ART. VII.—1. *The Descent of Man and Selection in relation to Sex.* By CHARLES DARWIN, M.A., F.R.S. 2 vols. London: 1871.

2. *Contributions to the Theory of Natural Selection.* By A. R. WALLACE. Second Edition. London: 1871.

3. *On the Genesis of Species.* By St. GEORGE MIVART, F.R.S. London: 1871.

SINCE the publication of the 'Origin of Species' in 1859, no book of science has excited a keener interest than Mr. Darwin's new work on the 'Descent of Man.' In the drawing-room it is competing with the last new novel, and in the study it is troubling alike the man of science, the moralist, and the theologian. On every side it is raising a storm of mingled wrath, wonder, and admiration. In elegance of style, charm of manner, and deep knowledge of natural history, it stands almost without a rival among scientific works; and its popularity must be a keen pleasure to its author, if he be not lifted above the level of popular praise and blame, by his previous high achievements. The subject is of the very highest importance. In the 'Origin of Species,' the principles of the doctrine of natural selection were laid down, and in part had to be taken in trust because the whole of the evidence was not laid before the reader. The 'Variation under 'Domestication' formed the first instalment of the proof, in which Mr. Darwin showed how wonderfully plastic animals and plants become under the care of man, and how new breeds and varieties may be developed by constant selection, which he believes to be equal in classificatory rank to those ordinarily termed genera and species in nature. The present work contains the first application of the theory to a given case—the evolution of man, chosen by the author himself. As a crucial test therefore of the truth of his theory of creation, this work is of high value. But it has a higher claim on our attention than even this, for Mr. Darwin does not confine his argument to the origin of man's body from pre-existent forms; he ventures to carry it into the region of mind, and to account for man's spiritual powers by a process of natural selection from rudiments in the lower animals. It is indeed impossible to over-estimate the magnitude of the issue. If our humanity be merely the natural product of the modified faculties of brutes, most earnest-minded men will be compelled to give up those motives by which they have attempted to live noble and virtuous lives, as founded on a mistake; our moral

sense will turn out to be a mere developed instinct, identical in kind with those of ants or bees; and the revelation of God to us, and the hope of a future life, pleasurable day-dreams invented for the good of society. If these views be true, a revolution in thought is imminent, which will shake society to its very foundations, by destroying the sanctity of the conscience and the religious sense; for sooner or later they must find expression in men's lives. We propose to examine the evidence on which conclusions so far reaching as these are based, first of all taking up the argument as to man's bodily descent, and then passing on to that of the origin of our intellectual and moral faculties. The question before us, is, 'can man, body and soul, be accounted for by natural selection?' In discussing this we shall have occasion to examine the differences between the various races of men, and to see how far 'sexual selection' will account for those variations which cannot be explained by the theory of 'the survival of the 'fittest.' We will not here anticipate the conclusion of our own argument; but we must observe at starting, that Mr. Darwin appears to us to be not more remarkable for the acuteness and ingenuity of his powers of observation of natural phenomena, than he is for the want of logical power and sound reasoning on philosophical questions.

Before we plunge into the subject, it is necessary to define what is meant by natural selection. Plants and animals in a state of nature, under favourable conditions of life, have a tendency to increase rapidly; as for example the horse, and the white clover, in Australia; but as the sum of the food in each area is a constant quantity, the number of individuals arriving at maturity must, on the whole, remain stationary. And this must lead to a struggle for existence:—

'Our own observation,' writes Mr. Wallace, 'must convince us, that birds do not go on increasing every year in a geometrical ratio, as they would do were there not some powerful check to their natural increase. Very few birds produce less than two young ones each year, while many have eight or ten; four will certainly be below the average; and if we suppose that each pair produce young only four times in their life, that will also be below the average, supposing them not to die, either by violence or want of food. Yet at this rate, how tremendous would be the increase, in a few years, from a single pair! A simple calculation will show that in fifteen years, each pair of birds would have increased to nearly two thousand millions! Whereas we have no reason to believe that the number of the birds of any country increases at all in fifteen, or in one hundred and fifty years. With such powers of increase, the population must have reached its limits, and have become stationary, in a very few years after the origin of

each species. An immense number of birds must therefore perish, each year, before arriving at maturity, and these, for the most part, would be the weak, diseased, and less gifted individuals.

Or, if we take the case of an oak forest, every tree will drop, at least, one thousand acorns annually, though till an old tree falls, not one of these can grow into an oak. Then comes in the principle of heredity, by which the parent hands down to its offspring a general likeness, and the principle of variation, by which no offspring resembles its parent in every particular. In the struggle for life, the minute variations, presented by all living beings, would either aid or retard the organisms in which they were manifested, and would result in the survival of the fittest. Lastly the change of external conditions, which now is universal and unceasing, would give free scope for the accumulation of variations in one direction through heredity, the organic change keeping pace with that of the conditions, and the animal and plant continuing to be in perfect harmony with its environment. By the action of these complex laws, summed up under the head of Natural Selection, and by them solely, both Mr. Darwin and Mr. Wallace believe that all plants and animals have sprung from pre-existent forms, that have *gradually* diverged from one another; and they both insist, that insomuch as external circumstances change slowly, changes in life must be correspondingly slow and continuous. We do not intend to enter into the general considerations of the merits of this theory, for the false reasoning from domestic breeds to species in nature has been demonstrated by Professor Huxley.* and its inadequacy to explain the phenomena of the animal kingdom by Mr. Mivart,† but we shall confine ourselves strictly to the application of it to the 'Descent of Man.' Does the present state of man admit of explanation by this hypothesis? And if the origin of man's body can thus be accounted for, does it explain also mental and moral phenomena? If it be a law like that of gravitation, it must be a key to all the facts which it is supposed to cover.

It is universally admitted, that man, in his purely physical nature, is closely linked with the brutes. His body is subject to the same laws of reproduction, growth, decay, and death as theirs, and is built essentially on the same plan. Each muscle, nerve, blood-vessel, and bone, is represented, more or less, in the bodies of the higher mammals, and especially among the anthropomorphous apes. Besides these obvious

* Lay Sermons, p. 280. † Genesis of Species.

points of resemblance there are others equally striking. Man is liable to certain of the same diseases as the brutes, such as hydrophobia, variola, and glanders, a fact which 'proves the 'close similarity of their tissues and blood, both in minute 'structure and composition, far more plainly than does their 'comparison under the best microscope, or by the aid of the 'best chemical analysis.'* Our embryonic development also differs in no respect from that of the higher mammals, and is scarcely, if at all, distinguishable from that of the dog or the ape. It is useless for any man to shut his eyes to the full weight of this identity of structure.

The evidence afforded by rudimentary organs tends also in the same direction. The panniculus carnosus muscle, for instance, by which horses move and twitch their skin, is found in an efficient state in the human forehead and neck, while it is very generally not traceable in the other parts of the body. Some people, however, have the power of moving the scalp, very much as the lower animals, and of setting in motion the muscles of the ear. This probably is an instance of the loss of an organ by disuse. The small vermiform appendage to the human cæcum is a rudiment of that which is long and convoluted in the orang and enormous in the marsupials. The small point also on the inner margin of the outer fold of the ear, which Mr. Woolner first detected when at work at his figure of Puck, is alleged to be the last lingering trace of a pointed ear, as in some of the baboons, and many other animals. Many other cases might be adduced of the same kind.

The variations also traceable in the human frame point in the direction of the lower animals. In one case, quoted by Professor Haughton, the arrangement of tendons of thumb and fingers characteristic of the macaque was fully shown in the human hand; and Mr. Wood, in a series of papers contributed to the Royal Society, has minutely described a number of muscular variations in man, which represent normal structures in the lower animals. In one male subject no less than seven such variations were observed, all of which plainly represented the muscles of certain kinds of apes. Mr. Wood considers that these variations 'must be taken to indicate some un-'known factor, of much importance to a comprehensive know-'ledge of general and scientific anatomy.' Mr. Darwin argues, that this unknown factor is most probably the tendency to revert to a former state of existence:—

* Darwin's 'Descent of Man,' vol. i. p. 11.

'It is quite incredible that a man should through mere accident abnormally resemble, in no less than seven of his muscles, certain apes, if there had been no genetic connexion between them. On the other hand, if man is descended from some ape-like creature, no valid reason can be assigned why certain muscles should not suddenly reappear after an interval of many thousand generations, in the same manner as with horses, asses, and mules, dark-coloured stripes suddenly reappear on the legs and shoulders, after an interval of hundreds, or more probably thousands, of generations.' (Vol. i. p. 129.)

Hence it is contended that the identity of the structure of man's body with that of the brutes cannot be accounted for by the ordinary doctrine of special creation, or the creation of species directly and immediately out of nothing, which is itself hedged in with insuperable difficulties in general application. It does not explain the variations in the direction of the lower animals, nor the rudimentary organs, nor the embryological development. Nor does it afford any clue to the law of geological succession. It does not tell us why the existing group of marsupials in Australia should have been represented in the quaternary age by allied species in that region; or why the armadillos and sloths of South America should find their nearest allies in those species which immediately preceded them in that area; or why, in the Old World, the Asiatic elephant should be so closely allied to the mammoth. It moreover implies a corresponding annihilation of the pre-existent species. This doctrine, invented before the birth of the physical sciences, has long ago been given up by many theologians, and by all biologists, who could not fail to see the bond of union which unites all living bodies together. Professor Owen, no less than Professor Huxley, does not hesitate to ascribe the identity running through the animal kingdom to the continual operation of natural laws:—'I have been led,' he writes, 'to recognise species as exemplifying the continuous 'operation of natural law, or secondary cause; and that, not 'only successively, but progressively, from the first embodi-'ment of the vertebrate idea under its old Ichthyic vestment 'until it became arrayed in the glorious garb of the human 'form.'* But no two anatomists are agreed as to the exact mode in which these secondary laws produce different forms. And this doctrine of evolution, by which man is supposed to have sprung from an antecedent form, differs merely in name from secondary or derivative creation; although many writers believe that it is antagonistic. It merely attempts to give *some* of the causes which probably brought about the change—

* Anatomy of Vertebrates, vol. iii. p. 796.

such as variation, heredity, change of conditions, and the other factors, which together make up what Mr. Darwin terms natural selection; but it does not attempt to show all. It is very generally taken to be identical with the natural selection theory; but it really differs in the important point that the latter professes to explain all the phenomena of life by the action of the causes which it enumerates, ignoring completely the possible co-operation of other factors of change. This essential difference is worthy of careful attention; for if the one theory is consistent with the phenomena of the material world, and does not clash with what we know of the world of mind, the other and narrower theory is, in our belief, inconsistent with the facts of both.

This doctrine of evolution is strangely exaggerated, both by its opponents and supporters, being looked upon by the one as destroying the foundations of their religious belief, and by the other as an overwhelming argument in favour of materialism. We cannot see that it has the least bearing in one way or the other. That man was brought into being by the operation of a secondary law, need not alarm the most timid theologian, and the validity of the direct argument, from the physical to the mental, cannot be admitted. As Mr. Mivart very justly remarks, 'Derivative creation is not a supernatural act, but is 'simply the Divine action by and through natural laws. To 'recognise such action in such laws is a religious mode of re-'garding phenomena, which a consistent theist must necessarily 'accept, and which an atheistic believer must similarly reject. 'But this conception, if deemed superfluous by any naturalist, 'can never be shown to be *false* by any investigations con-'cerning natural laws, the constant action of which it presup-'poses.'* Evolution pure and simple does not touch in the least degree the province of religion. It leaves the origin of life as great a mystery and wonder as ever, and presents a nobler view of the great Creator, who endowed living forms with such wondrous capacities, and made them subject to laws of being, which may include variations, just as they include reproduction by natural causes. It deals solely with the working of these laws, which we have been able to detect by our limited insight into nature; and it cannot explain the phenomena without the will of a directing Intelligence. The naturalist who fancies that he can trace the order of the universe to the combinations of a series of accidents or who can explain all phenomena by the working of some principle which

* Genesis of Species, p. 262.

he has lighted upon, must have a very high opinion of his own powers of analysis; and the materialist who thinks that there is no necessity for a God in the world, is merely asserting what he cannot prove. The *onus probandi* rests with them; and until they can explain the phenomena by the working of their own principles, few will be inclined to trust in a mere negative philosophy, unsupported by evidence.

The doctrine of evolution may be the only reasonable explanation of the differences and resemblances of plants and animals, and of their distribution in space and time. But nevertheless, it must be admitted that its truth is as yet very far from being proved. It may be a provisional hypothesis, destined to yield place at the discovery of a higher law. But we are confident that evolution brought about solely by means of natural selection, according to the views of Mr. Darwin, is capable of being disproved in the very case which he has chosen as a test of his theory, and which Mr. Wallace, co-founder of the theory, has expressly excepted from the action of what he believes to be a law to the rest of the organic world.

Man, when compared with the higher apes, presents bodily differences which are of very small value in classification. Professor Huxley admits the following as the only characters of importance, in separating the sub-order anthropidæ from the apes and lemurs:—the even and uninterrupted series of teeth, which present no break with the exception of the canines; the length of the great toe, which is nearly as long as the second; and the modifications in his structure consequent on the habitual attitude of standing erect. The great size and complexity of brain, on which Professor Owen founds his class Archencephala, is valueless in classification, because the variations in these respects exhibited by the quadrumana are greater than those presented by man on the one hand, and the quadrumana on the other. It is extremely probable that the non-development of the canines is owing to their gradual disuse as weapons, while the modifications in the skeleton have a definite relation to the erect carriage of man. Mr. Darwin therefore argues with considerable force, that even the small importance attached by Professor Huxley to these differences is too great, and that man ought to form merely a family or sub-family.

Nevertheless, it does not follow that man has been evolved from the higher apes through natural selection, although he were genetically descended from them. Professor Huxley has called attention to the important difference between artificial races and breeds on the one hand, and natural species on the

other—the one being fertile and the other infertile. This destroys the validity of the argument that because the one is the result of small variations selected by man, the other is the result of small variations selected by nature. There is also a fatal objection to a theory which presupposes that specific change has been brought about by minute variations, gradually accumulated, and transmitted from parent to offspring. In the well-known cases of the six-fingered Kelleia family, and of the bandylegged breed of Ancon sheep in Massachusetts, an organic change of great magnitude suddenly appeared and was transmitted to the offspring. If these varieties may be produced *per saltum* by some unknown cause, and certainly not by natural selection, why should not species be also formed in the same way? The few cases of this kind on record altogether destroy the force of Mr. Darwin's argument. It is for him to show cause why man should not have been produced suddenly from a quadrumanous ancestor, and to bring forward proof that he was merely the result of the slow accumulation of certain favourable varieties *in the human direction*. Mr. Darwin's view professes to be based on *a posteriori* grounds. Can he show that one natural species has ever been gradually evolved by natural selection? To answer that animals have not been observed with sufficient care, or for a sufficient length of time, is merely a mode of confessing ignorance; and to quote variation under domestication is to beg the question whether artificial varieties are of the same value as natural species. So far as our experience tells us anything, it distinctly shows that artificial varieties are *not* equivalent to species in nature. The points of difference between man and the apes, which are of value from the natural history point of view, may have been brought about in part by natural selection; but Mr. Darwin has not brought forward evidence to prove that it was the sole cause.

There are, however, certain human organs which can be proved not to be capable of production on the Darwinian hypothesis, for they are adapted to a state of things far removed from all the habits and requirements of savage life; they are framed, not for his present, but for his future condition as a civilised being. The human brain is claimed by Mr. Wallace as an exception to the general law. The average cranial capacity, according to Drs. Davis and Moreton, is in the Teutonic family 94 cubic inches; in the Esquimaux 91; in the Negroes 85; in Australian 80·9; in Asiatics 87·1; and 77 in the Bushmen. In this respect, therefore, there is not much difference between civilised and savage man. It is evident that size

of brain stands in direct relation to high intellectual powers, since Cuvier, Goethe, and Napoleon, and other great intellects, have been possessed of large brains; while if the adult European possess a skull of less than 65 cubic inches of brain, he is invariably idiotic. If we proceed to compare the human with the quadrumanous brain, we find that the maximum size in the latter is reached in the gorilla, which contains only 34½ cubic inches, although it is a creature far above the average size of man:—

'We have seen,' Mr. Wallace proceeds to argue, 'that the average cranial capacity of the lowest savages is probably not less than *five-sixths* of that of the highest civilised races, while the brain of the anthropoid apes scarcely amounts to *one-third* of that of man, in both cases taking the average; or the proportions may be more clearly represented by the following figures—anthropoid apes 10; savages 26; civilised man 32. But do these figures at all approximately represent the relative intellect of the three groups? Is the savage really no further removed from the philosopher, and so much removed from the ape, as these figures would indicate? In considering this question, we must not forget, that the heads of savages vary in size, almost as much as those of civilised Europeans. Thus, while the largest Teutonic skull in Dr. Davis' collection is 112·4 cubic inches, there is an American of 115·5, an Esquimaux of 113·1, a Marquesan of 110·6, a Negro of 105·8, and even an Australian of 104·5, cubic inches. We may therefore fairly compare the savage with the highest European on one side, and with the ourang, chimpanze or gorilla, on the other, and see whether there is any relative proportion between brain and intellect.'*

The range of intellectual power in man is enormous. No one could compare a senior wrangler with a savage incapable of counting beyond four, without realising the enormous chasm between them, and yet that chasm is not represented in a relative size of brain, and cannot be weighed, or measured, or detected by the most delicate analysis. The engine of thought in the savage is not very much inferior to that in the wrangler, and merely requires the motive power of circumstances to set it to work. Are then the conditions of savage life such as would be likely to evolve such an engine as this by natural selection?

'Such races as the Andaman Islanders, the Australians, and the Tasmanians, the Digger Indians of North America, or the natives of Fuegia, pass their lives so as to require the exercise of few faculties not possessed in an equal degree by many animals. In the mode of capture of game or fish, they by no means surpass the ingenuity or forethought of the jaguar, who drops saliva into the water, and seizes the fish as they come to eat it; or of wolves and jackals, who hunt in

* Contributions to Theory of Natural Selection, p. 338.

packs; or of the fox who buries his surplus food till he requires it. The sentinels placed by antelopes and by monkeys, and the various modes of building adopted by field-mice and beavers, as well as the sleeping-place of the ourangutan, and the tree-shelter of some of the African anthropoid apes, may well be compared with the amount of care and forethought bestowed by many savages in similar circumstances. His possession of free and perfect hands, not required for locomotion, enable man to form and use weapons and implements which are beyond the physical power of brutes; but having done this, he certainly does not exhibit more mind in using them than do many lower animals. What is there in the life of the savage, but the satisfying of the cravings of appetite in the simplest and easiest way? What thoughts, ideas, or actions are there, that raise him many grades above the elephant or the ape? Yet he possesses, as we have seen, a brain vastly superior to theirs in size and complexity; and this brain gives him, in an undeveloped state, faculties which he never requires to use.' (*Wallace*, p. 342.)

It is clear, therefore, that the brain of savage man is far beyond his needs. How can it be accounted for by the principle of natural selection, or by the accumulation of small variations good for the individual? Its large size cannot be traced to circumstances of life, because it is quite disproportionate to the actual requirement; and even if once originated, ought, according to Mr. Darwin's theory, to have been lost by disuse. For if natural selection tends in some instances to raise a race of beings, it might tend in others to lower it; to a savage the organs and instincts of an animal might be more useful than the latent brain power of a sage. Mr. Darwin's answer to this, that man owes his immense superiority of brain to the invention of fire, and of weapons and implements, resulting directly from the development of his powers of observation, memory, curiosity, imagination, and reason, is not to the point, even if he can prove that these again are the result of natural selection. Mr. Wallace's objection is that the size of the brain over and above the savage needs, cannot be accounted for by their struggle for life, and that a steady slow increase of brain matter useless to the individual in the life-battle would be impossible. The accumulation of minute differences *not* demanded by the circumstances of life, is contrary to the very first principles of the Natural Selection theory. In this case there must be some other principle at work. And if we do not admit that latent capacities in the savage brain were implanted for use at some time in the distant future, we can only say that they are the result of a force which we do not know, and of a law which we have not grasped. We have but the alternative either to ascribe them to the operation of an Almighty Will, or simply to confess our total ignorance.

Neither can the structure of the larynx, or the delicate adjustment of parts by which it acquires such marvellous powers, be accounted for by the Natural Selection principle, because the faculty of song is not the least use to man in a state of savagery.

'With man (writes Mr. Darwin) song is generally admitted to be the basis or origin of instrumental music. As neither the enjoyment or capacity of producing musical notes are faculties of the least direct use to man in reference to his ordinary habits of life, they must be ranked among the most mysterious with which he is endowed. They are present, though in a very rude and, as it appears, almost latent condition, in men of all races, even the most savage; but so different is the taste of the different races, that our music gives not the least pleasure to savages, and their music is to us hideous and unmeaning. The musical faculties which are not wholly deficient in any race, are capable of prompt and high development, as we see with Hottentots and negroes, who have readily become excellent musicians, although they do not practise in their native countries anything that we should esteem as music. But there is nothing anomalous in this circumstance; some species of birds which never naturally sing can without much difficulty be taught to perform; thus the house-sparrow has learnt the song of the linnet. As these two species are closely allied, and belong to the order of Insessores, which includes nearly all the singing birds in the world, it is quite possible or probable that a progenitor of the sparrow may have been a songster. It is a much more remarkable fact that parrots, which belong to a group distinct from the Insessores, and have differently-constructed vocal organs, can be taught not only to speak, but to pipe or whistle tunes invented by man, so that they must have some musical capacity. Nevertheless it would be extremely rash to assume that parrots are descended from some ancient progenitor which was a songster. Many analogous cases could be advanced of organs and instincts originally adapted for one purpose, having been utilised for some quite distinct purpose. Hence the capacity for high musical development, which the savage races of man possess, may be due either to our semi-human progenitors having practised some rude form of music, or simply to their having acquired for some distinct purposes the proper vocal organs. But in this latter case we must assume that they already possessed, as in the above instance of the parrots, and as seems to occur with many animals, some sense of melody.' (Vol. ii. pp. 333, 334.)

Mr. Darwin does not face the difficulty offered by the problem to his theory. Even if it be granted that the song of the linnet and the chirping of the house-sparrow be derived ultimately from what he terms 'sexual selection,' the latent capacity in the sparrow of learning the song of the linnet, is a difficulty which cannot be overcome. For how could it have originated by the gradual accumulation of small variations, seeing that it is seldom or never exercised in a state of nature? The

comparison of the musical powers of sparrows with those of Hottentots is hardly fair, since the sparrow merely imitates the linnet mechanically, while the Hottentots and Negroes strike out melodies of their own, which are not mere copies of the music of the higher civilisation. Nor is it any explanation to say that the musical capacity of savages may be due to the rude practice of music by their ancestry, for in that case, to apply Mr. Darwin's own principles, it would have been lost through long disuse. Mr. Wallace admits (p. 350) that it is one of those things which cannot be accounted for by the principle which he advocates:—

'The habits of savages give no indication of how this faculty could have been developed by natural selection; because it is never acquired or used by them. The singing of savages is a more or less monotonous howling, and the females seldom sing at all. Savages certainly never choose their wives for fine voices, but for rude health, and strength, and physical beauty. Sexual selection could not therefore have developed this wonderful power which only comes into play among civilised people. It seems as if the organ had been prepared in anticipation of the future progress of man, since it contains latent capacities which are useless to him in his earlier condition. The delicate correlations of structure that give it such marvellous powers could not therefore have been acquired by means of natural selection.'

Without calling in the aid of teleology, or some law now unknown, the capacities of the human larynx are incapable of explanation. The mode of formation of the ear and eye in man and the higher animals, also afford a crushing argument against Mr. Darwin:—

'The eye (writes Mr. Mivart*) is formed by a simultaneous and corresponding ingrowth of one part and outgrowth of another. The skin in front of the future eye becomes depressed, the depression increases and assumes the form of a sac, which changes into the aqueous humour and lens. An outgrowth of brain substance, on the other hand, forms the retina, while a third process is a lateral ingrowth of connective tissue, which afterwards changes into the vitreous humour of the eye. The internal ear is formed by an involution of the integument, and not by an outgrowth of the brain. But tissue in connexion with it, becomes in part changed, thus forming the auditory nerve, which places the tegumentary sac in direct communication with the brain itself.'

These complex and simultaneous co-ordinations could not have been produced by small beginnings, since they are useless until the requisite junctions are effected. In this case without definite purpose, it is hard to believe how the simul-

* Genesis of Species, p. 51.

taneous changes in one direction could be effected, and it is incredible that they should have been brought about by a combination of chances. Mr. Murphy has very ably treated the difficulties offered by the eye to the Darwinian hypothesis in his work on 'Habit and Intelligence.' On this, and similar points of the subject, we willingly contrast the loose and inconclusive conjectures of Mr. Darwin, with the exquisite force and skill with which the adaptation of the various parts of the human frame to their appropriate objects, was demonstrated by Sir Charles Bell in his 'Treatise on the Hand.'

The doctrine of Natural Selection is therefore hopelessly inadequate to the explanation of the phenomena offered by man's body; but its truth or falsehood have no necessary connexion with the theory of evolution. The results of the study of embryology and physiology point to the descent of man from the lower animals, not by natural selection, but by the working of a law which has not yet been revealed by the scalpel. If the brain, the ear, the eye, and the larynx in the lowest savage, be not ordered for the achievement of the highest ends of civilisation, if they be not talents intrusted to the human race, they cannot be accounted for in any other way. Natural selection has doubtless exerted great influence in modifying form, but it has not yet been proved in any one case of being capable of turning varieties into species, or of originating a new organ or capacity There must therefore be some principle at work which is not natural selection, some force which has eluded the grasp of the naturalist.

Still less can the theory be said to explain the phenomena of mind. We owe indeed to Mr. Darwin some gratitude for his attempt to explain the origin of the intellectual faculties by a purely materialistic argument, since his failure is that of one of the greatest natural philosophers who has ever attempted to approach this most difficult problem. His point of view is one peculiarly his own, as he takes merely the aspect offered by natural history. It might indeed occur to some that this method of dealing with the subject would be about as likely to result in the discovery of truth as that of a chemist who should approach the deepest and most abstruse phenomena presented by physiology by means of analysis, without taking into account the vital processes which transcend his skill. Such an investigation would obviously lead to an erroneous conclusion. Mr. Darwin, before he can fairly argue from matter to mind, must prove that they are both the same in kind, which is manifestly impossible. We do not intend to enter into the metaphysical relation of one to the other, but we shall

examine what Mr. Darwin has to say in favour of his views, which, if true, will revolutionise philosophy and profoundly affect society. If our intellect and moral sense be mere developments of certain elements in the lower animals by natural selection, man is merely a superior sort of brute, the great Ruler of the world a mere shadow of ourselves projected by our imagination, and our morality a mere instinct of the same order as that which rules the actions of the worker-bee. Mr. Darwin states that his argument does not touch the question of the existence of a God, but it completely destroys the objective value of any idea which we can form of Him, and this practically amounts to the same thing. A full discussion of these momentous questions is beyond the limits of a review. We can only analyse the evidence which it brings forward in favour of such far-reaching conclusions.

Mr. Darwin, after having enumerated the bodily links which connect man with brute, proceeds to the inquiry whether his mental attributes are not in like manner descended, and to see whether there be any fundamental difference between them in man and the higher animals. At the very outset he makes an admission which destroys the basis of his future argument.

'Such variations appear to arise from the same unknown causes acting on the cerebral organisation, which induce slight variations or individual differences in other parts of the body; and these variations, owing to our ignorance, are often said to arise spontaneously. We can, I think, come to no other conclusion with respect to the origin of the more complex instincts, when we reflect on the marvellous instincts of sterile worker-ants and bees, which leave no offspring to inherit the effects of experience and modified habits.

'Although a high degree of intelligence is certainly compatible with the existence of complex instincts, as we see in the insects just named and in the beaver, it is not improbable that they may to a certain extent interfere with each other's development. Little is known about the functions of the brain, but we can perceive that as the intellectual powers become highly developed, the various parts of the brain must be connected by the most intricate channels of intercommunication; and as a consequence each separate part would perhaps tend to become less well-fitted to answer in a defined and uniform, that is instinctive, manner to particular sensations or associations.

'I have thought this digression worth giving, because we may easily underrate the mental powers of the higher animals, and especially of man, when we compare their actions founded on the memory of past events, on foresight, reason and imagination, with exactly similar actions instinctively performed by the lower animals; in this latter case the capacity of performing such actions having been gained, step by step, through the variability of the mental organs and natural selection, without any conscious intelligence on the part of the animal

during each successive generation. No doubt, as Mr. Wallace has argued, much of the intelligent work done by man, is due to imitation and not to reason; but there is this great difference between his actions and many of those performed by the lower animals, namely, that man cannot on his first trial, make, for instance, a stone hatchet or a canoe, through his power of imitation. He has to learn his work by practice; a beaver, on the other hand, can make its dam or canal, and a bird its nest, as well, or nearly as well, the first time it tries, as when old and experienced.' (Vol. i. p. 38.)

If 'unknown causes' bring about simple variations, what right has Mr. Darwin to attribute them to the operation of natural selection? To attribute an effect to an unknown cause, is merely a mode of confessing ignorance. Mr. Darwin in this passage has stated an argument against the truth of his views with great fairness. If we cannot be sure in the comparison of the actions performed by the lower animals with similar actions performed by the mental powers of man, that the same mode of reasoning is employed in each, we are liable to great error in interpreting their actions by our own motives. If I interpret the mental processes of a beaver by my own standard, I am guilty of an anthropomorphism quite as great as that which the materialists lay to the account of theologians, and I can be proved to be in error by an appeal to facts. Does the spider know mechanics, or is the bee acquainted with geometry, because *we* could not bring about the same results without a knowledge of these sciences? When Mr. Darwin admits that he does not know how variations are brought about, he forsakes the very key of his position, and when he further allows that similar actions in brutes may be attributed to dissimilar causes, he invalidates his own reasoning from our actions to those of the brutes.

The lower animals, like man, feel pleasure and pain, happiness and misery, and are possessed of the same emotions of terror, suspicion, love, and revenge. The more complex emotions also are common property; a dog is jealous of his master's affection if lavished on any other creature, which proves that he not only loves, but has the desire to be loved. Animals love praise, and in the case of dogs and horses feel emulation. The hunter and the hound enjoy the sport almost equally with their master. 'There can be no doubt,' writes Mr. Darwin, 'that 'a dog feels shame as distinct from fear, and something very 'like modesty when begging too often for food. A great dog 'scorns the snarling of a little dog, and this may be called 'magnanimity. Several observers have stated that monkeys 'certainly disliked being laughed at, and they sometimes in-'vent imaginary offences. In the Zoological Gardens I saw

'a baboon who always got into a furious rage when its keeper 'took out a letter or book and read it aloud to him, and his 'rage was so violent that, as I witnessed on one occasion, he 'bit his own legs until the blood flowed.' All animals feel wonder, and many exhibit curiosity, the latter quality affording opportunity for hunters, in many parts of the world, to decoy the game into their power. The faculty of imitation, so strongly developed in man, especially in a barbarous state, is present in monkeys. A certain bull-terrier of our acquaintance, when he wishes to go out of the room, jumps at the handle of the door and grasps it with his paws, although he cannot himself turn the handle. Parrots also reproduce with wonderful fidelity the tones of voice of different speakers, and puppies reared by cats have been known to lick their feet and wash their faces after the same manner as their foster-mothers. Attention and memory also are present in the lower animals, and it is impossible to deny that the dreams of dogs and horses show the presence of imagination, or that a certain sort of reason is not also present. Animals also profit by experience, as any man realises who sets traps. The young are much more easily caught than the old, and the adults gain caution by seeing the fate of those which are caught. Tools also are used by some of the higher apes. The chimpanzee uses a stone to crack a nut resembling a walnut, and the Abyssinian baboons (C. gelada) fight troops of another species (C. hamadryas), and roll down stones in the attack before they finally close in a hand-to-hand encounter. The idea of property is common also to every dog with a bone, to all birds with their nests, and notably in the case of rooks. Nor can a certain kind of language be denied to the brutes. The dog communicates his feelings by barks of different tones, which undoubtedly raise in his fellow dogs ideas similar to those passing in his own mind. It is universally allowed that in all these particulars the mental constitution of man strongly resembles that of the higher animals. But here we part company with Mr. Darwin.

Articulate speech, Mr. Darwin allows, is peculiar to man. Not the mere power of articulation, for parrots can talk, but the large power of connecting definite sounds with definite ideas, which depends on the development of the mental faculties. Mr. Darwin, p. 54, places the intellectual powers as the cause, and articulate speech as the effect. The latter he derives, a few pages further on, directly from the cries and sounds of animals.

'I cannot doubt that language owes its origin to the imitation and modification, aided by signs and gestures, of various natural sounds,

the voices of other animals, and man's instinctive cries. When we treat of sexual selection we shall see that primeval man, or rather some early progenitor of man, probably used his voice largely, as does one of the gibbon-apes at the present day, in producing true musical cadences, that is in singing; we may conclude from a widely-spread analogy that this power would have been especially exerted during the courtship of the sexes, serving to express various emotions, as love, jealousy, triumph, and serving as a challenge to their rivals. The imitation by articulate sounds of musical cries might have given rise to words expressive of various complex emotions. As bearing on the subject of imitation, the strong tendency in our nearest allies, the monkeys, in microcephalous idiots, and in the barbarous races of mankind, to imitate whatever they hear, deserves notice. As monkeys certainly understand much that is said to them by man, and as in a state of nature they utter signal-cries of danger to their fellows, it does not appear altogether incredible, that some unusually wise ape-like animal should have thought of imitating the growl of a beast of prey, so as to indicate to his fellow monkeys the nature of the expected danger. And this would have been a first step in the formation of a language.' (Vol. i. p. 56.)

We ask for the evidence that at the present day any unusually wise ape has ever been known to imitate the cry of a wild beast, so as to indicate its presence to its fellows? Why also, if the first stage of articulate development began in musical cadences, by which the chords of the voice were strengthened and gradually perfected, and if the second consisted in the imitation of other sounds, have not the birds evolved for themselves an articulate language, seeing that they exercise their voices at least as much as any of the higher animals? The American mocking-bird imitates the cries of other birds, and has exercised its vocal chords acquired on the hypothesis during courtship. Why does it not speak? This mode of accounting for human speech covers too wide a field. If it be true in the case of man, why is it not equally true in the case of birds? The answer that their intellect is not sufficiently highly developed, merely refers the difficulty back to the cause by which the intellectual difference is brought about. And this Mr. Darwin, as we shall presently see, believes to have been caused in great part by articulate speech. Mr. Darwin can hardly mean, in the passage just quoted, that monkeys understand very much that is said to them by man, in any other sense than a dog may be said to understand, that is to say, the gestures, the tone of voice, and the expression of the countenance, not that they can grasp the meaning of any abstract term. A broken chain of loosely stated facts such as this cannot prove anything.

The second stage in the evolution of language is that in

which the vocal organs were strengthened and perfected by the inherited effects of use, and this would react on the power of speech. 'But,' Mr. Darwin goes on to say, 'the relation 'between the continued use of language and the development 'of the brain has no doubt been far more important. The 'mental powers in some early progenitor of man must have 'been more highly developed than in any existing ape, before 'even the most imperfect form of speech could have come 'into use; but we may confidently believe that the continued 'use and advancement of this power would have reacted on 'the mind by enabling and encouraging it to carry on long 'trains of thought. A long and complex train of thought 'can no more be carried on without the aid of words whether 'spoken or silent, than a long calculation without the use of 'figures or algebra.' Articulate speech undoubtedly stands in the closest relation to the development of mental powers. Mr. Darwin indeed admits that, 'the fact of the higher apes 'not using their vocal organs for speech no doubt depends on 'their intelligence not having been sufficiently advanced. 'The possession by them of organs, which, with long-con-'tinued practice, might have been used for speech, although 'not thus used, is paralleled by the case of many birds which 'possess organs fitted for singing though they never sing.' How then is the origin of intelligence accounted for? Mr. Darwin states that it is merely the development by natural selection of those emotions and faculties which exist in the lower animals, such as love, memory, curiosity, imitation, and the like, by the gradual accumulation of variations through the principles of inheritance. But if this be true, why have not these faculties, so widely spread in the lower animals, borne fruit in a corresponding cerebral development? If all the essentials of our intelligence exist in the lower animals, why have they not produced something approaching to our intellect in some one of the innumerable forms of life? The fact that they have not done so renders the theory very improbable.

Articulate speech stands undoubtedly in direct relation to intellectual faculty, and that again to the large size of the brain in man, which, as we have seen, cannot be accounted for by natural selection. Whether or no language sprang originally from the imitation of the noises of nature — and for the arguments for and against, we would refer to the works of Max Müller, Lubbock, and Tylor—Mr. Darwin has not adduced one shred of proof that it is merely descended in an unbroken line from the cries of animals. Man's intellect would

however use those emotional and interjectional sounds which are merely the physical expression of its wants and which, like the body, are links connecting man with the lower animals. After language was once originated a struggle for life would at once begin, as Max Müller remarks, in which the most favoured words and forms would survive the less favoured. And thus, although Mr. Darwin's principle cannot account for the origin of language, which we agree with Max Müller in considering beyond the powers of our analysis, it accounts to a great extent for the differences in dialects and forms of speech.

But if Mr. Darwin's explanation of language be unsatisfactory, still more so is his theory of the derivation of those intellectual faculties which are undoubtedly peculiar to mankind, such as self-consciousness, abstraction, and the power of forming general ideas. If he can show that they are descended from certain rudiments in the lower animals, it must be admitted that our intellect is the same in kind with what passes for intellect in the brutes. He does not even venture to discuss them, for the very singular reason that writers have given them different definitions:—

'It would be useless (he writes) to attempt discussing these high faculties, which, according to several recent writers, make the sole and complete distinction between man and the brutes, for hardly two authors agree in their definitions. Such faculties could not have been fully developed in man until his mental powers had advanced to a high standard, and this implies the use of a perfect language. No one supposes that one of the lower animals reflects whence he comes or whither he goes—what is death or what is life, and so forth. But can we feel sure that an old dog with an excellent memory and some power of imagination, as shown by his dreams, never reflects on his past pleasures in the chase? And this would be a form of self-consciousness. On the other hand, as Büchner has remarked, how little can the hard-worked wife of a degraded Australian savage, who uses hardly any abstract words and cannot count above four, exert her self-consciousness, or reflect on the nature of her own existence.'

It is certainly very prudent in Mr. Darwin to pass over those points which afford insuperable obstacles to his theory of natural selection as applied to mind; but their omission destroys the value of the argument. We cannot of course prove the negative that dogs have no self-consciousness, but the *onus probandi*, that they have, rests with Mr. Darwin. An appeal to the Australian savage will hardly help to bridge over the mental difference between men and animals, for although in a state of nature he does not exert his mental faculties, they are brought out by education. How this latent capacity was acquired, and why it is not lost by disuse in a state of nature,

are questions which cannot be answered by an appeal to natural selection.

We hold, therefore, that Mr. Darwin has signally failed in advancing proof, that either articulate language, or the higher faculties of the human mind, have been evolved by any known law from the cries or mental attributes of animals. Whatever kinship man may have with the brutes in bodily structure, and in some of the senses and faculties, these form a barrier between man and the brute, which cannot be accounted for in the present state of our knowledge, and which are wholly inexplicable on the Darwinian theory.

The universal belief in the supernatural is held by Mr. Darwin to be the result of the development of the intellectual faculties:—

'Nor is it difficult to comprehend how it arose. As soon as the important faculties of the imagination, wonder and curiosity, together with some power of reasoning, had become partially developed, man would naturally have craved to understand what was passing around him, and have vaguely speculated on his own existence. . . . The belief in spiritual agencies would soon pass into the belief in the existence of one or more gods. For savages would naturally attribute to spirits the same passions, and the same love of vengeance, or simplest form of justice, and the same affections which they themselves experienced. . . . The feeling of religious devotion is a highly complex one, consisting of love, complete submission to an exalted and mysterious superior, a strong sense of dependence, fear, reverence, gratitude, hope for the future, and perhaps other elements. No being could experience so complex an emotion until advanced in his intellectual and moral faculties, to at least a moderately high level. Nevertheless we see some distant approach to this state of mind in the deep love of a dog for his master, associated with complete submission, some fear, and perhaps other feelings. The behaviour of a dog when returning to his master after an absence, and, as I may add, of a monkey to his beloved keeper, is widely different from that towards their fellows. In the latter case, the transports of joy appear to be somewhat less, and the sense of equality is shown in every action.'

The comparison of the feeling of religious devotion in man, with the emotions of dogs and monkeys, would be unworthy of notice had it been made by any man less distinguished than Mr. Darwin. A belief in the supernatural is present in the one; can Mr. Darwin show that it is present in the other? The comparison of unlike things very often leads him into error. He compares, for instance, the belief of savages that natural objects are animated by living essences, with the barking of a 'very sensible' dog at a parasol moved by the wind on a lawn, 'which must have reasoned to himself in a 'rapid and unconscious manner, that movement without any

'apparent cause indicated the presence of some strange living 'agent, and that no stranger had a right to be on his territory.' What right has he to attribute to the lower animals human motives? To reason from man to dog is as absurd as from dog to man.

Mr. Darwin deals with religion as summarily as he has dealt with the higher faculties of the human mind:—

'The same high mental faculties which first led man to believe in unseen spiritual agencies, then in fetishism, polytheism, and ultimately in monotheism, would infallibly lead him, as long as his reasoning powers remained poorly developed, to various strange and superstitions customs. Many of these are terrible to think of—such as the sacrificing of human beings to a blood-loving god; the trial of innocent persons by the ordeal of poison or fire, witchcraft, &c. Yet it is well occasionally to reflect on these superstitions, for they show us what an infinite debt of gratitude we owe to the improvement of our reason, to science, and our accumulated knowledge. As Sir J. Lubbock has well observed, "It is not too much to say that the horrible dread of unknown evil "hangs like a thick cloud over savage life, and embitters every "pleasure." These miserable and indirect consequences of our highest faculties may be compared with the incidental and occasional mistakes of the instincts of the lower animals.' (Vol. i. p. 68.)

So far as we can gather the meaning of this remarkable passage, our idea of a God is a mere reflection of ourselves, without objective reality, the inevitable result of the activity of our minds. The passage, as it stands, presents difficulties greater than those which it seeks to explain. How can we feel grateful 'to the improvement of our reason, to science, 'and accumulated knowledge,' to a mere abstraction, instead of a personal being? By what standard of right and wrong are the instincts of the lower animals to be judged? Is it possible for an instinct to be a mistake, and yet to be at the same time the result of the accumulation of variations good to the individual by natural selection? If that theory be true a mistake would be impossible. Mr. Darwin in this case also has not advanced any proof that we worship a God which is a mere expression of our own high mental activity, and not the cause of it. He has merely involved himself in a maze of difficulties and contradictions. The question of the existence of a God who may be revealed to us need not be discussed, because it is not affected in the least degree by this argument. The lowest savage who worships a block of wood or stone does in fact express a sublime conception under a gross material form; but that single act of *worship*, even misapplied, severs him by an infinite chasm from the whole brute creation, which has, as far as we know, no conception of spiritual power.

We must now pass on to the view which Mr. Darwin takes of the origin of our moral sense; the noblest attribute of our being, summed up in the short, but imperious word, *ought*, so full of high significance. He approaches this most difficult problem partly because it is a stumbling-block in the way of the theory of natural selection, and partly because no one has examined it exclusively from the side of natural history:—

'The following proposition seems to me in a high degree probable—namely, that any animal whatever, endowed with well-marked social instincts, would inevitably acquire a moral sense or conscience, as soon as its intellectual powers had become as well developed, or nearly as well developed, as in man. For, *firstly*, the social instincts lead an animal to take pleasure in the society of its fellows, to feel a certain amount of sympathy with them, and to perform various services for them. The services may be of a definite and evident instinctive nature, or there may be only a wish and readiness, as with most of the higher social animals, to aid their fellows in certain general ways. But these feelings and services are by no means extended to all the individuals of the same species, only to those of the same association. *Secondly*, as soon as the mental faculties had become highly developed, images of all past actions and motives would be incessantly passing through the brain of each individual; and that feeling of dissatisfaction which invariably results, as we shall hereafter see, from any unsatisfied instinct, would arise as often as it was perceived that the enduring and always present social instinct has yielded to some other instinct, at the time stronger, but neither enduring in its nature, nor leaving behind it a very vivid impression. It is clear that many instinctive desires, such as that of hunger, are in their nature of short duration; and after being satisfied are not readily or vividly recalled. *Thirdly*, after the power of language had been acquired, and the wishes of the members of the same community could be distinctly expressed, the common opinion how each member ought to act for the public good would naturally become to a large extent the guide to action. But the social instincts would still give the impulse to act for the good of the community, this impulse being strengthened, directed, and sometimes even deflected by public opinion, the power of which rests, as we shall presently see, on instinctive sympathy. *Lastly*, habit in the individual would ultimately play a very important part in guiding the conduct of each member; for the social instincts and impulses, like all other instincts, would be greatly strengthened by habit, as would obedience to the wishes and judgment of the community.' (Vol. i. pp. 71, 72.)

This view of morals, like that of religion, is fundamentally based upon the gradual intellectual development of mankind. The very first proposition that any animal endowed with well-marked social instincts would have a conscience, is a mere crude hypothesis, incapable of being put to any test. It is, so far as our experience goes, an impossible case. Mr. Darwin takes care that its meaning may not be overlooked. If men

were reared, he says, under the same conditions as hive-bees, 'there can hardly be a doubt that our unmarried females 'would, like the worker-bees, think it a sacred duty to kill 'their brothers, and mothers would strive to kill their fertile 'daughters; and no one would think of interfering.' They would indeed so act from a strict sense of duty, comparable to that which leads us very frequently to sacrifice ourselves for the good of others. The sense of right and wrong, according to this view, is no definite quality, but merely the result of the working together of a series of accidents controlled by natural selection for the general good. We need hardly point out that if this doctrine were to become popular, the constitution of society would be destroyed; for if there be no objective right and wrong, why should we follow one instinct more than the other, excepting so far as it is of direct use to ourselves?

The three stages by which Mr. Darwin derives our moral sense from certain rudiments in the lower animals, are worthy of careful analysis. Many animals are social, act in concert, and mutually defend each other, and the impulse which leads them to herd together may be of the same kind as that by which human communities are formed. It is probable, Mr. Darwin writes, using strange language for a materialistic philosopher, that the senses of discomfort when alone, and of pleasure when in company,

'were first developed in order that those animals which would profit by living in society should be induced to live together. In the same manner as the sense of hunger and the pleasure of eating were no doubt first acquired in order to induce animals to eat. The feeling of pleasure in society is probably an extension of the parental or filial affections; and this extension may be in chief part attributed to natural selection, but perhaps in part to mere habit. For with those animals which were benefited by living in close association, the individuals which took the greatest pleasure in society would best escape various dangers; whilst those that cared least for their comrades and lived solitary would perish in greater numbers. With respect to the origin of the parental and filial affections, which apparently lie at the basis of the social affections, it is hopeless to speculate; but we may infer that they have been to a large extent gained through natural selection. So it has almost certainly been with the unusual and opposite feeling of hatred between the nearest relations, as with the worker-bees which kill their brother drones, and with the queen bees which kill their daughter queens; the desire to destroy, instead of loving, their nearest relations having been here of service to the community.'

It appears to us that Mr. Darwin in this passage completely contradicts his own argument. If the moral sense be derived

from the social instincts, and those again are based upon the parental and filial affections, about the origin of which it is hopeless to speculate, it is very strange that Mr. Darwin should have advanced a speculation which he himself looks upon as hopeless. Why should we infer that they have been gained through natural selection? The social instincts doubtless benefit the community, and thus indirectly the individual, but that this utility is the cause rather than the effect we have no evidence.

We come now to the second stage of the hypothesis. There are two series of instincts, the one social and enduring, and looking to the general good, and the other looking to the individual and less persistent. The approval of conscience is merely an unhesitating obedience to the first, while disobedience causes regret and remorse. We deny the fairness of a comparison between 'social instincts' and those qualities which are instincts in animals. The respect for property, or law, or the voice of society, cannot fairly be termed instincts, because, as Mr. Darwin himself has shown in defining instinct from imitation, these virtues are not transmitted in the same unerring way. They are gradually acquired by the infant, and are in no sense comparable to the impulse by which a bird builds a nest. The first trial of the bird is as perfect as the last, while the social virtues are slowly recognised and embraced by the child, and by continual habit become quasi-instinctively followed. Mr. Darwin is not justified in overlooking this most important difference between what he terms 'the social instinct' in man and the instinct of the lower animals. This portion of the argument is founded on a false analogy.

The third stage consists of the evolution of public opinion expressed through a language more or less perfect, by which the common good would form the standard up to which each person would act; and lastly, the tendency to act for the common good would become inherited, and the habit gradually come to be an instinct. And thus our sense of right and wrong is gradually evolved by natural selection, without the necessity of the interference of any other law. It is merely the result of the working of the principle of utility in our natures. Right is merely what is found by experience or ruled to be for the good of society; and wrong that which is hurtful or which is deemed so.

These views are, strictly speaking, utilitarian, but their basis is shifted from that of selfishness, or 'the greatest happiness principle,' to that of the general good. If they be

true, they must explain the phenomena of morals, and our virtuous actions must be essentially founded on a utilitarian basis. But how could this have been brought about through the agency of natural selection? Would it be possible for a being, acting for the good of society, gradually to acquire the idea of right by the exercise of his social instincts? He could only perfect them, and could not, on the hypothesis, separate the useful from the right. Mr. Wallace has discussed this point most admirably:—

'Although the *practice* of benevolence, honesty, or truth may have been useful to the tribe possessing these virtues, that does not at all account for the peculiar *sanctity* attached to actions which each tribe considers right and moral, as contrasted with the very different feelings with which they regard what is merely *useful*. The utilitarian hypothesis (which is the theory of natural selection applied to the mind) seems inadequate to account for the development of the moral sense. This subject has been recently much discussed, and I will here only give one example to illustrate my argument. The utilitarian sanction for truthfulness is by no means very powerful or universal. Few laws enforce it. No very severe reprobation follows untruthfulness. In all ages and countries, falsehood has been thought allowable in love, and laudable in war; while at the present day it is held to be venial by the majority of mankind, in trade, commerce, and speculation. A certain amount of untruthfulness is a necessary part of politeness in the east and west alike, while even severe moralists have held a lie justifiable to elude an enemy or prevent a crime. Such being the difficulties with which this virtue has had to struggle, with so many exceptions to its practice, with so many instances in which it brought ruin or death to its too ardent devotee, how can we believe that considerations of utility could ever invest it with the mysterious sanctity of the highest virtue—could ever induce men to value it for its own sake, and practise it regardless of consequences?' (P. 352.)

We do not see what answer either Mr. Mill or Mr. Darwin can make to this argument. Or again, supposing we test Mr. Darwin's view of the origin of regret and remorse on his own principles:—

'At the moment of action, man will no doubt be apt to follow the stronger impulse; and though this may occasionally prompt him to the noblest deeds, it will far more commonly lead him to gratify his own desires at the expense of other men; but after their gratification, when past and weaker impressions, and contrasted with the ever-enduring social instincts, retribution will surely come. Man will then feel dissatisfied with himself, and will resolve, with more or less force, to act differently for the future. This is conscience; for conscience looks backwards and judges past actions, inducing that kind of dissatisfaction which, if weak, we call regret, and if severe, remorse.'

Remorse is, according to this very remarkable view, merely

a sort of regret which flows from the not having followed a persistent instinct. But so far from the two feelings being the same in kind, they are utterly distinct. The man who has killed his friend by an accident, would feel keen regret, but would he suffer the tortures of humiliation and agony and despair which would inevitably follow a deliberate murder, and which prompt hardened criminals to yield themselves up to punishment? In the latter case there is regret, but it is covered by a deeper and more powerful feeling of remorse. And how could this have been acquired by natural selection or the working of the utility principle? It does not promote the good, or the happiness, or the self-interest of the individual, and so far as society is concerned, the lower feeling of regret would be equally useful. It cannot therefore be accounted for on the Darwinian hypothesis of the evolution of morals. Or again, if we appeal to the virtues of care and respect for the infirm and aged, how could they have sprung from the blind workings of feelings good for society, seeing that, to say the least, the trouble of their maintenance more than counterbalances the profit which society obtains from their experience? The weakly and the infirm act injuriously to society by leaving a weak and sickly offspring. On the principle of natural selection the Fijian custom of killing the adults at the first approach of old age, or the Esquimaux practice of deserting the aged and the infirm, ought to be universal. In all these cases, as Mr. Hutton has justly remarked, in combating the utilitarian genesis of morals, advocated by Mr. Spencer, 'we cannot *inherit* more than our fathers *had*.' No amount of the accumulation of the experiences of utility could give origin to a feeling in which utility not only had no share, but to which it was, if anything, antagonistic.

Even in the statement of his own views, Mr. Darwin contradicts himself. In p. 88 he defines 'a moral being to be one 'who is capable of comparing his past and future actions, or 'motives, and of approving or disapproving of them. We have 'no reason to suppose that any of the lower animals have this 'capacity; therefore when a monkey faces danger to rescue 'its comrade, or takes charge of an orphan monkey, we do not 'call its conduct moral.' How can this be reconciled with what seems to be the extension of the moral sense to dogs? (p. 92): 'The imperious word *ought* seems merely to imply the con-'sciousness of the existence of a persistent instinct, either 'innate or partly acquired, serving him as a guide, though 'liable to be disobeyed. We hardly use the word *ought* in a 'metaphorical sense, when we say hounds ought to hunt,

'pointers to point, and retrievers to retrieve their game. If 'they fail thus to act they fail in their duty, and act wrongly.' He also assumes in his argument the truth of propositions which are undoubtedly false. We should like to know, for instance, where Mr. Darwin finds the 'ever-present instinct 'of sympathy and good will,' on which, in his view, the moral sense depends. It is certainly not to be found in any of the busy haunts of men. The highest precept of morals is 'to 'return good for evil, to love your enemies, and do good to 'them that despitefully use you.' But that doctrine has not yet become an instinct, as every one of us can feel for himself. Mr. Darwin, in thus raising his standard of right and wrong on human sympathy and good will, must be thinking of some Utopia that has not yet been realised on this earth.

We may sum up Mr. Darwin's attempt to explain the growth of the moral sense in man, from rudiments in the lower animals by means of natural selections, as failing in every point. It does not explain any of those facts which we know from our own feelings to be true, and it is full of difficulties and contradictions. It has indeed failed, as any attempt from the natural history point of view might be expected to fail. We cannot account by any known natural laws for the moral sense or any of the virtues, or for the great intellectual superiority of man over the brutes. If they be not God-implanted, they baffle our powers of analysis. But whatever view be taken of their origin, they raise a barrier between us and the brutes which cannot be passed by the natural selection theory. On the one side stands man, gifted with articulate speech, conscience, and reason, able to look into the universe, and to rule its laws to his own advantage, and able also, as the materialists seem to forget, to look inwards and analyse his own mental condition. On the other are the beasts, subject to natural laws, without knowledge of the past or hope for the future, and gifted with just enough understanding to fit them for their conditions of life. To measure man's superiority over the brute by his bodily frame is the only method by which a naturalist can construct his system; but to proceed to say that there is a corresponding identity of mental character between man and brute, is to refuse to acknowledge facts in psychology which are as well ascertained as any of those in natural history. Till Mr. Darwin can show that the higher faculties of the human mind, such as the power of abstract thought and of forming general ideas, are merely developed from rudiments in the brutes by natural selection, his conclusion that the human mind is the same in

kind with that in the brutes is a mere assertion without proof. To discuss the problem with these important factors left out, is to play 'Hamlet' with the character of Hamlet left out.

But if all those non-physical characters on which our humanity depends could not be originated by natural selection, it may be admitted that they have been perfected by it. Small variations in intelligence are accumulated by a kind of natural selection from father to son, and every-day life consists of a keen competition which must on the whole tend to increase the powers of reason, in the same way that exercise strengthens a blacksmith's arm. The differences in the faculty of the lowest savage and that of a Shakspeare or a Goethe may be taken to be a measure of the power of natural laws, some known and some unknown, to modify intelligence, but even here the manifestation of the highest intellect is not the result of the accumulation of a small series of variations. Great men are not the crown and apex of a long line of ancestors gradually rising from the common herd; but they appear suddenly, *per saltum* as the naturalist would say, or, as it were, God-sent. None inherit their extraordinary faculties. The survival of the fittest is of course a necessary law of our being, but not the only law; it does not originate, but it merely moderates, what is brought before it, and weeds out what is hurtful to the individual.

We will now return to the bodily attributes of man, on which Mr. Darwin is to be listened to with great respect. The erect posture he attributes to a gradual change of habit in our ancestors, on our walking on the ground, and on the great value which the hands would be for various purposes. The peculiarly human modifications of the vertebrate structure caused by this change has probably given to man those characters by which he is known to the naturalist from the quadrumana. They may possibly be due in part to natural selection; but we cannot be sure that the habit of walking erect was first attained by that means. The nakedness of our skin, which Mr. Wallace ascribes to a supernatural agency, and the variation in colour in different races, he attributes to the action of sexual selection, or the varying tastes which have led women to choose their partners, and *vice versâ*. To this principle we shall recur presently.

Although the human race has most extraordinary powers of resisting the force of external conditions, yet in some cases change of condition acts directly on the human body. In the United States, for instance, the measurements of more than one million soldiers who served in the late war, proves that a

residence in the Western States during the years of growth tends to increase stature. On the other hand, a seafaring life delays growth according to the investigations of Mr. Gould. The large size of the bodies and the great thoracic capacity of the Aymara Indians has been traced by Mr. Forbes to their living on a lofty plateau from ten to fifteen thousand feet above the sea. With regard to the blackness of the negroes, we differ from Mr. Darwin, and we are inclined to ascribe it to the direct action of the sun in the torrid zone, rather than to the capricious taste of men and women in choosing their partners; and for this reason, which Mr. Darwin omits to notice, that although a black absorbs more heat than a light-coloured skin, it yields it up with much greater freedom and without blistering.* Mr. Darwin's argument against this view, derived from the distribution of the variously-coloured races, which does not coincide with corresponding differences of climate, and from the fact that the Dutch settlers in South Africa have undergone a slight change in three hundred years, has no bearing on the question. It merely implies the improbability of the colour having been brought about by gradual variation, but not if it were originated by a sudden variation, as in a case quoted by Dr. Wells.† Hannah West was born from fair parents in Sussex, and was of light complexion, excepting that her left shoulder, arm, fore-arm, and hand, were covered with a jet black skin. We may note in passing, that this remarkable change could not have been brought about by natural selection. Had a variety of this kind once sprung up among the ancient dwellers of the torrid zone in Africa, it is only reasonable to suppose that it would gradually have spread over the continent, because it is better fitted to endure a hot climate than the white skin. The probability that negroes have thus originated, suddenly, and not by natural selection, is considerably increased by the well-known cases to which we have alluded, of the sudden appearance of the short-legged Ancon sheep and of the six-fingered Kelleia family, in each of which the peculiarity suddenly obtained was handed down by inheritance. Were a variety of this kind to spring up among the Dutch, it is very probable that it would spread over Africa in the same way as the negro. The three hundred years of which Mr. Darwin speaks is as yesterday compared with the vast lapse of time implied by the present distribution of the negroid races.

* On this point a series of experiments by Sir Everard Home is conclusive. Philosophical Transactions, 1821, vol. iii. p. 1.

† Essays, p. 246.

In treating of the various races of men, Mr. Darwin unaccountably omits to notice perhaps the most important essay which has been written on the subject, in which the number of races is satisfactorily decided according to their external characteristics. Professor Huxley, approaching the subject altogether from the natural history point of view, finds that there are four well-defined groups, or races, each of which is possessed of likenesses and unlikenesses, which do not shade off into each other, except under circumstances which render it highly probable that interbreeding has taken place.* The first, or the Australoid, is possessed of the following characters—'a dark 'complexion, ranging through various shades of light and dark 'chocolate colour; dark or black eyes; the hair of the scalp 'black, neither coarse and lank nor crisp and woolly, but soft, 'silky, and wavy; the skull always belonging to the dolicho-'cephalic group, or having a cephalic index of less than 0·8.' It ranges at the present day throughout the great continent of Australia, but is not found in the contiguous island of Van Diemen's Land. The hill tribes in the Dekhan present all these characters, and 'an ordinary coolie would pass muster 'very well for an Australian, though he is ordinarily less 'coarse in skull and jaw.' The ancient Egyptians also, Professor Huxley believes to belong to the same race, for although the modern Egyptian 'has been much modified by civilisation, 'and probably by admixture, he still retains the dark skin, the 'black silky wavy hair, the long skull, the fleshy lips, and the 'broad alæ of the nose which we know distinguished his remote 'ancestors, and which caused both him and them to approach 'the Australian and the "Dasyu" more nearly than they do 'any other form of mankind.' The researches of Colonel Lane Fox on the various kinds of implements in use among savages add great weight to the conclusion that these isolated peoples belong to one and the same stock. The very singular weapon, the boomerang, usually considered to be peculiar to Australia, is used in the Dekhan, and was formerly used by the ancient Egyptians. Professor Huxley thinks it very probable that the dark whites (Melanochroi) stretching from northern Hindustan through western Asia, skirting both shores of the Mediterranean, and extending through Western Europe to Ireland, 'had their origin in a prolongation of the Australoid, which 'has become modified by selection or intermixture.' Brunettes may perhaps owe their beauty to a dash of Australoid blood.

* International Congress of Prehistoric Archæology, Norwich Volume, p. 92. 1868.

The second, or the Negroid race, has a 'dark skin, varying 'from yellowish brown to what is usually called black, dark or 'black hair which is crisp, or what is commonly called woolly 'in texture,' and with but rare exceptions a long head. In Africa it presents two marked modifications—the dwarfed, light-complexioned bushman, and the tall dark negro proper. Men possessed of negroid characters inhabit the Andaman Isles, the peninsula of Malacca, the Philippines, the chain of islands passing south and east parallel to the east coast of Australia to New Caledonia, and lastly Tasmania, where they are now represented by one lonely woman.

The third, or Mongoloid race, is characterised by a complexion ranging 'from brownish yellow to olive; the eyes are 'dark, usually black; the hair of the scalp black, coarse, 'straight, and long.' The proportions of the skull, so constant in the two preceding races, vary in this from extreme dolichocephaly to extreme brachycephaly. It ranges from the banks of the Danube and Finland through the great steppes of Central Asia, China, Japan, and through the two Americas. It peoples also most of the islands in the Pacific Ocean, and has effected a lodgment in Madagascar, probably through the great aptitude for navigation which some of its branches, such as the Malays and Japanese, undoubtedly possess.

The fourth race, or the Xanthochroic, to which we ourselves belong, possess 'blue or grey eyes and yellow or yellow brown 'hair, and a skull varying in size and form from extreme 'length to extreme breadth.' The fair-haired Germans may be taken as types. More or less crossed with the Australoid races, it constitutes the dark-haired people of northern Africa, southern Europe, and Asia Minor; and it passes through Asia Minor to the north of India. It occupies an area relatively small compared with the Mongoloid race, but is now spreading over the earth with great rapidity wherever the climate will allow of a foothold.

The distribution of these four races of men offers a point of considerable difficulty. We can understand how the two latter peoples spread to remote regions by means of navigation; but neither the Australoid or the Negroid races possess any facility for devising means of transport by water. For either of them to have crossed the sea from any one region where they are found to a far distant point, would have been impossible. It is therefore absolutely certain that they must have migrated by land, under very different physical conditions to those which now obtain. If we start from Africa, we get an unbroken continent as far as the Malacca peninsula. The islands farther to

the south in which the two races have escaped destruction from the other competing races, must during the time they passed from one to the other have been a continuation of the solid land of Asia. In no other manner can the presence of the same people in Australia and the Dekhan be accounted for, or in the Andamans and Tasmania. And Australia must have been insulated from the mainland of Asia *before* the Negritos took possession of what is now the chain of islands extending from Malacca through New Guinea down to Tasmania. Had it not been so the Negritos would have spread over the great Australian continent. The view that the chain of islands in question are the higher grounds of a land now submerged, a mountain chain, like that of the Andes or Rocky Mountains, of a region which has disappeared beneath the waves of the sea, is considerably strengthened by the examination of the east coast of Australia, where a great barrier coral reef, extending for a thousand miles at various distances from the shore, testifies to the gradual sinking of the land. Such phenomena Mr. Darwin has proved in his work on coral islands are the rule rather than the exception in the Pacific Ocean; and to speak in general terms, there is ample proof that the Pacific Ocean is on the whole a subsiding area at the present day. The distribution of the Negroid race in Africa is probably due to an opposite movement of land. The burning sands of the Sahara have been proved by late geological research to have been the bed of a sea, which flowed south of the Atlas, which would form an impassable barrier to the northward migration of the Negroid races.

Nor are we without a clue to the relative antiquity of these four races. The Australoid race must have found its way into Australia along the continuation of the mainland, before that region was insulated from the Asiatic mainland, and it is equally certain that the Negroid races occupied the same continuation of land, probably destroying the original occupants after that geographical change took place. There is, therefore, strong reason for believing that the Australoid occupied that region before the Negroid invasion. Whether the Mongoloid race be older than the Xanthochroic is doubtful, but its wide distribution seems to lead to that conclusion. The relative ages of these great races can of course only be determined at their points of contact; but judging from their distribution we should be inclined to place them in the following order in point of time: Australoid, Negroid, Mongoloid, and Xanthochroic. And that this sequence is true of at least two out of the four is proved by the independent testimony of the cerebral deve-

lopment. In this respect the Australoid and Negroid are at the bottom, and between these and the remaining two races there is a considerable gap. The two former are separated from the two latter by the lapse of time necessary for the bringing about of great geographical changes over a considerable area in Europe, Asia, and Africa.

The much vexed question whether these races are entitled to rank as species in nature, is, in our belief, satisfactorily decided by an appeal to that great test of a species, the fertility of the offspring. The hybrids in nature are invariably sterile, while it is a notable fact that the offspring of marriages between the different races are fertile, and it would follow that these races are not entitled to specific rank, and consequently that man was descended from one and not from many stocks. Mr. Darwin views them as sub-species.

The condition of the primeval man is veiled in impenetrable darkness. Sir John Lubbock, arguing from the present state of the lowest and most degraded savage, believes that he was a savage of the lowest order, and endowed with the knowledge of fire and assisting his bodily weakness with rude tools and weapons. Mr. Darwin holds (vol. i. p. 235) that 'in a 'series of forms graduating insensibly from some ape-like 'creature to man as he now exists it would be impossible to 'fix on any definite point when the term Man ought to be 'used.' It may be that the primeval man was closely linked to the apes in body, very much as we ourselves are, but we deny that there is any evidence of an insensible graduation. While there are cases on record of parents producing offspring as unlike themselves as one species is unlike another in nature, and of the variations from a parental form being handed down to the descendants, how can we tell that man has not arisen from his lowly ancestry suddenly, from the incidence of causes beyond the ken of the naturalist? How can we tell that he did not spring forth suddenly as the manifestation of humanity in the brute creation? We maintain, that it is highly probable, from the stand-point of natural history, that he did so appear, while natural selection does not explain the known facts of the case. We bear in our body, Mr. Darwin says, the marks of our lowly origin, and it may be added we bear in our minds an equal proof of an origin which is not from below, but from above. It may be fair to point to the tip in the ear, and the moulding of our bodily frame, as testifying to our relationship with the apes; surely it is equally just to point to our higher intellectual faculties and our moral sense, as being sent by a higher Intelligence. 'Spiritual powers (Mr. Darwin

'allows) cannot be compared or classified by the naturalist;' why then should he attempt to compare and classify them? Man's body has probably been evolved from a lower form, but not, as we have shown, by natural selection. Our intellectual faculty and our moral sense, in so much as they are not found in the lower animals, cannot have been merely the result of a like evolution, and we can safely say that they have no brutish origin.

Mr. Darwin thus indicates the probable line of our descent:—

'The most ancient progenitors in the kingdom of the Vertebrata, at which we are able to obtain an obscure glance, apparently consisted of a group of marine animals, resembling the larvæ of existing Ascidians. These animals probably gave rise to a group of fishes, as lowly organised as the lancelet; and from these the ganoids, and other fishes like the lepidosiren, must have been developed. From such fish a very small advance would carry us on to the Amphibians. We have seen that birds and reptiles were once intimately connected together; and the Monotremata now, in a slight degree, connect mammals with reptiles. But no one can at present say by what line of descent the three higher and related classes—namely, mammals, birds, and reptiles, were derived from either of the two lower vertebrate classes—namely, amphibians and fishes. In the class of Mammals the steps are not difficult to conceive which led from the ancient Monotremata to the ancient Marsupials; and from these to the early progenitors of the placental Mammals. We may thus ascend to the Lemuridæ; and the interval is not wide from these to the Simiadæ. The Simiadæ then branched off into two great stems, the New World and Old World monkeys; and from the latter at a remote period, Man, the wonder and glory of the universe, proceeded.

'Thus we have given to man a pedigree of prodigious length, but not, it may be said, of noble quality. The world, it has often been remarked, appears as if it had long been preparing for the advent of man; and this in one sense is strictly true, for he owes his birth to a long line of progenitors. If any single link in this chain had never existed, man would not have been exactly what he now is. Unless we wilfully close our eyes, we may, with our present knowledge, approximately recognise our parentage; nor need we feel ashamed of it. The most humble organism is something much higher than the inorganic dust under our feet; and no one with an unbiassed mind can study any living creature, however humble, without being struck with enthusiasm at its marvellous structure and properties.' (Vol. i. p. 212.)

The truth or falsehood of this pedigree has no relation whatever to religious belief, for we have already proved that the changes which it pre-supposes were not brought about by natural selection. The difficulties in the way of that theory offered by the brain, ear, or eye of man apply with equal force to the organs of the lower animals. Natural

selection is undoubtedly a most powerful agent of change, but it is not, as Mr. Darwin believes, the sole agent. He now admits that he over-stated his case in the 'Origin of Species' in order that its claims might not be overlooked. 'I had not 'formerly sufficiently considered (he writes) the existence of 'many structures which appear to be, as far as we can judge, 'neither beneficial nor injurious; and this I believe to be one 'of the greatest oversights as yet detected in my work.' We believe that as his great work progresses, the theory of natural selection will be gradually changed for that of evolution, in which it is relegated to a very subordinate role. There are indications of this change of front in the 'Descent of Man,' which is rendered inevitable by the recognition of factors of change other than natural selection.

The special characters of each of the great races of mankind have probably been derived in the same way as those of animals bred under domestication. After their first dispersion from one centre, they intermarried among themselves and became of a family type, in proportion as they were insulated by geographical boundaries or by mutual antipathies. There is no greater difficulty in thus explaining the differences between the races than in explaining those which undoubtedly exist between different families and clans. Were two families insulated for some thousands of years from each other, they would become endowed with certain peculiar physical characters. And were they placed in different quarters of the world, there is every reason for believing that they would present differences, almost as marked as those between the Mongoloid and the fair-haired races. Mr. Darwin believes that they cannot be accounted for by natural selection, and he invokes to his aid the principle of sexual selection by which men and women choose their partners:—

'I do not intend to assert that sexual selection will account for all the differences between the races. An unexplained residuum is left, about which we can in our ignorance only say, that as individuals are constantly born with, for instance, heads a little rounder or narrower, and with noses a little longer or shorter, such slight differences might become fixed or uniform, if the unknown agencies which induced them were to act in a more constant manner, aided by long-continued intercrossing. Such modifications come under the provisional class, alluded to in our fourth chapter, which, for the want of a better term, have been called spontaneous variations. Nor do I pretend that the effects of sexual selection can be indicated with scientific precision; but it can be shown that it would be an inexplicable fact if man had not been modified by this agency which has acted so powerfully on innumerable animals, both high and low in the scale. It can further be

shown that the differences between the races of man, as in colour, hairyness, form of features, &c. are of the nature which might have been expected would have been acted upon by sexual selection.'

Mr. Darwin fully admits in this passage that variations suddenly arise from unknown causes, and that there are factors of change besides those which he enumerates; and he limits the sexual selection to the picking and choosing of the variations to a great extent according to the fancy, instead of for the good, of the individual, as in natural selection. Practically in so doing he allows the point for which we have been contending, that natural selection is powerless to originate a new form, although it is powerful to modify it when once it has arisen. To do justice to the argument we must briefly sum up the evidence as to the change wrought in the lower animals by sexual selection. This ought, indeed, to have formed a separate work, for it has but a collateral bearing on the sexual selection of man, and it would have been better if Mr. Darwin had first of all argued the effect of human caprice, which can be tested by our own experience, before he investigated the results which he believes to have been brought about by the same quality in the lower animals.

Sexual selection, according to Mr. Darwin, may be defined to be the cause of the great majority of those differences between males and females of the same species which cannot otherwise be accounted for, a cause co-ordinate with natural selection of the diversity of form and colour manifested in the animal kingdom. It is obvious that all facts in natural history can either be explained by natural selection, or they cannot; and it is hardly fair to put the latter into the category of sexual selection, and to keep the third class which cannot be explained by either in the background. To sexual selection are attributed equally the splendour of the humming bird, the wattles and comb of the turkey-cock, and the superior strength of the males over the females, or the reverse. It seems to us that the results of two very different factors are ascribed to its action. On the one hand there is that natural desire of propagating their kind which is distinctly normal, and which leads to the deadly conflicts between the males, in which the larger and the stronger are the conquerors, or to changes in bodily form by which the union of the sexes is promoted. To this may be ascribed the large size and the development of antlers in the buck, the curvature of the lower jaw of the salmon, the large tusks of the wild boar, and innumerable other cases which are enumerated in a most charming manner in the 'Descent of Man.' We fully admit that this is a con-

stant and persistent force, tending continually to one end, and that is the multiplication of the individual which is stronger or better armed. On the other hand there is caprice or fancy, which is uncertain as the wind in its action upon ourselves, and which, if our experience be worth anything, has a tendency to vary with each individual. How the action of this quality in individuals during a long course of ages could have resulted in the *constant* colours and forms in males and females, which, according to Mr. Darwin, are of no good to the individual, rather than have brought about an infinite variety within the limit of each species, is a difficulty with which Mr. Darwin cannot possibly grapple. Caprice is certainly present in the higher animals; but so uncertain an agent could never have produced an uniform result, whether it be of form or of colour. We will examine the argument as to colour.

Beauty of colour is very generally found throughout the animal kingdom, and is essentially of the same kind. The gorgeous tints of a sea-anemone or of a coral, or the lustrous sheen on the hairs of a sea-slug or on the interior of an ear-shell, are as beautiful as the stripes of a tiger or the splendour of a bird of paradise. None could maintain for a moment that there is the slightest difference between them as works of art. In some cases the design of colouring is the same in the higher and lower classes of the animal kingdom. In the cone-shells, for instance, the contrast between the black stripes and reddish back-ground of the tiger's skin is exactly followed, and among the endless varieties of the cowry, some are ornamented with the same colours as some of the antelopes. It is only reasonable to account for this identity on the hypothesis that like results have been produced by similar causes, and that whatever may be the explanation of the colours of one class of organisms, ought also to explain the presence of similar colours in the other class. Mr. Darwin, however, with a strange want of logic, denies this. In the case of the lower animals, such as sea-anemones, corals, and others which either present no sexual differences or are hermaphrodite, he believes that colours are the direct result of the chemical nature, or the minute structure of their tissues, independently of any benefit thus derived—'The tints of the decaying leaves in an American 'forest are described by everyone as gorgeous; yet no one 'supposes that these tints are of the least advantage to the 'trees. Bearing in mind how many substances closely analo-'gous to natural organic compounds have been recently formed 'by chemists, and which exhibit the most splendid colours, it

'would have been a strange fact if substances similarly coloured 'had not often originated, independently of any useful end 'being thus gained, in the complex laboratory of living or-'ganisms.' Thus a large division of the animal kingdom is taken out of the category both of natural and sexual selection, and relegated to that which is of unknown causation. With the higher animals, according to Mr. Darwin, the case is very different; 'for with them, when one sex is much more bril-'liantly or conspicuously coloured than the other, and there is 'no difference in the habits of the two sexes which will account 'for this difference, we have reason to believe in the influence 'of sexual selection; and this belief is strongly confirmed when 'the more ornamented individuals, which are almost always 'the males, display their attractions before the other sex. We 'may also extend this conclusion to both sexes, when coloured 'alike, if their colours are perfectly analogous to those of one 'sex alone in certain other species of the same group.' The very fact that beauty of colour is found equally distributed among the lower animals where there could be no sexual selection, implies that in the higher animals also it could not have been the result of sexual selection. There is, doubtless, connexion between splendour of colour and sexual functions in all the higher animals, as in the case of the male stickleback, described by Mr. Warrington as being beautiful beyond description during the breeding season—'The back and eyes of 'the female are simply brown, and the belly white; the eyes 'of the male, on the other hand, are of the most splendid 'green, having a metallic lustre like the green feathers of some 'humming birds. The throat and belly are of a bright crim-'son, the back of an ashy green, and the whole fish appears as 'though it were somewhat translucent and glowed with an 'internal incandescence' (vol. ii. p. 14). It is absurd to suppose that this remarkable transformation is caused by the female stickleback choosing her partners for millions of generations with a special view to brilliancy of colour.

Animals are variously affected by different colours, being attracted by some and repelled by others; but this does not prove that their partners owe their tints to the taste of the opposite sex. Mr. Darwin's argument, derived from the fact that splendidly coloured males show off their beauty to the females, loses point from the circumstance that they will also show off to their fellow males, as in the case of grouse, or to spectators, as in the case of peacocks, which frequently exhibit their splendid tails to the unsympathetic eyes of pigs, horses, and cows. We do not deny that the higher animals

exert some choice in their courtship, but we deny that Mr. Darwin has advanced proof that the beautiful colours of the males in the higher animals are due to sexual selection. In the present state of knowledge, we must confess our ignorance of the *vera causa*; but whatever it may be, we may fairly infer that it must explain the tinting of shells and corals, and the lower animals, as well as that of the higher classes of the animal kingdom, the exquisite painting of a turbo, which during life is concealed beneath the thick epidermis, as well as the glories of a peacock. Mr. Darwin professes his inability to conceive the purpose of the beauty which pervades the organic creation, if it be not subservient to the reproduction of race. But is the beauty of creation confined to organic beings? Does it not extend to the crystal and the gem drawn from the deepest mines? Does it not beam in every ray of light which flashes over sky or sea? Does it not fill the firmament, and clothe the earth? What matters it to explain by some idle theory the colours on the back of a caterpillar, when the whole universe is replete with the same marvellous hues, symmetry, and grace?

Mr. Darwin has told us some amusing stories of the loves of the animals—the lady spider, that fell upon and ate up her lover, to the unspeakable horror of the beholder; the seal which bows to his lady love till he has got her within range of his teeth; the coquetry of the Thysanura—are perfect of their kind; but he has not advanced a shadow of proof that sexual selection is capable of producing the changes of form and colour which he attributes to it. To the truth of his view it is necessary to show that taste in the species has always flowed in one definite direction, without any of that fickleness which we associate with the idea of taste. He must also show that animals possess instinctive love of beauty and of positive ugliness, judged according to our standard. These two essentials to his theory he assumes without any attempt at proof.

Throughout the treatise on sexual selection Mr. Darwin is continually committing the error which he pointed out in his first volume—that of treating the productions of animals as if they flowed from the same qualities as would be necessarily implied if they were our own. Because birds are beautiful, and build beautiful nests, he argues that they possess the same æsthetic taste as we ourselves under the highest culture:—

'The best evidence, however, of a taste for the beautiful is afforded by the three genera of the Australian bower-birds already mentioned. Their bowers, where the sexes congregate and play strange antics, are differently constructed, but what most concerns us is, that they are

decorated in a different manner by the different species. The satin bower-bird collects gaily-coloured articles, such as the blue tail-feathers of parakeets, bleached bones and shells, which it sticks between the twigs, or arranges at the entrance. Mr. Gould found in one bower a neatly-worked stone tomahawk and a slip of blue cotton, evidently procured from a native encampment. These objects are continually rearranged, and carried about by the birds whilst at play. The bower of the spotted bower-bird is beautifully lined with tall grasses, so disposed that the heads nearly meet, and the decorations are very profuse. Round stones are used to keep the grass-stems in their proper places, and to make divergent paths leading to the bower. The stones and shells are often brought from a great distance. The regent-bird, as described by Mr. Ramsay, ornaments its short bower with bleached land-shells belonging to five or six species, and with berries of various colours, blue, red, and black, which give it, when fresh, a very pretty appearance. Besides these, there were several newly-picked leaves and young shoots of a pinkish colour, the whole showing a decided taste for the beautiful. Well may Mr. Gould say these highly decorated halls of assembly must be regarded as the most wonderful instances of bird architecture yet described, and the taste, as we see, of the several species certainly differs.' (Vol. ii. p. 112.)

There is surely no more evidence that these birds build nests from æsthetic motives than that beavers build their dams from their knowledge of the principles of applied mechanics. If the exquisite beauty of birds, taking them as an example, be merely the result of the reaction of the æsthetic faculties on the plumage of their partners, we may as well at once give up the attempt to compete with them in the department of taste. Our noblest painters cannot hope to reproduce the tints of a humming-bird's feather. Can we hope, after struggling after the higher culture for generations, and having our love for the beautiful obtained by education, and transformed into an instinct by inheritance, to attain to the æsthetic cultus—shall we say? of a female argus-pheasant. In our present state we are in that respect infinitely inferior to the lower animals on the hypothesis. To treat animals as if they were men and women is little less than absurd. Moreover, were beauty the result of sexual selection, it ought to be manifested in the highest degree in the highest animals, since a sense of the beautiful is to a large extent dependent on intellectual development. This could not be maintained by Mr. Darwin, or by any other naturalist. From whatever point of view the theory is examined, it is altogether inconsistent with known facts.

Inferences might not unfairly be drawn from this portion of Mr. Darwin's work, to which we cannot in this place do more than advert. But we do him no injustice in ascribing to him the theory of Lucretius—that Venus is the creative power of

the world, and that the mysterious law of reproduction, with the passions which belong to it, is the dominant force of life. He appears to see nothing beyond it or above it. In a heathen poet such doctrines appear gross and degrading, if not vicious. We know not how to characterise them in an English naturalist, well known for the purity and elevation of his own life and character.

We must now conclude our remarks on this subject of absorbing interest. Never, perhaps, in the history of philosophy, have such wide generalisations been derived from such a small basis of fact. Mr. Darwin's theory of the growth of the moral sense and of the intellectual faculty is unsupported by any proof; and the very corner-stone of the hypothesis, that the human mind is identical in kind with that of the brutes, is a mere assumption opposed alike to experience and philosophy. The view of sexual selection is greatly exaggerated, and altogether inadequate to explain the differences between the sexes. In a word, Mr. Darwin has chosen this crucial test of the truth of natural selection, and it has broken down at every point where it has been tried. Mr. Wallace, treating of the general question of the evolution of life, takes very much the same view as Mr. Darwin, but he allows that Man cannot be accounted for by the theory. Yet both these authors have upon the whole done good to science by making people think; and the results of that thought will be, in our belief, not the blind acceptance of their views, but a realisation of the truth, that whatever the doctrine of evolution may be worth, so far as relates to man's body, man's intellect and moral sense are now, as they ever were, inscrutable from the point of view offered by natural history; and only to be comprehended from far higher considerations, to which, as a mere naturalist, Mr. Darwin has not attained.