beauty of exotic posies, and the brilliant flash of the gold-fish, have a strange aspect when viewed through brown November fog.

I cannot see the top of the Nelson Column when I cross Trafalgar Square: it seems a pillar planted to shore up the sky tumbling amain on all sides. The squirting fountains strike me as adding insult to injury. Isn't the air moist enough without their help?

On the helmets, and cuirasses, and scabbards of the mounted sentries at the Horse Guards the fog condenses like breath on glass, and flows down in trickling streams. Tiny dew-drops tremble on their moustaches, which have sadly lost their lackered gloss. Their dismounted brother, stalking under the archway yonder, in boots that seem too heavy for even his long legs to lift, 'looms in the distance' like a gigantic Cochin-China's ghost.

By the time that I have strolled round St James's Park, and marked that here, as at the Exchange, the seedy *habitués*, who sit silent on the benches—in this case, staring with lacklustre eyes into the ornamental water instead of the quadrangle—maintain their posts with inexplicable fortitude, although you might write your name in the fat dew on the seats, I begin to think that I have had enough of fog, and should prefer some dinner. I jump into an omnibus, and jolt back to London Bridge. It is now about three in the afternoon, but genuine night—or rather the awful gloom of eclipse—has descended on the city. Lurid torches dance, flaring over the crossings, as the imp-like link-boys, with wild shouts, pilot fearful and moneyed passengers.

Through the fog-tunnel again we ramble. Suddenly light shoots through the dusk like the brilliance of *Eau d'Or*, when the sediment is shaken, and just before we arrive at Deptford, we come out in glass-clear air beneath a turquoise sky, and see far off the dome of the Crystal Palace flashing in the westering sunbeams like a Titan's golden shield.

'Truly, the light *is* sweet, and a pleasant thing it is for the eyes to behold the sun!'

CHARLES DARWIN ON THE ORIGIN OF SPECIES.

Heretofore, most naturalists have regarded *species* as a cluster of characters affecting a particular group of plants or animals, which goes on through generations, either wholly without change, or with only occasional variations liable to be easily obliterated. In the geological record, they have seen organisms specifically distinguished make their appearance with particular formations, and after a certain term of existence disappear, as if they had then become extinct; a necessary sequel to this view being that none of the species now existing can be traced further back than the tertiary or last great formation, while most of the conspicuous plants and animals of our epoch have apparently come into existence since that period. How species originated, naturalists have not concerned themselves to inquire, either regarding the question as too mysterious to be solved by science, or being content to assume that there was a particular effort of creative providence engaged in each case.

To any one who haunted Section D at the British Association during the last few years, it was evident that science was beginning to consider this question as not so hopelessly insoluble as naturalists had been accustomed to represent it. When, moreover, it had become a fashion to regard all the operations of the physical world as conducted in an order or fixed arrangement, it might have been anticipated that there would not long be wanting men to surmise that the succession of organisms revealed by geology had also been under some divine appointment of the same general nature—one connected phenomenon, instead of many. It should not, therefore, surprise us very much that a naturalist of the highest reputation has now come forward with an attempt to solve the question on purely scientific grounds. Mr Charles Darwin won his first laurels, many years ago, as naturalist of the *Beagle* in her voyage round the world; he has since lived much in retirement, on account of the state of his health, but devoting himself all the time to experimental inquiries regarding this very subject. The result is a pile of observations calculated to form a large work, but of which he has been pleased to send forth an introductory sketch or summary in the volume before us.*

Mr Darwin's theory is, that there is a real variability in organisms, acting through the medium of the reproductive system; and that when the progeny so varied finds itself better adapted for the surrounding conditions than its predecessors, it gains an ascendency in the competition of the multitude of creatures for existence, establishes itself, and exterminates those which it has vanquished. A *variety* in botany or zoology he contemplates as 'species in the process of formation,' or 'incipient species;' and he implies that the apparent fixity of the idea of species would give way, if we had the objects under our attention for a sufficient time to enable us to observe so large a transition. That man, by selecting individuals for breeding of the domestic animals, 'unconsciously' produces varieties in these species, is undoubted. Mr Darwin sees a natural process of selection constantly going on with like effects. 'Let us,' says he, 'take the case of a wolf, which preys on various animals, securing some by craft, some by strength, and some by fleetness; and let us suppose that the fleetest prey—a deer, for instance—had, from any change in the country, increased in numbers, or that other prey had decreased in numbers during that season of the year when the wolf is hardest pressed for food. I can, under such circumstances, see no reason to doubt that the swiftest and slimmest wolves would have the best chance of surviving, and so be preserved or selected—provided always that they retained strength to master their prey at this or at some other period of the year, when they might be compelled to prey on other animals. I can see no more reason to doubt this, than that man can improve the fleetness of his greyhounds by careful and methodical selection, or by that unconscious selection which results from each man trying to keep the best dogs without any thought of modifying the breed.'

'Even,' he continues, 'without any change in the proportional numbers of the animals on which our wolf preyed, a cub might be born with an innate tendency to pursue certain kinds of prey. Nor can this be thought very improbable; for we often observe great differences in the natural tendencies of our domestic animals: one cat, for instance, taking to catch rats; another, mice; one cat, according to Mr St John,

* *On the Origin of Species by Means of Natural Selection, or the Preservation of Favoured Races in the Struggle of Life.* By Charles Darwin, M.A. London: Murray. 1859.

bringing home winged game; another, hares or rabbits; and another hunting on marshy ground, and almost nightly catching woodcocks or snipes. The tendency to catch rats rather than mice is known to be inherited. Now, if any slight innate change of habit or of structure benefited an individual wolf, it would have the best chance of surviving and of leaving offspring. Some of its young would probably inherit the same habits or structure, and by the repetition of this process, a new variety might be formed which would either supplant or coexist with the parent-form of wolf. Or, again, the wolves inhabiting a mountainous district, and those frequenting the low-lands, would naturally be forced to hunt different prey; and from the continued preservation of the individuals best fitted for the two sites, two varieties might slowly be formed.'

Another of his illustrations touches curiously on those mutual adaptations of natural objects which have been so often noticed, shewing how, in the course of the general providential design, they might come about. 'I can see no reason,' says he, 'to doubt that an accidental deviation in the size and form of the body, or in the curvature and length of the proboscis, &c., far too slight to be appreciated by us, might profit a bee or other insect, so that an individual so characterised would be able to obtain its food more quickly, and so have a better chance of living and leaving descendants. Its descendants would probably inherit a tendency to a similar slight deviation of structure. The tubes of the corollas of the common red and incarnate clovers (*Trifolium pratense* and *incarnatum*) do not, on a hasty glance, appear to differ in length; yet the hive-bee can easily suck the nectar out of the incarnate clover, but not out of the common red clover, which is visited by humble-bees alone; so that whole fields of the red clover offer in vain an abundant supply of precious nectar to the hive-bee. Thus, it might be a great advantage to the hive-bee to have a slightly longer or differently constructed proboscis. On the other hand, I have found, by experiment, that the fertility of clover greatly depends on bees visiting and moving parts of the corolla, so as to push the pollen on to the stigmatic surface. Hence, again, if humble-bees were to become rare in any country, it might be a great advantage to the red clover to have a shorter or more deeply divided tube to its corolla, so that the hive-bee could visit its flowers. Thus, I can understand how a flower and a bee might slowly become, either simultaneously, or one after the other, modified and adapted in the most perfect manner to each other, by the continued preservation of individuals presenting mutual and slightly favourable deviations of structure.'

There would appear to be, according to Mr Darwin, a natural provocation to variety, 'for,' says he, 'the more living beings can be supported on a given area, the more they diverge in structure, habits, and constitution.' Therefore, he adds, the more diversified the descendants of any one species become, the better will be their chance of succeeding in the battle of life. Having remarked, in recapitulation, that natural selection leads to divergence of character and to much extinction of intermediate forms of life, he expresses his belief that 'on these principles the nature of the affinity of all organic beings may be explained.' 'It is a truly wonderful fact—the wonder of which we are apt to overlook from familiarity—that all animals and all plants throughout all time and space should be related to each other in group subordinate to group, in the manner which we everywhere behold—namely, varieties of the same species most closely related together; species of the same genus less closely and unequally related together, forming sections and sub-genera; species of distinct genera much less closely related; and genera related in different degrees, forming sub-families, families, orders, sub-classes, and classes. The several subordinate groups in any class cannot be ranked in a single file, but seem rather to be clustered round points, and these round other points, and so on in almost endless cycles. On the view that each species has been independently created, I can see no explanation of this great fact in the classification of all organic beings; but, to the best of my judgment, it is explained through inheritance and the complex action of natural selection, entailing extinction and divergence of character.'

Mr Darwin admits several difficulties in the way of his theory, and treats them with great candour. We have not space to advert to his remarks on the sterility of hybrids, the geographical distribution of organisms, or, indeed, any other difficulty but that resting in the apparent suddenness of the commencement and extinction of species in the earlier ages of the world. Here, he thinks, explanation lies in the extreme imperfection of the geological record. A formation represents but a brief space of time, compared with the blanks that lie between, and even formations have only been examined in a few widely separated parts of the earth. As the matter stands, we constantly find this class of difficulties. For example, mammalia appeared a few years ago to have commenced abruptly with the tertiary formation; now, 'the richest accumulation of mammals belongs to the middle of the secondary series.' 'Cuvier used to urge that no monkey occurred in any tertiary stratum; but now extinct species have been discovered in India, South America, and in Europe even as far back as the eocene stage.' Such facts prohibit us from speculating on the exact point of time for the appearance of any species on the face of the earth. We are equally forbidden to allege, with Sir Roderick Murchison, that the Lower Silurian fossils are the earliest animals on the globe. Mr Darwin admits how grave these difficulties have been, since they have caused 'all the eminent naturalists, as Cuvier, Owen, Agassiz, Barrande, Falconer, and E. Forbes, and all our greatest geologists, as Lyell, Murchison, and Sedgwick, unanimously, and often vehemently, to maintain the immutability of species.' But he has 'reason to believe that one great authority, Sir Charles Lyell, from further reflection, entertains grave doubts on this subject.' And, after all, how significant are the facts, that 'the organic remains from an intermediate formation are intermediate in character,' and that 'fossils from two consecutive formations are far more closely related to each other than are the fossils from two remote formations.' Of this last truth, Pictet gives a well-known instance, 'the general resemblance of the organic remains from the several stages of the chalk formation, though the species are distinct in each stage.' It seems 'alone, from its generality, to have shaken Professor Pictet in his firm belief of the immutability of species.' 'On the theory of descent,' says Mr Darwin, 'the full meaning of the fact of fossil remains from closely consecutive formations, though ranked as distinct species, being closely related, is obvious.'

The curious modern doctrine of morphology is pressed by Mr Darwin into the service of his theory. 'Most physiologists believe that the bones of the skull are homologous with—that is, correspond in number and in relative connection with—the elemental parts of a certain number of vertebræ. The anterior and posterior limbs in each member of the vertebrate and articulate classes are plainly homologous. We see

the same law in comparing the wonderfully complex jaws and legs in crustaceans. It is familiar to almost every one, that in a flower the relative position of the sepals, petals, stamens, and pistils, as well as their intimate structure, are intelligible on the view that they consist of metamorphosed leaves, arranged in a spire. In monstrous plants, we often get direct evidence of the possibility of one organ being transformed into another; and we can actually see in embryonic crustaceans, and in many other animals, and in flowers, that organs, which, when mature, become extremely different, are at an early stage of growth exactly alike. How inexplicable are these facts on the ordinary view of creation! Why should the brain be enclosed in a box composed of such numerous and such extraordinarily shaped pieces of bone? As Owen has remarked, the benefit derived from the yielding of the separate pieces in the act of parturition of mammals, will by no means explain the same construction in the skulls of birds. Why should similar bones have been created in the formation of the wing and leg of a bat, used as they are for such totally different purposes? Why should one crustacean, which has an extremely complex mouth formed of many parts, consequently always have fewer legs; or conversely, those with many legs have simpler mouths? Why should the sepals, petals, stamens, and pistils in any individual flower, though fitted for such widely different purposes, be all constructed on the same pattern?

'On the theory of natural selection, we can satisfactorily answer these questions. In the vertebrata, we see a series of internal vertebræ bearing certain processes and appendages; in the articulata, we see the body divided into a series of segments, bearing external appendages; and in flowering plants, we see a series of successive spiral whorls of leaves. An indefinite repetition of the same part or organ is the common characteristic (as Owen has observed) of all low or little-modified forms; therefore, we may readily believe that the unknown progenitor of the vertebrata possessed many vertebræ; the unknown progenitor of the articulata many segments; and the unknown progenitor of flowering-plants, many spiral whorls of leaves. We have formerly seen that parts, many times repeated, are eminently liable to vary in number and structure; consequently, it is quite probable that natural selection, during a long-continued course of modification, should have seized on a certain number of the primordially similar elements, many times repeated, and have adapted them to the most diverse purposes. And as the whole amount of modification will have been effected by slight successive steps, we need not wonder at discovering in such parts or organs a certain degree of fundamental resemblance, retained by the strong principle of inheritance.'

He takes help likewise from the doctrines of embryology—'namely, the very general, but not universal difference in structure between the embryo and the adult; of parts in the same individual embryo, which ultimately become very unlike, and serve for diverse purposes, being at this early period of growth alike; of embryos of different species within the same class, generally, but not universally, resembling each other; of the structure of the embryo not being closely related to its conditions of existence, except when the embryo becomes at any period of life active, and has to provide for itself; of the embryo apparently having sometimes a higher organisation than the mature animal into which it is developed.' He believes that all these things can be explained on the view of 'descent with modification.' 'On the principle of successive variations not always supervening at an early age, and being inherited at a corresponding not early period of life, we can clearly see why the embryos of mammals, birds, reptiles, and fishes, should be so closely alike, and should be so unlike the adult forms.'

'Disuse,' he proceeds to say, 'aided sometimes by natural selection, will often tend to reduce an organ, when it has become useless by changed habits or under changed conditions of life; and we can clearly understand on this view the meaning of rudimentary organs. But disuse and selection will generally act on each creature, when it has come to maturity, and has to play its full part in the struggle for existence, and will thus have little power of acting on an organ during early life; hence the organ will not be much reduced or rendered rudimentary at this early age. The calf, for instance, has inherited teeth, which never cut through the gums of the upper jaw, from an early progenitor having well-developed teeth; and we may believe that the teeth in the mature animal were reduced, during successive generations, by disuse, or by the tongue and palate having been fitted by natural selection to browse without their aid; whereas, in the calf, the teeth have been left untouched by selection or disuse, and on the principle of inheritance at corresponding ages have been inherited from a remote period to the present day. On the view of each organic being and each separate organ having been specially created, how utterly inexplicable it is that parts, like the teeth in the embryonic calf, or like the shrivelled wings under the soldered wing-covers of some beetles, should thus so frequently bear the plain stamp of inutility! Nature may be said to have taken pains to reveal, by rudimentary organs and by homologous structures, her scheme of modification, which it seems that we wilfully will not understand.'

Mr Darwin fully expects that his views, if accepted, will revolutionise natural history. They will, as his experience teaches him, immensely increase its interest as a study. They may also afford a help in the breeding of animals for economic purposes. On the general effect in natural theology, he thus remarks: 'Authors of the highest eminence seem to be fully satisfied with the view that each species has been independently created. To my mind, it accords better with what we know of the laws impressed on matter by the Creator, that the production and extinction of the past and present inhabitants of the world should have been due to secondary causes, like those determining the birth and death of the individual. 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. Judging from the past, we may safely infer that not one living species will transmit its unaltered likeness to a distant futurity. And of the species now living, very few will transmit progeny of any kind to a far-distant futurity; for the manner in which all organic beings are grouped, shews that the greater number of species of each genus, and all the species of many genera, have left no descendants, but have become utterly extinct. We can so far take a prophetic glance into futurity as to foretell that it will be the common and widely spread species belonging to the larger and dominant groups which will ultimately prevail and procreate new and dominant species. As all the living forms of life are the lineal descendants of those which lived long before the Silurian epoch, we may feel certain that the ordinary succession by generation has never once been broken, and that no cataclysm has desolated the whole world. Hence we may look with some confidence to a secure future of equally inappreciable length. And as natural selection works solely by and for the good of each being, all corporeal and mental endowments will tend to progress towards perfection.'

It will be interesting to observe the effect, in the scientific world, of such views brought forward on scientific grounds by a naturalist of eminence.

SPEECH WITHOUT WORDS.

'I DON'T see, Aunt Georgey,' observed a small boy of five and a half, who was sticking at his figures during an arithmetical examination—'I don't see the *good* of the multiplication table. It seems to me to be going through so much to get at so little.'

'You'd rather play at "Tit, tat, toe," I daresay, Dickey,' remarked his beloved aunt, smiling sardonically.

'Ay, there's something *in* that,' replied the youth, unconscious of her sarcasm; 'one sees what one is driving at there, all along.'

'Nevertheless, everything has its use,' persisted the old lady, who was a very Minerva for aphorisms, and like that heathen celebrity, kept a bird, which, however, was not an owl, but a parrot. 'No one can tell what immense advantages may flow from the acquisition'——

'From the what?' interrupted the rude lad, who was of an inquiring rather than a reverent disposition.

'From learning the least things, my dear.'

'Ah,' observed the boy, 'I daresay: there's the alphabet now, for instance, ain't there? Who ever first hit on *that*, I wonder, to teach a fellow to read?'

'Ay, and there's the deaf and dumb alphabet, too, Dickey, which teaches people to talk without words.'

'And were you ever deaf and dumb, Aunt Georgey? O my, what a funny go!'

'If you won't use these *very* strange words, child—and where you picked them up is, I am sure, quite a marvel to me—I'll tell you a story of how Aunt Georgey herself once saved her life, entirely through having learned the deaf and dumb alphabet: shall I?'

'Instead of the lesson, Aunt Georgey? O yes, I should like it better than pie.'

'There were two little boys, Dickey, and one of them not very much older than you, who used to come and stay with your Uncle Frank—you never saw him, dear child, did you? Ah, he would have liked those bonny blue eyes!—to stay with your Uncle Frank and me, when we were first married; and they could neither hear nor speak, Dickey.'

'Couldn't they eat neither, Aunt Georgey, nor drink, nor nothing?'

'O yes; they were only deaf and dumb; but that is a very dreadful misfortune indeed, my child, of itself. They could not talk except with their fingers—so—only ever so much quicker.'

'That ain't talking; that's cat's cradle, Aunt Georgey!'

'No, it isn't; it's speech, though there are no words. I said then—"Dickey, don't interrupt your aunt with foolish observations."'

'I didn't hear you, then,' replied Dickey.

'Perhaps not, my dear, but nevertheless I did say it; so don't. Your Uncle Frank [illegible]rned this foreign alphabet on purpose, that we might understand what these two poor lads had to say. They were far quicker, far cleverer than you, Dick; they could read and write, ay, and draw and sew, and do many other things which you would make but a very bad hand at.'

'Could they do the multiplication table, Aunt Georgey?'

'Yes, child.'

'Could they play at "Tit, tat, toe," Aunt Georgey?'

'Yes; and at draughts, and backgammon, and chess, and at fox and geese, as well as any boys. They could almost see what we said, though they could not hear, with such quick eager eyes did they watch every movement of our lips. We soon, however, got to talk as easily with our fingers as our tongues; and sometimes, when the lads were not with us, Uncle Frank and I used to converse in that manner when we were alone, for practice.

'It happened upon one occasion that he had to go to London on important business; he was to have gone by an afternoon train, but something delayed him, so that he was not able to leave before the night-express. I was not in very good health, and retired to my bedroom about two hours before his departure; he promised, however, to come up and wish me good-bye before he started, which would be between twelve and one o'clock in the morning. The matter which called him away was connected with the bank here, which had just been burned down; and my husband, it seems, though I did not know it at the time—so great a secret had he endeavoured to keep it—had many thousand pounds belonging to the concern in his temporary possession, locked up in the iron safe in our bedroom, where the plate was kept. He was bank-manager, and responsible for the whole of it. It was wintertime, and there was a fire in the room, so bright and comfortable that I was in no hurry to leave it and get into bed, but sat up, looking into the fiery coals, as I have seen you do, Dickey, and thinking about all sorts of things; not so much about your favourite palaces, and fairy gardens, and the castles which Jack the Giant-killer took, that are to be seen there, doubtless, as you say; but upon the long journey your Uncle Frank had to take that night, and of how dreary the days would seem until he returned; and in particular how lonely I should feel in that great room all by myself, when he would be away; for I was a dreadful coward, Dickey, and not like you, who go to sleep in the dark like a brave boy, and never want a nursemaid to sit in your room. It was a little after eleven o'clock when I got into bed, but I did not feel the least inclined for sleep even then; I knew Uncle Frank would be coming to wish me good-bye presently, and besides, there seemed to be all sorts of noises about the room, which my foolish ears always used to hear whenever I was alone at night-time.

'If a little soot fell down the chimney, it was, I thought, a great black crow at least, which would soon be flying about the room, and settling on my pillow, if a mouse squeaked in the wainscot, it was the creaking of some dreadful person's shoes, coming upstairs to kill your silly old aunt with a carving-knife; and if the wind blew at the casement, it was somebody else trying to get in at the window, although it was two stories high. You may imagine, then, my horror when I heard a tremendous sneeze within a quarter of an inch of me, just behind the head-board of the bed, and between that and the wall, where there was a considerable space. I had, as usual, taken the precaution, before I put the candle out, of looking everywhere in the room where it was quite impossible any person could be hid; but in the little alcove into which the bed was pushed I had never so much as thought of looking, although that was a capital hiding-place for anybody. Ever since I had slept in that room, in short, I had been like the ostrich of whom we read yesterday, Dickey, who puts his head in the sand, and then imagines himself in perfect security. I had piqued myself upon precautionary measures that, after all, might just as well have been omitted. The only thing, as I believe, which saved my reason from

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