterile offspring, and they would transmit to their fertile progeny the tendency to produce a family divided in qualities as they themselves have done. Nothing is more probable than that such unproductive workers would be very variable; for any variation that improved their working power would be advantageous, and would be likely thus to be preserved: although it is somewhat startling to meet with such diversity as in the workers of the driver ant of West Africa, in which "the difference is the same as if we were to see a set of workmen building a house, of whom many were five feet four inches high and many sixteen feet high," while, moreover, "the larger workmen had heads four instead of three times as big as those of the smaller men, and jaws nearly five times as big." We are not surprised to learn (p. 241) that "though the workers can be grouped into castes of

different sizes, yet they graduate insensibly into each other." In fact no one who is convinced by Mr. Darwin's previous proofs and reasoning, will be long delayed by the curious case of sterile insects. For our part we must say that we see no improbability in all the various species of ants on the face of the earth having descended from a common stock, or in all the species of bees and wasps being in the same relationship to one another, we can readily join our author in the retrospect which he thus words:—"For myself, I venture confidently to look back thousands on thousands of generations, and I see an animal striped like a zebra, but perhaps otherwise very differently constructed, the common parent of our domestic horse, whether or not it be descended from one or more wild stocks of the ass, the hemionus, quagga, and zebra." (p. 167.)

Leaving untouched many topics most ably handled by Mr. Darwin, as the analogy of variations in allied species, and the prevalence of variation in dominant species, we give one extract from his observations on correlation of growth, and that on account of the singularity of the instances adduced.

"What can be more singular than the relation between blue eyes and deafness in cats, and the tortoise-shell colour with the female sex; the feathered feet and skin between the outer toes in pigeons, and the presence of more or less down on the young birds when first hatched, with the future colour of their plumage; or, again, the relation between the hair and teeth in the naked Turkish dog, though here probably homology comes into play? With respect to this latter case of correlation, I think it can hardly be accidental, that if we pick out the two orders of mammalia which are most abnormal in their dermal covering, viz. Cetacea (whales) and Edentata (armadilloes, scaly ant-eaters, &c.), that these are likewise the most abnormal in their teeth."—p. 144.

Under the term "correlation of growth," Mr. Darwin shows that variations, which have no evident utility, and which thus would not be preserved by the process already so often described to which he gives the name of natural selection, may be due to some unknown laws of relationship between the various parts of the organization. But we must confess that we do not see how the existence of useless members of a community, like the drones in a hive, square with Mr. Darwin's theory of selection by the

pressure of severe competition. Surely if the competition amongst bees were very great, the hive that had the fewest drones would have the most honey for its working bees, and would thus in the end prevail. If natural selection has been so powerfully at work that to save a waste of time and wax, it has taught the bee to make its wonderful comb, (p. 233.) and to destroy its drones, how comes it when one single male is all that is needed to pair with the queen, and that, as Huber thinks, but once in two years? how comes it that natural selection has not diminished the number of the drones? *Diminished* we say, for if there be any truth in this modification of species, as we are willing to believe, then is the multiplicity of drones an inheritance from the day when the working bees were also fruitful and required a mate. It is well to remark that there are cases in which nature herself, in her attempt to fulfil the law "increase and multiply," devotes sundry and sometimes many members of the family to the celibate life!

It will be at once deduced from Mr. Darwin's theory, that he regards the difference between species and varieties as arbitrary. "A well-marked variety may be justly called an incipient species." (p. 52). "Species are only strongly marked and permanent varieties." (p. 56). "Varieties tend to become converted into new and distinct species." (p. 59.) Nor do we know of any difficulty, save only one, which stands in the way of the immediate acceptance by naturalists of this assertion. That one difficulty, and it is a very grave one, is the sterility of species, and the fertility of varieties, when intercrossed. Beyond a doubt if this difficulty holds good, the whole of Mr. Darwin's web has been spun in vain. It would establish an intrinsic difference between a species and a variety, which would be fatal to the theory. Our author has shown brave fight against this opponent, and we think with marked success.

He has first distinguished the sterility of the first cross between two different species from that of the hybrid, and he explains both one and the other by the very principle which he lays down at starting, respecting variation; and it must be confessed that it speaks favourably for a theory when it is brought as the key to unlock the very objection against itself. The conditions of life affect the entire organism, and especially its reproductiveness. Thus it

produces variations, and thus sterility. Domestication gives us striking instances of both. Varying conditions of life have affected our horses, dogs, pigeons, and fowls, and their offspring have widely varied from the parent stock. Our Zoological Gardens furnish us with numberless animals that are perfectly healthy in confinement, but yet will not breed. It was for this reason that we said that we looked forward to the publication of the catalogues of facts affecting the reproductive system which Mr. Darwin promises us, as so valuable a help towards understanding on what success depends in the attempt to acclimatize and domesticate fresh species. The illustration he gives is almost a proof. As with ourselves, slight changes in the conditions of life, say of climate or occupation, are favourable, and violent changes are detrimental: so in animal and vegetable life, crossing with an individual slightly varying, is beneficial, while great variations constitute a bar. If there were thus an essential difference between species and varieties, there ought to be no produce at all in the case of a cross, and the production of a hybrid should be impossible.

"The canary-bird has been crossed with nine other finches, but as not one of these nine species breeds freely in confinement, we have no right to expect that the first crosses between them and the canary, or that their hybrids should be perfectly fertile." (p. 252). The circumstances are most unfavourable. If in a state of nature a mule were to be produced, it would then be a much fairer test; but this cannot be, for as, in nature, the principle of inheritance, of like producing its like, is a general law, so is also the cognate one, of like pairing with like.

Further, our ideas of the sterility of different species when crossed, are derived in the main, from naturalists who have assumed it as a first principle, and have accepted it as a test to determine what differences were specific. Even thus, however, it does not hold good. To pass over the many instances of various species that produce mules, the few ascertained fertile hybrid animals, and the far more numerous fertile hybrid plants, there are cases of plants "which can be far more easily fertilised by the pollen of another and distinct species, than by their own pollen." (p. 250). "A multitude of cases could be given of very closely allied species which will not unite, or only with extreme difficulty; and on the other hand, of very

distinct species which unite with the utmost facility." (p. 257). Again, "there are many cases in which two pure species can be united with unusual facility, and produce numerous hybrid offspring, yet these hybrids are remarkably sterile. On the other hand, there are species which can be crossed very rarely, or with extreme difficulty, but the hybrids, when at last produced, are very fertile. Even within the limits of the same genus, these two opposite cases occur." (p. 256). And comparing in this respect, animals with plants; "if our systematic arrangements can be trusted, that is, if the genera of animals are as distinct from each other as are the genera of plants, then we may infer that animals more widely separated in the scale of nature, can be more easily crossed than in the case of plants; but the hybrids themselves are, I think, more sterile." (p. 252). That sterility in crossing, or in hybrids, will not serve as a test of specific differences, is very clear. The extreme sensitiveness of the reproductive system, so that it can be fatally injured, even though the general health of the individual is unaffected; our great ignorance of what is, or is not injurious to it, as we see in our attempt to domesticate; the extremely unfavourable circumstances in which all experiments must necessarily be conducted, so that even the most careful observers will produce conflicting results: these and several other considerations prove that it could not practically be used as a test of species. The varying conditions of life seem to us a sufficient solution of the difficulty. The young are placed by one parent in conditions of life for which, by their hybrid organization, they are but half adapted. Their lives are thus, especially when young, extremely precarious; and the perfection of their system still more so. Did we know of anything else that could introduce an equally violent change, it would surely produce equal sterility.

One more extract, and we leave this portion of the subject.

"Lastly, and this seems to me by far the most important consideration, new races of animals and plants are produced under domestication by man's methodical and unconscious power of selection, for his own use and pleasure: he neither wishes to select, nor could select, slight differences in the reproductive system, or other constitutional differences correlated with the reproductive system. He supplies his several varieties with the same food; treats them in

nearly the same manner, and does not wish to alter their general habits of life. Nature acts uniformly and slowly during vast periods of time on the whole organisation, in any way which may be for each creature's own good; and thus she may, either directly, or more probably indirectly, through correlation, modify the reproductive system in the several descendants from any one species. Seeing this difference in the process of selection, as carried on by man and nature, we need not be surprised at some difference in the result."—p. 269.

Mr. Darwin's friends, and indeed he himself, expect that his views, if adopted, will work a revolution in natural history. That they open almost new fields for examination, there can be little doubt, "on the causes and laws of variation, on correlation of growth, on the effects of use and disue, on the direct action of external conditions," (p. 486.) and, we may add, on analogy of form as distinguished from affinity, on fertility, and so forth. But we cannot agree that a great change will be effected in the systematic study of nature. That systematists should be agreed on the arbitrary character of their arrangement, and that they should acknowledge that "well-marked varieties are incipient species," would certainly be an immense advantage as removing ambiguities. A *consensus* of naturalists will be required as to the precise amount of variation that in each case is to be regarded as specific. That Mr. Darwin's theory will be sufficiently widely adopted for this to be true, we have every expectation. But that the system for the future to be followed, can be in any way that of descent, that "our classifications will come to be, as far as they can be so made, genealogies," we have every reason to doubt. The means alluded to by Mr. Darwin—rudimentary organs, aberrant groups, embryology—are singularly insufficient for the work. It would be better to abandon all attempt at classification by such affinities even when known. What advantage can there be in ranking the primrose and cowslip, because they are believed to have a common descent, as varieties, rather than as species?

"These plants differ considerably in appearance; they have a different flavour, and emit a different odour; they flower at slightly different periods; they grow in somewhat different stations; they ascend mountains to different heights; they have different geographical ranges; and lastly, according to very numerous experi-

ments made during several years, by that most careful observer Gärtner, they can be crossed only with much difficulty. We could hardly wish for better evidence of the two forms being specifically distinct. On the other hand, they are united by many intermediate links, and it is very doubtful whether these links are hybrids; and there is, as it seems to me, an overwhelming amount of experimental evidence, showing that they descend from common parents."

Why should we add, "and consequently must be ranked as varieties?" (p. 50.)

That naturalists, who have professed the immutability of species, should have admitted into their classifications rules showing their belief in real affinity and relationship, has furnished Mr. Darwin with an unanswerable *argumentum ad hominem* towards them. To attempt to search amongst animals and plants, for traces of common ancestry, in order to arrange them, would be to introduce a rule that would cause endless differences of opinion, and to throw all classification into confusion.

Passing, with great regret, over Mr. Darwin's interesting chapter on Geographical Distribution, in which he relates experiments, and produces arguments that will be of the greatest value to the Christian apologist, we come now to the grave question of the extent of the applicability of his theory. The extent to which he carries it is simply appalling, for it is in contradiction to revelation.

"I cannot doubt that the theory of descent with modification embraces all the members of the same class. I believe that animals have descended from at most only four or five progenitors, and plants from an equal or lesser number. Analogy would lead me one step further, namely, to the belief that all animals and plants have descended from some one prototype. But analogy may be a deceitful guide. Nevertheless all living things have much in common, in their chemical composition, their germinal vesicles, their cellular structure, and their laws of growth and reproduction. We see this even in so trifling a circumstance as that the same poison often similarly affects plants and animals; or that the poison secreted by the gall-fly produces monstrous growths on the wild rose or oak-tree. Therefore I should infer from analogy that probably all the organic beings which have ever lived on this earth have descended from some one primordial form, into which life was first breathed."—p. 484.

"The whole history of the world, as at present known, although of a length quite incomprehensible by us, will hereafter be recognised as a mere fragment of time, compared with the ages which

have elapsed since the first creature, the progenitor of innumerable extinct and living descendents, was created."—p. 488.

We have shown that we are not to be frightened by so serious an abuse of a theory from frankly adopting all that the author has proved.

We feel convinced that the principal position maintained by this book, will be adopted by all naturalists, and by all thoughtful minds: but that any other mind, as calm and well balanced as Mr. Darwin's own, will hazard a proposition so thoroughly gratuitous as this with which he has concluded we cannot possibly believe. He labours under the disadvantage of the pride of parentage; we hope and trust that when his great work is forthcoming, he will not put forward any such frantic position.

"When I view all beings not as special creations, but as the lineal descendants of some few beings which lived long before the first bed of the Silurian system was deposited, they seem to me to become ennobled." (p. 489). Is it an ennobling idea that a pedigree which ends with, "who was the son of Adam, who was the son of God," is to be supplanted by a descent, as long as you please, from some Ante-Silurian cellule? That this is meant to apply to the human race, the following passage, which has been referred to more than once, shows but too clearly.

"I can, indeed, hardly doubt that all vertebrate animals having true lungs have descended by ordinary generation from an ancient prototype, of which we know nothing, furnished with a floating apparatus or swim-bladder. We can thus, as I infer from Professor Owen's interesting description of these parts, understand the strange fact that every particle of food and drink which we swallow has to pass over the orifice of the trachea, with some risk of falling into the lungs, notwithstanding the beautiful contrivance by which the glottis is closed. In the higher Vertebrata the branchiæ have wholly disappeared—the slits on the sides of the neck and the loop-like course of the arteries still marking in the embryo their former position."—p. 191.

All the arguments our author has adduced for the horrid genealogy he would assign to the human race, are now before the reader, and what do they amount to? All lungs were once swimbladders, and betray a fishy ancestry, the fœtal gills tell the same story, and tails could only have been useful in the water!

When this is acknowledged, how puzzled Mother

Church will be! Baptism and holy water, and fishes for symbols, will show famously that she has unconsciously held this opinion all along: but how much she will have to rewrite! Fancy Ash Wednesday and *Memento homo quia piscis es, et in cete reverteris!* We have been fish, and, if bears may become whales, why not we? Topsy's "'Spects I growed," will become an article of faith; and the "Doctrine of Developments" will be universally adopted.

But this is too bad of Mr. Darwin, who knows as well as any man, how imperfect is our knowledge of facts, how far more imperfect our knowledge of causes. Surely the following considerations alone should have led him to be careful how he drew such immense conclusions from such small premises. It is anything but a mouse born of a mountain: it is a mountain of a mouse.

"If green woodpeckers alone had existed, and we did not know that there were many black and pied kinds, I dare say that we should have thought that the green colour was a beautiful adaptation to hide this tree-frequenting bird from its enemies; and consequently that it was a character of importance and might have been acquired through natural selection; as it is, I have no doubt that the colour is due to some quite distinct cause, probably to sexual selection. A trailing bamboo in the Malay Archipelago climbs the loftiest trees by the aid of exquisitely constructed hooks clustered around the ends of the branches; and this contrivance, no doubt, is of the highest service to the plant; but as we see nearly similar hooks on many trees which are not climbers, the hooks on the bamboo may have arisen from unknown laws of growth, and have been subsequently taken advantage of by the plant undergoing further modification and becoming a climber. The naked skin on the head of a vulture is generally looked at as a direct adaptation for wallowing in putridity; and so it may be, or it may possibly be due to the direct action of putrid matter; but we should be very cautious in drawing any such inference, when we see that the skin on the head of the clean-feeding male turkey is likewise naked. The sutures in the skulls of young mammals have been advanced as a beautiful adaptation for aiding parturition, and no doubt they facilitate, or may be indispensable for this act; but as sutures occur in the skulls of young birds and reptiles, which have only to escape from a broken egg, we may infer that this structure has arisen from the laws of growth, and has been taken advantage of in the parturition of the higher animals."—p. 197.

Can we be blamed for attributing the embryonic gills

to the unknown "laws of growth" to which these sutures in the skull are referred?

That, apart from these preposterous extremes, Mr. Darwin's work has done the cause of religion admirable service, we do not hesitate to say. It accounts for the extinction of so many races of animals and plants, and the rise of others in a way that is a positive relief after the assertion of some Christian geologists, that we are bound to believe in a fresh creation at the close of each Geologic period. It accounts for the dispersal of animals and plants without the necessity of recurrence to many—some have said at least five-and-twenty—distinct "centres of creation." Its use will occur to every one in accounting for the striking varieties we find amongst the living descendants of Adam and of Noah; and so far from showing, as Mr. Darwin seems to think, "that no cataclysm has desolated the whole world," it makes the universality of the Deluge of far easier credence, and diminishes the number of fellow voyagers with the patriarch in the ark.

Mr. Darwin has entirely failed to prove the necessity of enormous periods of time for the production of very considerable variation; and his *cheval de bataille*, the changes induced by domestication, point to an opposite conclusion. That the periods of time revealed to us by geology, were enormously long, no one can doubt, and the extinction and variation that took place during those periods, in the main, geology also discloses. But the variation of domesticated animals, furnishes us with a singular parallel to the variation of the human race. In some unaccountable way there seems, when a certain point is reached in a given direction, to be a limit to variation, and races are produced, which, if their common origin be acknowledged, may fairly be called distinct species. If on Egyptian monuments we recognise the physiognomy of races of men still existing unchanged, it is singular that in the same most ancient records, we see much diversity in the breeds of our domestic animals; "and that some of the breeds closely resemble, perhaps are identical with, those still existing." (p. 18). It may be the fact that such breeds have bred truly for four or five thousand years, and yet attained their utmost divergence from the parent stocks in a comparatively short space of time. Mr. Darwin does not seem to have anything better than Mr. Horner's wonderful piece of pottery, to carry him back for

"fourteen or fifteen thousand years," long before which "ancient periods, savages, like those of Tierra del Fuego or Australia, who possess a semi-domestic dog, may have existed in Egypt." He acknowledges that "there is reason to believe that King Charles's spaniel has been unconsciously modified to a large extent since the time of that monarch:" and again, "though the old Spanish pointer certainly came from Spain, Mr. Borrow has not seen, as I am informed by him, any native dog in Spain like our pointer." (p. 35). If equal attention had been paid to other variations in animals as the origin of the ancon sheep fortunately met with, and if the amount of modification that our gardeners could speak to as having happened even in so short a space as a man's life, were all to be registered, they would make any one hesitate in requiring such very lengthened periods for the production of existing variations.

How Mr. Darwin can ever have persuaded himself to speak so calmly of "the first creature, the progenitor of innumerable extinct and living descendants," we cannot conceive. The very most that he can think he has *proved*, is, that such might possibly have been the origin of all beings that have life. But he has not advanced a single step towards proving that such *was* their origin. In two skilfully elaborated chapters on the Geologic record, he labours manfully, and it seems to us, successfully to show the imperfection of that record; and this was necessary for the truth of his theory at all, for how could it be true if innumerable intermediate creatures had not once existed? As far then, as Mr. Darwin's scientific arguments go, they are entirely in favour of that truth and applicability of his theory which would be serviceable to religion: immediately that he stretches it to an extent that would contradict the Mosaic account of creation, he rests simply on gratuitous hypothesis. Geology gives far too perfect an account for Mr. Darwin here. He has not only to account for the non-appearance of forms throughout all stages of the world's history, but he has the far more difficult task, and one that he will never accomplish, of accounting for the vast diversity of the forms of organic beings in the earliest fossiliferous strata. "Several of the most eminent geologists, with Sir R. Murchison at their head, are convinced that we see in the organic remains of the lowest Silurian stratum, the dawn of life on this planet." (p. 307)

This may not be the case, but nothing can be less probable, or more baselessly hypothetical, than that a stratum shall ever be discovered, to show that a period ever existed when the earth was peopled with a single organic form.

For ourselves, we can only say this, that the perusal of Mr. Darwin's book has strongly impressed upon us, that there exists a great variability in plants and animals, and that variations that conferred an advantage on their possessor would most probably be perpetuated, to the detriment and ultimate extinction of the less perfect form: that, on the other hand, in certain species, little or no variation is found, and this not only in an aberrant type, like the Ornithorhynchus, but in very many less eccentric forms, which, as a matter of fact, have endured through every known age of the world. We have concluded that both animals and plants have thus a power of adapting themselves to various climates and conditions of life, and of gradually assuming a great diversity of organization, which have enabled them to fill the world. We have seen thus great extinctions, and great variations taking place so that if an inhabitant of one of the earlier periods of the world's history were now to arise, he would look in vain for some familiar forms, while he would find himself surrounded by many that to his eye would be new and strange. But we do not find ourselves in any position to lay down any general laws, or to consider theories as proved which assert even "that all the existing species of the same group, have descended from one progenitor," (p. 306) much less any attempt to sketch a still larger genealogical tree.

Bearing in mind that we have not one aboriginal language, but several; that some have varied, may be, but little, while others have not only changed exceedingly, but have been the parent of many and diverse varieties, we know not what illustration we could introduce preferable to that given by Mr. Darwin himself.

"If we possessed a perfect pedigree of mankind, a genealogical arrangement of the races of man would afford the best classification of the various languages now spoken throughout the world; and if all extinct languages, and all intermediate and slowly changing dialects, had to be included, such an arrangement would, I think, be the only possible one. Yet it might be that some very ancient language had altered little, and had given rise to few new languages, whilst others (owing to the spreading and subsequent isolation and

states of civilisation of the several races, descended from a common race) had altered much, and had given rise to many new languages and dialects. The various degrees of difference in the languages from the same stock, would have to be expressed by groups subordinate to groups ; but the proper or even only possible arrangement would still be genealogical ; and this would be strictly natural, as it would connect together all languages, extinct and modern, by the closest affinities, and would give the filiation and origin of each tongue."—pp. 422-23.

Whether this is a practicable system of classification or no we have already discussed, but that it furnishes a fair parallel to what has taken place amongst the citizens of the world, we have little hesitation in admitting. These thoughts are not new to us. The unity of descent, and variety of form, of our domestic animals, not to say the consideration of the differences amongst our fellow-men, must have often directed the thoughts of many into this channel ; but we owe Mr. Darwin many thanks for the steadiness of investigation, the thorough knowledge of natural history, and the comprehensive grasp of his subject which characterize the very remarkable book before us.

ART. IV.—1. *The Times Newspaper.*

2. *Le Pape et le Congrès.* Paris, E. Dentu et Firmin Didot Frères, Fils et Cie. Libraires Editeurs, 1859.

3. *La Question Romaine.* Par E. About. Bruxelles, Meline, Cans & Cie. Libraires Editeurs, 1859.

4. *Le Progres par le Christianisme, Conferences De Notre Dame de Paris.* Par Le R. P. Felix de la Compagnie de Jesus. Années, 1856—1859. Paris, Librairie Adrien Le Clere & Cie.

THE king of journals, like the king of men, is grand and magniloquent in his wrath and in his triumph. Gifted with an unerring perception of the truest interests of mankind, and with a capacious heart open to all their sufferings and wrongs, what subject so calculated to enlist his sympathies and raise his eloquence to the pitch of