DARWINISM.

A LECTURE

DELIVERED BEFORE THE

TORQUAY NATURAL HISTORY SOCIETY,

FEB. 1ST, 1869,

BY

THOMAS R. R. STEBBING, M.A.,

LATE FELLOW AND TUTOR OF WORCESTER COLLEGE, OXFORD.

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THE object of this lecture is to explain, with as much simplicity as possible, the opinions of Darwin on the chain of secondary causes which has resulted in the wonderful structures known to us as living creatures, and including, in an almost infinite variety, lichen and moss, mite and mildew, grass and flower and branching tree; mollusk and reptile and fish; the swan, the petrel, the ostrich and the eagle; the cunning ape; the faithful hound; the elephant, sagacious and mindful of insults; the lion, capable of generosity; the horse, patient of labours and eager for victory; and, along with a multitude of others diversely qualified, One, without doubt partaking of the animal nature that lives and dies, yet seeming to partake of something beyond it, seeming to be distinguished from all the rest by its postures, by its laughing, by its cooking its food, by its articulate language, by its powers of reasoning; and yet linked and united to its inferiors by a multitude of affinities and sympathies, resemblances of form and nature, and by the very details of its superiority. So ran the Pagan legend that Providence had compacted man's moral nature out of particles taken from each of the lower animals, giving him the wisdom of the serpent and the

fiery courage of the lion.* To this sense of an intimate union between man and the rest of the animate creation have the writers of fables in all ages appealed, while imparting their lessons of prudence and virtue under the guise of transactions between birds and beasts and trees of the forest.

It is well known that after the discovery of almost every great truth a sort of feeling or instinct of it can be traced back in obscure hints, in chance expressions, in vague guesses, in flights of imagination, so that people very soon begin to fancy that they have all along understood and maintained the very theory, which on its first appearance, they violently rejected as something false and even vicious. Darwinism has this characteristic of truth, that it has often been obscurely anticipated. It has this other characteristic, that its fiercest opponents have already begun insensibly to adopt its conclusions, and to speak its language, to opine, even, that the credit of its promulgation belongs to themselves.

In Mr. Darwin's own historical sketch of the rise and progress of his doctrine, he does full justice to those who have preceded and who have worked with him in bringing it to light, and in establishing its foundations. The opinion that species originate, not by successive miraculous interpositions or acts of creation, but by birth, was held as far back as 1794-5, by four men of

*Horace. Odes, l. 16. 13.
Fertur Prometheus addere principi
Limo coactus particulum undique
Desectam, et insani leonis
Vim stomacho apposuisse nostro.

distinguished genius, by La Marck, by Mr. Darwin's own grandfather, Dr. Erasmus Darwin, by Geoffroy Saint Hilaire, and by the poet Goethe. In the present day, Mr. Wallace, Mr. Herbert Spencer, the great zoologist Van Baer, and others, independently of Mr. Darwin, seem to have come more or less to the same conclusions, which have been warmly espoused and powerfully vindicated by Dr. Hooker, Professor Huxley, and Sir Charles Lyell. I mention these names because it seems to be their due, and not for the sake of giving weight to any argument because of the scientific renown of its advocates; there are names, it may be, equally distinguished on the opposite side. But one thing ought to be observed, that the progress of scientific enquiry has achieved so much during the last hundred years that the opinions of the older Naturalists have an importance when they agree with modern conclusions, which they cannot have when they differ from them, unless it can be shown that the observations, the experiments, the discoveries of late years had all been made by, or were known to, the earlier enquirers. For those, however, who think the opinions of a past generation of necessity more trustworthy than those of the present, Sir Charles Lyell has done well to point out that Linnæus himself looked forward to a time when it should be proved that in botany, at least, all species of a genus had descended from the same mother.*

This is precisely Mr. Darwin's opinion on the origin of species at large. He applies it to the animal as well as

*Lyell. Principles of Geology, Vol. II., p. 324. Tenth Edition.

to the vegetable kingdom. He extends it by considering genera themselves as species of the orders which contain them, and orders as species of the great classes to which they as orders respectively belong. In a word, he considers that all living forms whatsoever are descended from a very few original ancestors of the simplest type, and that this primæval group itself had, probably, a common parentage. Wildly improbable, ludicrously absurd, degrading to humanity, and irreligious, no doubt this hypothesis has appeared to many, and will continue so to appear till it has been studied with attention, and studied without prejudice. To rescue it from the prejudice which would make it in the eyes of some a pernicious and forbidden study, is the hope which underlies the object of the present lecture.

Round Nelson's Column in Trafalgar Square there are four colossal statue lions, the conception of a great artist. They look unnatural, not because of their size, or their position, or the material of which they are made, but because they are all so exactly alike; and exact likenesses are scarcely ever found in animate nature, unless it be among the very simplest organisms. When we speak of a striking likeness between two human beings, we evidently imply that a high degree of similarity is uncommon, and, therefore, noteworthy. What is true of even the most highly organised animals, is true, as far as observation goes, of all below them. Horses, dogs, sheep, kine, afford familiar illustrations of this principle. To the uneducated eye, individual differences may be totally unapparent, which are yet

perfectly conspicuous to the trainer, the huntsman, the shepherd and the drover. Wild creatures know their mates; wild herds select their leaders; the bee and the ant are capable of distinguishing the various individuals of their own communities, for strangers of the very self-same species with themselves they repel or destroy.* As each creature is, in numberless cases, the offspring of two unlike parents, it cannot be an exact copy of either, and the influences of the two parents may be combined in various proportions in each of the offspring; but the parents themselves are continually changing, with the variations of age and food and climate, so that the very rule of resemblance between the producers and the produced will entail another rule of unlikeness between the several members of an offspring not born all at once.

It is a fact, which cannot be denied, that in numberless instances the young of a creature differ more or less from the parents and likewise among themselves. Why it should be so has been in part explained. This is the *Variability*, without which Natural Selection could never have been thought of, because without differences there would have been nothing to select. But this Variability being granted, the Darwinian theory becomes possible—becomes quite capable of referring back the elephant and the pig, for instance, to the same ancestry. The differences between progenitors and their immediate offspring are, it is true, comparatively slight. It would,

*Darwin. Animals and Plants under Domestication, Vol. II., p. 251

indeed, be a prodigious birth if one family contained at once a young monkey, a little pig, a big donkey, and a great goose; but it is obviously possible that any amount of unlikeness may be found between the descendants of common ancestors, if we are not confined to the differences of a single generation, but are allowed to multiply them through as many thousands as we require. Say that two race-courses differ in length by one yard; multiply that difference 1,760 times and they will then differ by a whole mile. If, on leaving this Lecture-room, you found the trees—which half-an-hour ago were bare and leafless—clothed with summer verdure, your gardens blooming with a wealth of roses, your orchards laden with autumnal fruits, you would scarcely credit your senses; and yet, when the requisite number of half-hours, reckoned by days and months, shall have elapsed, you will greet these wonderful changes as perfectly natural and nothing to be wondered at. In a dissolving view that is well managed, Alpine peak and glacier pass melt imperceptibly into some tall cathedral and sunshiny market-place. The two scenes are wholly unlike, and yet it is contrived that at no moment should the passage from one to the other be discernibly abrupt. Is it not possible then to conceive that through an immense multitude of generations the form of an ape might be derived from the form of a fish? We do not mean to say that this has actually happened, but supposing the descendant of the fish to vary continuously in the direction of the ape-like form, the result would be intelligible enough. What, then, is there to determine variation in

any particular direction, and what limits are there, if any, to the system of interminable change which the principle of variation seems to involve?

Of course it is understood that the general mass of characters or qualities belonging to any creature are inherited by one generation from its immediate ancestors and transmitted to its immediate descendants, so that for a long period there would be a large number of individuals in the world united into a group by common characters, which according to their supposed importance we might call specific or generic. But besides this, there is the very curious principle of *Reversion* to be taken into account, as largely conducing to the comparative permanence of species. In Norway, I believe, when the father's name is Jack, and the son's name is Tom, Tom is called Tom Jackson, and Tom is in the habit of giving his own eldest son the grandfather's name, and then Tom Jackson's son is called Jack Tomson. Now, in the same way, in nature, it not unfrequently happens that when a long-nosed man is father of a short-nosed son, the son of the short-nosed man inherits by reversion the more elongated feature of his grandsire. Under certain conditions, which, however, greatly limit it, the operation of this principle of Reversion may extend, so far as we know, to any quality whatever after an interval of any number of generations. The tendency, therefore, is to the permanence of species, and yet as will be shown in the sequel, it has furnished Mr. Darwin with an additional argument to prove that species are not permanent. It must be borne in mind that when

a character reverts from a very distant ancestor, the creature which inherits it will have numerous other qualities, all probably more or less differing from those originally united to the reversionary character; just as if, in the School of Art, a picture by Raffaelle were shewn to fifty pupils, and when it had been copied by the first, the second pupil were to make a copy of the copy, and so on to the end, each of the copies would no doubt differ more and more from the original, and yet in the very last, by the help of memory or sympathetic genius, there might be some beauty not to be found in any of the others, recalling the hand of the great master; while it is true that if the sketch were something exceedingly simple, the fiftieth copy, and all the intermediate ones, might be almost exactly like the original; and so in nature, exceedingly simple organisms are seemingly reproduced for almost endless generations with no change, or scarcely any.

If it be true that all living creatures on this earth spring from a very few, extremely simple, original germs of life, we have to explain how it is that now there is an enormous variety of highly organized creatures, and at the same time some of extreme simplicity. For, if the simplest forms are permanent, how can the more complex be derived from them? On the other hand, if the simplest forms vary, how is it that we find, as we do, the very earliest known form of life still living at the present day? The solution is easy to suggest, that the offspring of very simple forms are sometimes exactly like their parents, and sometimes not exactly like. From

what has been said above of Inheritance and Variation, this is in the highest degree probable, and, this being admitted, it will follow that according to circumstances the progeny that are like their parents, or those that are unlike, will have the best of it. Why this follows will now have to be explained.

All over the surface of our globe there is *a struggle for life* going on. The instinct of self-preservation is probably stronger than any other, so that we may rely upon it that the creatures of every race will strive to preserve their own existence, if need be, at the expense of that of others. It may be horrible to the sentimentalist, but it is true; and remember that man as well as the tiger is a carnivorous mammal. There is no beast or bird of prey that can be compared with man for his ravaging, destructive, butchering, remorseless dissipation of other forms of life, to preserve his own existence and make it comfortable. He secures his gluttony from famine, as far as he can, by being omnivorous. Moss and fungus, grass and herb, leaf and flower and stem and fruit, all alike find a grave in man. The lion and the flea are the victims of his fear; many a harmless snake and toad of his antipathy; the otter and the fox die for his sport; the ostrich and the ermine for his vanity. For his food, like a wolf, he slays the harmless sheep. Like a hawk, he pounces on the innocent chicken; like a wily panther, surprises the antlered stag; devours fish like a shark; spreads nets for his prey like a spider; and in some instances acquires a well-developed taste for the flesh of his fellow man.

Practically with all living animals, the first consideration is food. If all living animals could obtain abundance of pleasant and suitable food without preying on one another, the scene of war which Nature presents would perhaps in a great measure disappear. Yet this warfare is as conspicuous in the vegetable as it is in the animal kingdom. There is a certain amount of nourishment in a given piece of ground, and for that nourishment the plants upon it will compete, some thriving and multiplying to the hindrance and destruction of the others. Here again, if the surface of the globe supplied nutriment for all its plants, there should be at least no need for this destructive competition.

And how is it that this wide, wide world does not supply food enough for all the vegetable forms that make an effort to live upon it? The answer to this curious question has long been known, though not sufficiently attended to. It would not be fair to say that Nature is stingy in her supplies of food, but rather that she is too generously prolific of forms of life. For, take the supposition that all living creatures, whether animal or vegetable, were shielded from all enemies and influences at present hurtful to them, and let us see to what it would bring us. A single grain of wheat produces an ear containing ten, twenty, or some larger number of grains. But if the ear contained only two grains, still at that rate of increase, a single grain would in thirty years be represented by more than a thousand millions of grains.* What, then, would be the position

*1,073, 741, 824. grains.

of the world, if, starting with a thousand millions of grains, this rate of increase were allowed to continue unchecked, not for thirty years, but for three thousand? But Mr. Darwin has calculated in regard to the elephant, which is reckoned the slowest breeder of all known animals, that, according to the very lowest probable rate of natural increase, a single pair would in five hundred years have a progeny of fifteen million living elephants.* Now fancy an island like our own, only in a climate suitable to elephants, into which a couple should have found their way a thousand years back. At the end of five hundred years, if all that were born were enabled to breed unchecked, there would be at least fifteen millions of their huge descendants stalking about the land; but, at the end of five hundred years more, there would be one hundred and twelve millions of millions of elephants. Goodness! What a stupendous menagerie! What a zoological garden! What a prospect at the end of the next five hundred years! And all this time, remember, according to our sentimental, philanthropic, philelephantine, nature-improving scheme, the men and women, the donkeys with a soul above thistles, the thistles no longer toothsome to donkeys, the mice, the rats, the cats, the oaks, the cabbages, the toadstools, would have been multiplying, not in the same proportion as the elephants, but very much more rapidly. The great desideratum would be standing room. The back of an elephant, or the branch of an oak, would no doubt

*On the Origin of Species. p. 74. Fourth Edition.

command an enormous rent, and a right of way across the heads of your neighbours would be religiously guarded by the law of the land. Nor would the position of affairs be better in the surrounding sea; for while these elephants have been computed to breed at the rate of two young ones in thirty years, a single codfish has been found to produce in one year more than six millions of eggs, and there are other creatures infinitely more prolific.*

You see, then, that the struggle for existence is an absolute necessity; and out of this all-essential strife springs what has been well called Natural Selection. What is meant by this will more easily be understood by looking first at Artificial Selection, which has been practised by man, sometimes consciously, and oftener unconsciously, in the process of domesticating a great number of plants and animals. Dogs, sheep, bulls, pigs, horses, fowls, pigeons, cabbages and other culinary vegetables, strawberries and all manner of edible fruits, together with gay-coloured, curiously-formed, sweetly-perfumed garden-flowers innumerable, have been and are still being, subjected to man's selection. That the wonderful changes which occur are indeed due to man's repeated choice of the varieties which suit his purposes, is clear from this, that all the remarkable changes have taken place in those particular qualities which man has valued, leaving the other qualities comparatively unaltered. Let it be speed, size, taste, colour, form,

*Darwin. "Animals and Plants under Domestication." Vol. II. p. 379.

temper, the coat, the feathers, the flesh, the muscular strength, the powers of endurance; in a vegetable, let it be the root, the stem, the leaf, the flower, the fruit, the seed, let it be what it will that is of value, that part and that character has been in each case most highly developed. To take a few examples: You are fond of peas, and you sow in your garden what your seedsman tells you are the finest new varieties; you like strawberries, you admire roses, you fancy a good cabbage, you are particular about having a mealy potato; so in each case you plant what you understand to be the best new kinds. What will you say if it turns out that the roses have improved in their roots but not in the bloom, and the potatoes in the bloom but not in their tubers; that the strawberries have remarkably fine leaves but very small fruit; that the peas and the cabbages have indeed enormous stems, while the seed of the one and the leaf of the other are insignificant in size and tasteless to the palate. So, too, if you purchase a race-horse and a pig from the most noted breeders of those animals, will you not be disgusted if it turns out that the horse has a remarkable propensity for fattening, while the pig is distinguished by nothing but its extreme fleetness of foot? These disappointments do not occur, because the variations of domesticated plants and animals are selected by competent persons. Were strawberry-leaves of as much importance in horticulture as they are in heraldry, many fine varieties would soon be exhibited. As soon as the most minute tendency to vary in any particular direction has been descried in any living

creature, the fancier can exaggerate the difference to an extent inconceivable to the inexperienced. As a popular illustration of this, we may take the Big Gooseberry, which fills so large a space in the newspapers when Parliament is prorogued. A gooseberry has been grown weighing more than 37 pennyweights—that is, nearly two ounces.* But mere size is not a fair test of the extreme plasticity of living organisms. You may have your trees growing stiffly upright, or with pendulous branches and prostrate stems: you may have your cattle long-horned, short-horned, or with no horns at all; your rabbits straight-eared or lop-eared; your fowls with every variety of comb and crest and wattles and plumage; and your pigeons pretty well at discretion. A type is prefigured, and the fancier produces it; and what is done for amusement with pigeons, is done for food, for profit, for the good of mankind at large, by the grower of corn, by the breeder of sheep, by all the wise produce-masters of the world.†

Such is Artificial Selection; but man is after all but one of Nature's works, and one of her numerous agents. All that he does, however miraculous it may seem, can only be done under her conditions, and by the means which she supplies. In Artificial Selection man does but take advantage of the natural laws of Inheritance and Variation, and while he is seeking by means of these to

*37 dwts, 7 grs., or 895 grs., between seven and eight times the size of the wild fruit. See "Animals and Plants under Domestication." Vol. I., p. 356.

†Darwin. "Animals and Plants under Domestication," passim.

produce one alteration, Nature herself is producing perhaps a hundred others. For, by the law of *Correlation*, when one part changes, some other or others almost inevitably change with it. Whether it be shortening the beak of a pigeon or lengthening the neck of a giraffe that is in question, Nature takes care, along with the change, to make other adaptations of the structure in the creature's interest under its altered circumstances. Surely, the working of this principle of Correlation indicates a far-sighted Providence of the results, the disastrous monstrosities, that would otherwise have sprung from the law of Variation.

Man's efforts are considerably limited, moreover, by the law of Reversion. Now, supposing many differing species to be descended, as we maintain, from common ancestors, what ought to be the observable effects of this law? Evidently, we should expect the character of one species now and then to appear in species allied to it, or species of kindred origin to vary in the same manner. In accordance with such an expectation, we find the horse and the ass sometimes assuming the stripes of the quagga and the zebra; certain varieties of the pigeon, the fowl, the turkey, the canary-bird, the duck, and the goose, all have top-knots or reversed feathers on their heads; one kind of melon resembles a cucumber in everything but taste; there are purple-leaved varieties of the beech and the hazel; and a great multitude of plants sometimes exhibit their leaves cut, blotched, and variegated.*

Now, from the working of Nature under, as it were,

*"Animals and Plants under Domestication, Vol. II., pp. 348—351."

man's guidance, we pass to the working of Nature when left to her own discretion. The work of Natural Selection is a very slow and secret work; the slowness of it veils the movement. As with the hour-hand of a tiny watch travelling but an inch in a day, there is progress which you cannot discern, there is change that can be marked and registered at intervals, though each successive moment and each successive movement seem to leave things exactly as they were. You have heard of the Greek simpleton who had been told that a raven lived three hundred years, and so bought one to see. We might live three thousand years instead of three hundred without being able to prove the theory of Natural Selection by actual observing. But when a group of most important observed facts can be explained consistently by this theory, and by none other, while no fact has been brought forward to make it inadmissible, it ought to be accepted till some theory can be produced equally unimpeachable and explanatory of a larger group of facts.

Qualities are inherited; but with this peculiarity, that very generally, and sometimes of necessity, the inheritor comes into possession of the inherited quality at the same period of life at which it was acquired by the parent. As, for instance, the child of a gouty father, though it may be destined in old age to inherit the disease, is not born with the gout, any more than a calf is born with horns, or a cherry-tree produced covered with cherries. In the life of every creature there is not merely growth, but development. At every stage of life

it is possible for some quality acquired by variation to be fixed by Natural Selection. But in the embryonic and earliest stages of development, variation is least likely to be of service to any creature. Such variations, therefore, will less often be selected than others, and if it be true that many species have a common ancestry, then it ought to be found that in their embryonic and earliest stages they resemble one another. This is precisely what we do find. Plants, the most remote in appearance and properties when full grown, differ but slightly in their cotyledons: the difference between the egg of a nightingale and the egg of an ostrich bears no proportion to the dissimilarity between the two birds when fully developed; nor by comparing the roe of a herring with the roe of a salmon could you possibly guess, before experience, how the full-grown fish would differ. But in the life of every human being there is a stage of development, at which the most sagacious physician could not distinguish him from the embryo of a snake, a lizard, a bird, or an ape.* Now, if the simplest embryonic forms of life were the progenitors of all existing forms, this is intelligible; but how else can it be explained?

* An important caution may here be quoted from Mr. Herbert Spencer. "An impression," he says, "has been given by those who have popularized the sentiments of Embryologists, that, during its development, each higher organism passes through stages in which it resembles the adult forms of lower organisms—that the embryo of a man is at one time like a fish, and at another time like a reptile. This is not the fact. The fact established is, that up to a certain point, the embryos of a man and a fish continue similar, and that then differences begin to appear and increase—the one embryo approaching more and more towards the form of a fish; the other diverging from it more and more. And so with the resemblances to the more advanced types."
Principles of Biology, Vol. 1, *p.* 143.

But, again, if species do not vary, how comes it that those living at the present day are for the most part not to be found among the fossil creatures of the ancient rocks? Well, some will tell you there have been many distinct creations, following after many catastrophes potent to destroy all the previous inhabitants of the globe. Well, I would answer, if you rest on Scripture, that view has no basis in Scripture, but if you do not rest on Scripture, it certainly has no scientific foundation, for though the crust of the globe has been made what it is almost exclusively by the action of fire and water, the effect of any sudden convulsions has been a mere nothing as compared with the results from the steady, slow-going, ceaselessly-operating forces of those two agents. Besides, when you look back through the rocks of different ages, not only do you find some forms the same in all, which testifies to the permanent unity of the living creation, but in those forms which differ, you find the differences increasing the further you go back, and some forms you find which have no modern representatives, forms, that is, which have been beaten in the struggle for existence.

Travel over the globe, and every country will present you with some new species; distant rivers, distant islands, in the ocean shallows separated by great deeps, the opposite sides of a continent, the twin sides of a mountain chain, the foot, the spur, the knee, the breast, the snow-clad head of an Alpine range, will all present you with their own peculiar forms of life. And how came they there? Created, some will say, *in* those regions

and *for* those regions, because of their special adaptation to them. Yet, since the globe has been inhabited, vast tracts of it have changed their climates from tropical heat to frozen gloom, and again, yielded the thick-ribbed ice to genial suns and fragrant zephyrs. Unhappy species, the creatures of a fixed idea, created for the temperate meridian of Devonshire, and condemned by the thoughtlessness of nature, to pass their lives in a climate like that of Nova Zembla!

But further, had each species been assigned to its station, as some suppose, by a single act of creation, is it not reasonable, does not reverence require us to expect that each species would have been best off in its own station? But this is not the case. On the contrary, imported species of plants and animals often thrive prodigiously in their new *habitat*, and over-run it.

Once more, we find in numberless plants and animals rudimentary organs that are of no use to the possessors, —mammæ, that give no milk; pistils, in male florets; in insects wings too small for flight, and soldered to the wing cases; the fifth toe in the hind-foot of the dog; the spur of the hen; the wing of the Apteryx; and the stunted, ineffectual, but ever-present tail in our noble selves.

On the old theory of creation, in face of these facts, we cannot save the admired doctrine that nature does nothing in vain; but on the Darwinian theory of creation, that doctrine still holds good, and wisdom is still justified by all her productions; for Natural Selection works only for the good of a species; it does not work in

vain, or waste its efforts in getting rid of any organ simply because it is useless, so long as it is not injurious; it leaves it as it was and where it was, a germ, a capacity, perhaps, in the future, to be re-developed or fitted for a new purpose.

Here we have incidentally touched upon what seems to be morally the grandest part of the whole theory, an even sublime explanation, as far as it goes, of that small fraction which we see in terrestrial life of the great and manifold works of God. We noted above that it is to death, a necessity much hated, much maligned, that we owe the possibility of our own birth and standing-room on the face of the globe; but the theory of Natural Selection makes it further clear that the causes of death which we most dread and think evil of—war and famine and pestilence—are tending continually to improve the races of living creatures. On the whole, the wisest, the strongest, the healthiest survive to propagate their species. In the long run, prudence, courage, and temperance prevail, and their owners become the parents of the later generations.

When the competition for life becomes severe, as to every race of creatures, man included, it does at times become, the smallest advantageous variation will give its possessor a superior chance of surviving, while the smallest that is disadvantageous will diminish the chance. Take the apposite instance of a number of quadrupeds incapable of climbing, supported by browsing on the leaves of trees during a dearth of other suitable food. When the lower leaves within the general reach were

exhausted, the famine still continuing, those animals alone would survive which, by some peculiarity, could reach the higher leaves. In this way, those that could spring best, those that could assume even a climbing posture, those endowed with the longest legs, snouts, or necks, would be selected. In some such a way, then, we can conceive the jumping powers of the kangaroo and the antelope, the climbing powers of the bear and the cat, the trunk of the elephant, and the long neck of the giraffe to have been evolved by natural selection. The keen scent of the hound, the sharp eye of the lynx, the gay colours of the butterfly, the splendid plumage of the bird of Paradise, are all easy to account for on this principle of natural selection. So, too, are the dull colours of many female birds, to whom obscurity is useful in protecting their young; so, too, the almost blindness of the mole, which works in the dark, and to which an instrument at once delicate and useless, would entail the risk of positive injury.

The principle explains what no other hypothesis has ever done, not only nature's perfection, which, in the hour of ease, we are ready to believe in, but what has hitherto been a much greater puzzle to those who knew of its existence, nature's imperfection. The whole creation is in constant travail to bring forth something better than its present best. The products of man's reason are not, you will readily admit, always perfect, and yet man's reason is a part of the creation, and of nature's work. The waste of life is prodigious, if such a term is applicable to the circumstance that often millions

of spores are produced in order that half a dozen plants may grow; millions of eggs in the roe of a fish, in order that the parents may be represented by three or four individuals. The bee defends itself by its sting, but its weapon of defence is fatal to itself. Were a merchant habitually to send five or six million articles of merchandize across the Atlantic on the bare possibility that five or six articles out of the number might reach their destination; or, were a father to arm his son with a weapon on the presumption that the first time he used it, it would cost him his life; you would think the man mad, not wise. Yet, if the astonishing fecundity of the braken, the mushroom, and the codfish, if the sting of the bee with its backward serratures, be the products of direct creation, the analogy is somewhat telling. How different, on the other hand, must our judgment be of those contrivances, when we trace them to the simple, primary, beneficent law of natural selection, working always steadily for the good of each species, and so working, that we may feel tolerably sure that when any species dies out and disappears, it has been replaced by something better. For, by this law, we see that fertility itself is a character which will be selected as tending to the preservation of a species, and that many creatures must have acquired the power of what looks like wasteful reproduction in the long-continued struggle for existence. We can see, too, how in that same struggle, it may have proved expedient for a creature to be armed with a weapon capable of inspiring terror, yet so contrived that its possessor should, of necessity, be peaceful towards its neighbours. True,

this might have been done by a single act of creation, but why, then, was it not done also in the case of the mosquito, the wasp, and the hornet?

On the theory of sudden creation, how can we account in any but an arbitrary manner, for the innumerable cases in which slight differences separate various species; for the confused neutral ground between different classes, as where, for example, a creature seems half animal half plant; for the isolation of many forms from the stations they are admirably fitted to occupy; for the fact that many creatures are hideous, weak, timid, violent, and venomous; for the imperfection of an instinct in one species found perfected in another, which Mr. Darwin exemplifies by comparing the cells of the humble-bee, the *melipona domestica* of Mexico, and the hive-bee, ranging from great simplicity to an extreme perfection.* But the principle of natural selection offers a solution to every one of these enigmas. It embraces all the various phases of life of the ancient world as well as the modern, and gives a key to the whole grand uninterrupted plan. It carries back the mind to a period when the earth was destitute of life; when yet, as it were, the

* "Origin of Species," p. 270. Mr. Darwin shows how the hexagonal cells of the hive-bee can have arisen from the simple cylindrical form, by bringing the cylinders sufficiently near together, so that their outlines, if completed, would intersect.

The Humble-bee makes separate and very irregular rounded cells.

The Melipona Domestica makes cells that are nearly spherical, but too near together for the spheres to be complete, flat walls of wax being built where they tend to intersect.

A little extra regularity, advantageous for the saving of wax and labour, would produce the symmetrical comb of the hive-bee with its two layers of hexagonal prisms.

thought in the Divine mind was still unspoken, that of one, and that as good as dead, should spring seed like the sand which is upon the sea-shore for multitude. Then it came to pass that the dust of the earth was called into life by the Life-Giver, and received the strange command and the mysterious power to multiply, and to replenish the earth. As soon as living creatures multiplied to any great extent, they would spread themselves into different lands and seas and climates; they would find different sources of nourishment, and then variation would come into play, and close upon variation would follow selection, not of necessity destroying the old forms, but establishing new ones, because in some stations the form that had not varied might thrive best, in others the variety would have an advantage.* As time went on, through the constant changes that the surface of the globe is undergoing, one variety would be isolated from another, and in such an isolation the differences would increase. And the more a species varied, the more fitted it might become for some *habitat*, from which it was completely cut off by a chain of mountains, a rapid river, or a deep sea. As the competition became more intense, variations would become more and more valuable, enabling creatures to occupy positions before untenable, ocean-depths, sandy shores, holes in rocks, fresh-water lakes, tops of mountains, branches of trees, the bodies of other living beings. Some would be taught by necessity and enabled by favourable variations to prey, as

*See "Principles of Biology," Vol. I. pp. 428—431.

well as take up their abode, on other creatures. And as the strife became more and more urgent, all sorts of qualities that from our point of view may seem noxious and degrading might prove of the highest service and advantage to their own possessors. Plants with sharp thorns and envenomed hairs, poisonous snakes, trichinæ and other parasites horrible to man, would find their advantage at our cost, or by unparalleled fertility would defy all efforts to extirpate them. Some species would profit by minuteness, others by size; others, in various ways, by talon, beak, thread-like tongue, prehensile tail, or furry coat; and, just as men are said to go through fire and water for the sake of money, so for the sake of preservation, no habit, no locality would be too uncongenial for a species to develop adaptation thereunto. And, accordingly, we find that the water-ouzel, which is a species of thrush, subsists entirely by diving; there is a tree-climbing lobster in the Mauritius; there are fishes which ramble about on the land, and one fish, the *anabas scandens*, can climb eight or ten feet up the trunk of a palm.*

The choice of food, the choice of habitation, the construction of dwelling-places for themselves or their offspring, methods of defence, methods of attack, are variously carried out by myriads of species. The processes employed, in man we call for the most part rational, in the lower animals we call them instinctive, but there are processes employed for these self-same

* "Origin of Species," p. 213. "Principles of Biology," Vol. I. p. 394, and p. 392.

objects by vegetables as well as by men. For plants, in one sense stationary, travel towards water by their roots, towards light by their branches; they assimilate the elements of nutriment that suit them, rejecting others. The Sensitive plant shrinks from the touch, Venus's Fly-trap closes round unwary insects and destroys them. Tendrils fasten on the supports that are offered them. Trees keep in their delicate blossoms till the weather is genial. Many a corolla folds carefully round stamens and pistils when the chilly twilight approaches.

Pass from proceedings like these to the swimming movements of a beheaded Dytiscus,* and other reflex actions in animals, to the food-seeking movements of the tentaculæ of the Hydra or fresh-water Polype, which hover doubtfully between reflex and instinctive action: go forward through the innumerable gradations of instinct till you come, for instance, to the spider, weaving its symmetrical web, rushing out of its lair to seize the prey when the web is shaken lightly, but keeping itself close from a too dangerous foe when the web is vehemently shaken. Examine the nest of the Mygale (the Trap-door spider) lined with silken tapestry, furnished with a door on a silken hinge, which it covers above with materials like the surrounding soil, and holds from beneath against an intruder, by applying its claws to the most advantageous point, the point most distant from the hinge: consider the little Sylvia Sutoria, or Tailor-Bird, which draws filaments of cotton from the

* Carpenter, "Animal Physiology," Chap. 14.

cotton-plant, and sews leaves together with its beak and feet to form a nest; go to the huts and river-dams of the beaver; attend a conclave of rooks judging an offender; look into the hive of the hive-bee; observe the conscious vanity of the peacock; preach liberty to the slave-making ants; watch the sagacious ways of dogs and horses; and then lastly see if it be possible to resist the conclusion that, were all forms that ever existed, from the earliest geological times to our own, present before us in the order of their genealogies, we should see them to be the members of a single family, now, indeed, immensely divergent, yet all united by some affinity or affinities, whether dimly or conspicuously shown.

How strangely men and beasts are united by similarity of blood and fibre! How strangely fishes, birds and mammals by the likeness of the vertebrate skeleton! How strangely plants and animals by the phænomena of generation, not only in the union of the sexes, but also in (*agamogenesis* or) asexual reproduction! Need we wonder at community of origin between a coral and a cactus, a whale and a sloth, a wolf and a Shylock, when we find that a lady's silken tresses, the bristles of a boar, the quill of the porcupine, the feathers of the owl, and the horns of the buffalo, are parallel and specifically interchangeable developments.

Consider the vine, with its stem, branches, twigs, roots, rootlets, leaves, tendrils, and the luscious grapes of the ripe cluster. From one seed sprang all of these. On the bough of an orange tree there live and grow

together leaf and petiole, flower and fruit, the green unripe fruit, the yellow and the golden-ripe. All these from one seed. Yet there is no jealousy among them. No one disowns a kindred origin for the root of the tree and its golden fruit, utterly unlike as these are, but, like so many other utterly unlike things in this world, sprung from the same germ.

To have produced and accumulated the vast divergences that now exist, a lapse of time, indeed, must be conceded, unmeasured and perhaps immeasurable; but this lapse of time is precisely what geology, independently of Darwinism, has already demanded. As the Scriptures speak of the earth as immovable, because so it is in reference to the senses of man, they speak also of the everlasting mountains, and with them the rocks are a type of the eternal: compared with the life of man these expressions are truthful and well-chosen, but they do not mean to say that the rocks are as eternal as God, nor yet everlasting compared with the existence of the globe. It may have taken ten thousand centuries to rear up a mountain, and yet, if we reckon the age of the globe on the scale of a man's life, the mountain be but of yesterday.

The immense antiquity, not only of the globe, but of that thin crust of it open to our inspection, has been ascertained by geology. Geology, again, has made it certain that during millions of years, changes on the earth's surface have been in continual progress, so that not once merely, but many times over, continents and oceans must have yielded to one another, yet by no

sudden, but ever by a gradual transposition, such as is in constant progress at the present day.

Seeing that the dwelling-place of living creatures is thus continually and continuously changing, how clumsy an arrangement it would have been had the forms of life been made constant, instead of being endowed, as they clearly have been, with a wonderful power of adaptation. The question, be it remembered, is not for a moment whether God has made the universe, but *how* He has made that portion of it which He has enabled us to see and examine. Nor yet, to be thoroughly accurate, is it in question *how* He has worked, but how He has been pleased to exhibit His operations to the reasoning minds of men. What is worthy of God we cannot indeed judge. We can only believe that the things which are, stand worthiest of His wisdom and goodness, whatever faults may seem in them to our rashly judging short-sightedness. But comparing theories of creation according to human notions, is it a nobler conception that God should have made successively groups of beings to fill the world, and then swept them away to make room for others nearly like them; each time, as it were, improving on His first idea, and so arguing the imperfection of what had gone before by the very improvement of what followed; or that, forseeing the perfect types from the beginning, He should have called into existence seeds of life capable, under the laws He gave them, of rising in successive generations through countless ages, to endowments of the noblest order, to a conscious life, to a reasoning faculty, to a moral sense, to a knowledge of

God. In such an origin there is for man no degradation, since the lowliness of his parentage has ever been traced back to the dust of the ground; and the lowest form of life is higher in our imaginations than the dull brute earth. Indeed, if we desire to exalt our self-appreciation, whether is it grander for us to have been the work of an instant, or to have been elaborated with Divine care through millions of ages? Will not any miracle in our behalf, however stupendous, seem more credible on the latter than on the former supposition? When we see what Development has already done for the human species, we can the more readily imagine what, under the same Lawgiver, it may do in the future for the individuals of our race. When we find it possible or probable that our own bodies contain resemblances to ancestors enormously remote in time, simply because they contain atoms from the bodies of those very ancestors living again in ourselves, we can understand how in a future, whether near or enormously remote, atoms from the very body of the man that dies may be called into a renewed existence, and clothed again with all that is necessary to personal identity, though haply more transformed and higher raised above the old self, than would be an ourang-outang or a naked savage, were they enabled to combine the chivalric courtesy of Sir Philip Sydney with the genius of Sophocles and Skakespere.

COCKREM PRINTER, TORQUAY.

DE LA

GÉNÉRATION SPONTANÉE.

Avons-nous eu père et mère?

Il y a un peu plus d'un siècle que Needham, naturaliste anglais, dans son livre : *New microscopical discoveries*, *London* 1745, imagina ou plutôt renouvela le système de la génération spontanée, qui n'était pas inconnu des anciens. Voltaire se moqua de Needham; mais Spallanzani et Buffon prirent la question au sérieux et tâchèrent de la résoudre.

Y ont-ils réussi? — C'est douteux, puisque l'année 1860 a vu nos savants rentrer dans l'arène.

Nous ne rappellerons pas les péripéties du combat qui, s'il ne prouva rien, amena du moins une série d'expériences dont la science profita et aussi le public, lequel y prit cet intérêt qui s'attache à toutes les grandes discussions quand elles sont à la fois profondes, consciencieuses et courtoises.

Lorsque deux camps sont en présence, il faut prendre parti pour l'un ou pour l'autre, car si vous demeurez entre eux, vous courez risque de recevoir les coups des deux côtés. Vétéran de toutes les guerres, j'ai fait comme ce digne Écossais, le plus pacifique des hommes, sauf qu'il ne pouvait voir briller un glaive sans tirer le sien; je me

suis jeté dans la mêlée et, en véritable héros d'Homère, j'ai commencé par un *speech* dont le texte est celui-ci :

Père et mère honoreras,

commandement que Dieu ne nous eût pas fait, si nous n'avions eu ni père ni mère.

Je vous tiens quitte du premier point de mon sermon et même du second, et je vais droit aux conclusions.

La génération spontanée est une rêverie, et de celles qui ne peuvent faire de bien à personne, parce que si elle était admise, elle conduirait droit au matérialisme. Si la matière inerte pouvait produire le moindre des corps organisés ou une chose jouissant de la vie et conséquemment de la volonté, de la mémoire, du désir, de l'espérance, enfin des principales facultés qui caractérisent l'homme lui-même, on ne voit pas pourquoi cet homme aussi ne serait pas une création spontanée, et par quelle raison il ne naîtrait pas partout où existeraient les conditions nécessaires pour le faire vivre.

La taille et le poids ne sont rien dans la création, et une souris peut avoir plus d'intelligence qu'un bœuf. Or, cette intelligence d'où lui vient-elle?—De la matière.—Elle était donc dans la matière, car on ne peut tirer d'une chose que ce qui y est. L'intelligence est-elle autre que la vie, et la vie autre que l'individu (1)?

Nous posons donc ce dilemme : ou la vie est dans a matière, ou elle n'y est pas. — Si elle y est, il n'y a pas de créature spontanée. — Si elle n'y est pas, il ne peut pas y en avoir.

Blessant à la fois la raison et l'évidence et annulant

(1) En d'autres termes, il n'y a pas de vie collective ni d'âme divisible. L'âme, la vie et l'individualité ne sont qu'une. (Voir : *De la Création, essai sur l'origine des êtres*).

Dieu lui-même, la génération spontanée n'est pas possible. Mais fût-elle réelle, je vous dirai que toute la science humaine, aidée des plus puissants instruments, ne saurait démontrer cette spontanéité. Toutes les expériences qu'on présente comme convaincantes n'ont, à mes yeux, aucune valeur. Vous avez isolé un corps quelconque de tout contact extérieur, dites-vous? — Non, vous ne l'avez isolé ni de la lumière, ni de la chaleur, ni de vous-même ou de votre fluide : or, dans cette lumière, dans votre souffle, dans la vapeur plus ou moins chaude qui s'échappe de vos organes comme de tous les corps vivants, il y a des germes (1).

En vain vous me direz : *Il n'y en a pas.* — Je vous répondrai : Qu'en savez-vous? vos yeux, vos instruments mêmes sont-ils infaillibles? est-ce que rien ne vous échappe? voyez-vous l'âme, la vie? voyez-vous le principe qui met en mouvement la sève des plantes, qui les féconde et leur fait produire des fleurs et des fruits? Le jour où vous avez découvert le microscope, un monde inconnu s'est ouvert devant vous : vous avez aperçu ce que vous ne soupçonniez même pas et ce que les naturalistes les plus avancés auraient traité de vision et de fable. Qu'il naisse un opticien plus habile ou plus heureux que ses prédécesseurs, qu'il invente une machine plus puissante, c'est encore un nouveau monde où vous allez mettre le

(1) Tout germe, par sa nature, est attractif, comme d'ailleurs du plus au moins le sont tous les corps, même inertes. Ce n'est qu'ainsi qu'on peut expliquer l'existence des masses ou des parties solides. Quand la dissolution les atteint, c'est que leur attraction cesse et qu'ils cèdent à celle d'autres corps. La diversité des attractions et des matières sur lesquelles elles s'exercent, fait la diversité et la spécialité des corps. Les germes attirent l'élément nécessaire à leur développement. Tous les germes ne forment pas des corps, mais ceux qui avortent contribuent à la formation des autres.

pied, et vous verrez des milliers d'êtres où vous n'en aperceviez pas un seul.

Les germes organiques sont partout : la terre, la mer, l'air en sont remplis (1). S'ils s'en éloignent un instant, bientôt ils y reparaissent. La chaleur, la lumière, l'électricité et d'autres moteurs que nous ignorons les font surgir des entrailles de la terre comme des profondeurs de l'espace et peut-être de quelqu'autre globe, car ces germes marchent aussi vite que ces rayons, que cette chaleur, que ce son, que cette lumière, que cette électricité qui les conduit ou qui les pousse.

Nos corps surtout, comme ceux des animaux et des végétaux mêmes, sont les grands moyens de transport des germes et les conducteurs de cette essence fécondante qui les éveille et les nourrit (2).

(1) Il viendra un temps où l'on regardera comme anormaux et faisant exception, les corps où l'on ne trouvera ni germes ni êtres. Qui sait même si ces êtres ou ces atomes mobiles, ces corpuscules qui vivent et circulent en nous, ne sont pas aussi indispensables à notre existence que le chyle et le sang ?

(2) Tout s'enchaîne dans la nature, tout s'entr'aide à vivre et à mourir ; car la mort elle-même, ce grand renouvellement des organes, n'est qu'un des moyens de la vie. Si, par cette mort ou cette dissolution de l'enveloppe, nos corps deviennent poussière, ce n'est pas de la poussière ou de ces détritus, de cet humus seulement propre à la végétation qu'ils se reconstituent, c'est de la matière répandue dans l'atmosphère, de cette matière qui a un mouvement et une chaleur qui lui sont propres ou qui lui communiquent ces effluves de la vie, ces émanations de nous, enfin ce gaz vital qui, dans l'état normal, s'échappe de nos corps par sa surabondance même et va nourrir et activer la vie dans d'autres corps. C'est ce même gaz, non encore signalé et attendant l'analyse, qui, dans la vieillesse, la maladie ou les blessures, se perd en nous sans se reproduire ni sans être compensé par celui que, bien portant, nous recevons d'autres êtres. C'est quand la puissance attractive de nos organes est tout-à-fait épuisée, quand notre corps usé ne peut ni produire suffisamment ni retenir le gaz qui lui est propre, ni absorber celui d'autrui, que la vie l'abandonne. Cependant, ce gaz

Comment admettre des êtres spontanés ou de génération sans précédents, quand il existe partout, non-seulement des germes préexistants, mais des germes fécondants et toutes les parties accessoires nécessaires à la constitution organique et au développement de ces êtres? Dans ces créatures improvisées, sans passé ni avenir, je ne pourrais voir qu'une anomalie, qu'une superfétation. Je n'y reconnaîtrais pas même de spontanéité ni de création, je n'y verrais que l'arrangement ou l'assemblage de parties déjà prêtes. L'expérimentateur serait ici dans la position du maçon à qui l'on fournit le plan et la matière pour bâtir une maison, pierre, fer, bois, mortier, et qui n'a plus qu'à les mettre en place.

Encore ici notre opérateur ne les y met-il pas, car ils s'y mettent seuls.

Comment se font ces créations dites spontanées? — Par la macération de produits végétaux, par une infusion de plantes plongées dans l'eau qu'on a fait bouillir dans un ballon. De ce mélange, on voit surgir des milliers de points mobiles, aspergilles ou autres, qu'on est convenu d'appeler animaux microscopiques, et l'on a donné cela comme une démonstration. En admettant que ce soit bien des êtres pourvus de tous les organes et propres à se reproduire, la seule conséquence que j'en tire, c'est que si ces êtres n'étaient pas dans le liquide, ils étaient dans la plante, et que

vital, ne nous y trompons pas, n'est point la vie, mais la parcelle de la matière la plus légère, la plus homogène au germe, la plus sensible à son attraction, celle enfin qui lui est le plus facile de s'assimiler et d'animaliser.

Ainsi, chaque germe, selon sa puissance vitale ou attractive, se pose en s'éveillant et se fortifie ensuite de cet élément réchauffé et épuré par ces myriades d'atomes ou de germes inféconds n'ayant que l'apparence d'êtres et qui sont seulement propres à nourrir d'autres germes, à les fortifier et à constituer d'autres corps.

le contact de l'eau chaude, loin de les tuer, les a fait éclore. Chose que nous voyons tous les jours dans nos mares et nos étangs, surtout l'été, quand, à demi-taris, les herbes y fermentent sous les rayons d'un soleil brûlant. Cette fermentation ne crée pas les êtres, mais elle les éveille et les pousse à agir.

En vain vous me direz que l'eau a été analysée et soumise à l'alambic, que la feuille ou la graine qu'on y plonge a été réduite en poudre, passée au tamis, puis au feu, et que vous avez pris les précautions les plus minutieuses pour prévenir toute communication et tout contact. — Je réponds : L'eau distillée, la matière calcinée, le vide opéré, l'air épuré, toutes les analyses et toutes les investigations microscopiques possibles, ne prouvent et ne peuvent rien prouver autre chose que l'impuissance de nos moyens, la faiblesse de nos yeux et l'insuffisance de nos cornues. Je suis parfaitement convaincu que vous n'avez pas vu de germes et que je n'en verrai pas plus que vous, mais je n'en tiens pas moins pour certain que là où un être apparaît, c'est que lui-même ou son germe y était.

On a aussi donné comme preuve de l'absence d'êtres dans l'atmosphère, le petit nombre de ceux qu'en rapporte la neige en tombant; mais n'en eût-elle apporté qu'un seul, il prouverait qu'il y en a, et ferait croire que tout autre corps que la neige, qui n'a rien d'attrayant, en aurait pu ramener davantage.

On nous dira que ce ne sont pas eux qui la cherchent, mais bien cette neige qui, les saisissant au passage et les enveloppant comme un réseau, devrait les amener en grand nombre, si réellement l'air en était peuplé.

A ceci, j'objecterai que ce réseau de neige me paraît à bien larges mailles pour que des animalcules et des germes aussi ténus ne puissent lui échapper, et que si cette neige est devenue assez épaisse pour former une couche opaque

et dès-lors imperméable, elle doit, par son poids et son mouvement, par la pression qu'elle exerce, par cet air qu'elle déplace, écarter ces corps sans les atteindre; ou si elle les atteint, sa première couche les ayant ramassés, il n'est pas étonnant qu'on n'en rencontre que peu ou point dans les suivantes. Cette expérience, non plus que les autres, n'est donc pas concluante.

Mais admettons qu'elle le soit et que votre théorie est une vérité, je demanderai : Ces êtres que vous faites naître ainsi spontanément, nouveaux sur la terre, y datent-ils de votre opération? sont-ils différents de ceux qu'ont vus vos prédécesseurs, ou bien ont-ils déjà eu leurs analogues? et parmi ces analogues, en est-il qui sont nés par la voie commune ou par la génération ordinaire? enfin, y aurait-il ici concurrence entre la nature et la science, ou si vous voulez, entre le chimiste et le Créateur? Si les êtres nés de la chimie sont venus au monde tout développés et sans subir ces épreuves qui, de l'état de germe et d'embryon, nous conduisent, à travers tous les dangers de la parturition, à la naissance, à l'enfance et à l'âge adulte, il faut avouer qu'ils sont singulièrement favorisés, et que l'enfant du laboratoire laisse ici bien loin derrière lui l'enfant de la nature.

Cependant, l'expérience nous prouve que cette nature choisit toujours les voies et les moyens qui sont à la fois les plus simples et les plus sûrs. Il est vrai qu'elle ne se hâte pas, qu'elle prend son temps, et que vos procédés sont infiniment plus expéditifs; mais sont-ils aussi certains, et toutes les formalités que vous avez mises de côté étaient-elles vraiment superflues? Quant à moi, routinier, j'ai foi aux anciennes méthodes, et je serais plus porté à croire aux générations spontanées si elles l'étaient un peu moins, ou si, au lieu de se faire à la minute ou en quelques heures, elles se faisaient en quelques mois; enfin, si je

voyais passer sous mes yeux toute cette suite de tranformations que l'anatomie nous montre dans le développement des espèces.

Si vous voulez me persuader, faites comme la nature : commencez par le commencement, créez d'abord un œuf, une graine, une bulbe, un bourgeon, un brin d'herbe ou de mousse, même une simple sporule, cela doit vous être facile : qui peut le plus, peut le moins. Ainsi je pourrai suivre toutes vos expériences, et il ne tiendra qu'à vous de me convaincre.

La nature nous a tracé les règles et fourni les modèles ; l'art doit les suivre et les imiter s'il se peut. Il en approchera quelquefois, mais jamais il ne les égalera, et moins encore ne les surpassera. — Tels étaient les conseils que je donnais à nos sculpteurs. Je serais tenté de les donner aussi à nos générateurs, dans la crainte qu'en voulant nous embellir, ils n'arrivent au résultat contraire ; et je leur dirais :

— Non-seulement vous n'embellirez pas les êtres, mais vous pourrez en faire d'étranges figures, de véritables monstres qui, par leur bizarrerie, désorientant nos naturalistes, dérangeraient nos plus belles classifications. Si vos créatures sont sans antécédents ni type de forme, si elles sont nées sans père ni mère, où seront leurs caractères de genres, d'espèces et de races ? A qui ressembleront-elles et d'où tireront-elles leur analogie ? Sans moule organique, jetées ainsi dans celui dú hasard (1), elles devront varier à l'infini ou selon les lieux et la circonstance. — Alors pourquoi le contraire arrive-t-il ? pourquoi vos aspergilles sont-elles toutes semblables ?

(1) Nous nous servons ici de cette expression faute d'autre. Le hasard n'est qu'un mot inventé par notre ignorance, pour désigner les effets dont nous ne connaissons pas les causes.

Cela seul indiquerait qu'il n'y a pas de spontanéité : la spontanéité n'est que l'accident, et jamais accident n'amène une suite d'effets réguliers et similaires. Jamais accident non plus n'a été créateur, parce qu'il n'y a rien d'improvisé dans la nature non plus que dans l'art : toute œuvre se compose de détails. Un choc, une convulsion, un coup de foudre, frappe, brise, détruit et n'édifie pas. Cette répétition des mêmes formes, cette vie qui, selon vous, les anime, prouvent donc qu'il n'y a pas d'accident et que la spontanéité n'est qu'apparente. Votre opération éveille ou développe un être, mais ne le crée pas. S'il se montre, c'est qu'il était là ; ou s'il n'y était pas, lui ou son germe, c'est qu'il s'y est introduit à l'aide même des moyens que vous avez pris pour l'en écarter.

— Mais qu'attendait-il pour paraître, direz-vous, et pourquoi ne se manifeste-t-il qu'au moment juste de notre opération ?

— C'est que par cette opération même vous l'avez mis en mesure de se manifester, et vous n'êtes pas plus le créateur de cet être que vous mettez en mouvement, que l'accoucheur n'est le père de l'enfant qu'il aide à venir au monde.

La puissance de l'homme peut aller jusqu'à modifier quelques parties extérieures de la forme et, de modification en modification, à présenter des variétés, des races même qu'on prendrait pour des espèces ; mais cette puissance ne va pas jusqu'à produire ces espèces, les perpétuer, ou d'une espèce en faire une autre, et moins encore à créer l'âme, la vie, et à la donner à la matière.

Si la génération spontanée était possible, à quoi servirait la génération lente et complexe ? Pourquoi ce travail progressif, cette succession de causes et d'effets : la fécondation, la conception, la gestation, la naissance et la croissance ? A quoi bon ce tâtonnement, cette suite de

demi-moyens, cette série de transitions et de métamorphoses pour amener à bien une seule créature, s'il suffisait de faire bouillir un peu de foin pour en créer une multitude?

Vous me direz : Il y a *créature* et *créature*. — Non, car je n'admets pas qu'il y ait *vie* et *vie*. La vie est toujours un *être*, et ce qui n'est pas un *être* est toujours la matière. Nul doute que cette matière entre dans la constitution de cet être, mais nul doute aussi qu'elle n'est pas cet être même, et qu'elle ne peut ni le produire ni l'animer. La création spontanée d'un puceron, s'il jouit de toutes les facultés de la vie, si c'est un être enfin, m'étonnerait tout autant que celle d'un enfant qu'on ferait apparaître en délayant un boisseau de farine dans un baril d'eau.

Cependant, je croirais à la possibilité de cette création si, dans cette farine, vous me montriez l'intelligence, la volonté, le désir, l'amour, la crainte, la vue, l'ouïe, l'odorat, le goût, enfin tout ce qui rentre dans les attributs d'une créature et la caractérise.

Et si toutes ces qualités s'y trouvent, je vous demanderai encore de m'y montrer le principe qui a pu les harmonier et former un tout pourvu d'organes aux ordres de la pensée, un tout ayant des fibres et des muscles esclaves de la volonté et qui lui obéissent en la réalisant en actions ou en la matérialisant en œuvres.

— Nos prétentions ne vont pas si haut, direz-vous; les êtres que nous faisons ne sont que de pauvres atomes, des animaux sans nom, enfin les plus infimes des créatures.

— D'accord; mais ces créatures vivent-elles? — Sans contredit. — Le savent-elles? — Certainement. — Veulent-elles continuer à vivre? — C'est probable, puisqu'elles se défendent quand on les attaque et qu'elles cherchent leur nourriture. — Vous reconnaissez donc toutes ces choses? — Oui. — Eh bien! ce que vous reconnaîtrez aussi, c'est que pour songer à se défendre et en avoir la volonté, il

faut prévoir et comprendre le danger ; que pour chercher sa nourriture, il faut la désirer et l'espérer ; que pour en retrouver le lendemain, on doit se rappeler où on l'a trouvée la veille.

Or, dans cette série d'actions communes à tous les animaux, quelque stupides que vous les supposiez, dans les facultés qu'elles nous révèlent, vous reconnaîtrez précisément celles que je viens de vous détailler : volonté, désir, courage, prévoyance, souvenir, espoir ; qualités sans lesquelles il n'est pas d'êtres, puisque sans elles la vie ne serait qu'une déception et qu'ils ne pourraient en faire usage ni la conserver même un jour ; qualités, ne l'oubliez pas, qui indiquent, comportent et rendent indispensables ces sens dont nous sommes pourvus nous-mêmes : le toucher, l'ouïe, la vue, le goût, l'odorat.

Et c'est en secouant une plante sèche dans un pot d'eau, ou en mêlant à cette eau du sucre ou de la gélatine, que vous allez produire toutes ces choses ! Allons donc !! Non, mille fois non, cela n'est pas et ne peut être, car cela blesse à la fois ma conscience et ma raison.

Je le répéterai encore : la vie ne peut naître que de la vie. Là où la vie n'est pas sous une forme quelconque, il ne peut paraître d'être. Ceci est l'évidence même, car la matière ne peut donner ce qui n'est pas en elle.

N'allons donc pas dire ici : *J'y crois parce que c'est impossible ;* car de toutes vos observations, quelque savantes et consciencieuses qu'elles soient, il n'en est pas une seule qui me montre cette possibilité, et qui nous fournisse même l'apparence d'une preuve. Tout votre système repose sur cette simple négation : *Nous n'avons pas vu.* Mais vous oubliez que si vous voyez aujourd'hui ce que vous n'avez pas vu hier, vous pourrez voir demain ce que vous ne voyez pas aujourd'hui. Finissons-en donc une bonne fois avec ces théories rêveuses, ou si nous

voulons les soutenir, appuyons-les de preuves qui aient une valeur quelconque.

P. S. On a fait à l'auteur l'objection suivante :

— Si vous donnez à la bête toutes les facultés de l'homme, quelle différence mettez-vous entre l'homme et la bête?

L'observation n'est pas nouvelle : on la lui fit en 1838, lorsque parut son livre sur la création et la progression des êtres.

Voici sa réponse :

— Cette différence est grande. L'homme n'est homme que parce qu'il a *en lui l'intuition de Dieu*, qu'il naît avec elle, et que quoi qu'il fasse, il ne peut l'y anéantir. Il n'y a jamais eu de peuple athée ; il n'y en aura jamais.

Voir ou ne pas voir la Divinité; avoir ou ne pas avoir en soi la faculté de la voir, telle est la différence entre l'homme et la bête.

Si l'intelligence de l'animal s'élevait jusqu'à entrevoir Dieu, *dès ce moment il serait homme.*

Abbeville, imp. P. Briez.