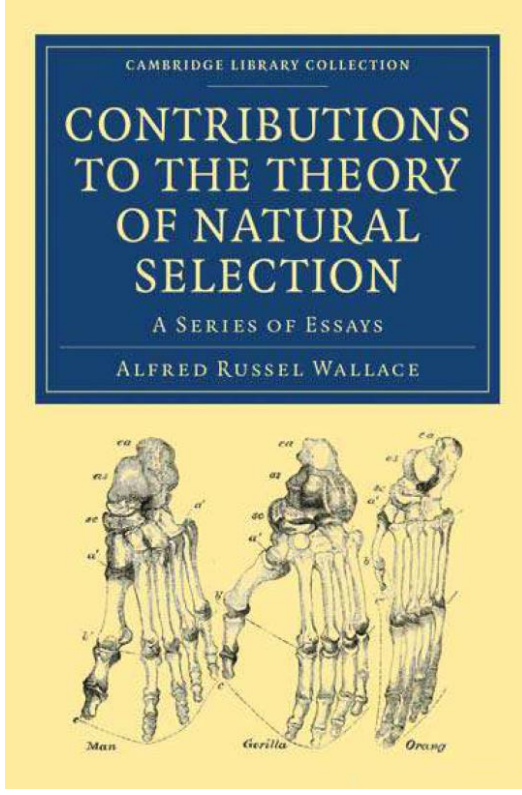

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THE LIMITS OF NATURAL SELECTION AS APPLIED TO MAN.

THROUGHOUT this volume I have endeavoured to show, that the known laws of variation, multiplication, and heredity, resulting in a "struggle for existence" and the "survival of the fittest," have probably sufficed to produce all the varieties of structure, all the wonderful adaptations, all the beauty of form and of colour, that we see in the animal and vegetable kingdoms. To the best of my ability I have answered the most obvious and the most often repeated objections to this theory, and have, I hope, added to its general strength, by showing how colour—one of the strongholds of the advocates of special creation—may be, in almost all its modifications, accounted for by the combined influence of sexual selection and the need of protection. I have also endeavoured to show, how the same power which has modified animals has acted on man; and have, I believe, proved that, as soon as the human intellect became developed above a certain low stage, man's body would cease to be materially affected by natural selection, because the development of his mental faculties would render important modifications of its form and structure unnecessary. It will, therefore, probably

excite some surprise among my readers, to find that I do not consider that all nature can be explained on the principles of which I am so ardent an advocate; and that I am now myself going to state objections, and to place limits, to the power of "natural selection." I believe, however, that there are such limits; and that just as surely as we can trace the action of natural laws in the development of organic forms, and can clearly conceive that fuller knowledge would enable us to follow step by step the whole process of that development, so surely can we trace the action of some unknown higher law, beyond and independent of all those laws of which we have any knowledge. We can trace this action more or less distinctly in many phenomena, the two most important of which are—the origin of sensation or consciousness, and the development of man from the lower animals. I shall first consider the latter difficulty as more immediately connected with the subjects discussed in this volume.

What Natural Selection can Not do.

In considering the question of the development of man by known natural laws, we must ever bear in mind the first principle of "natural selection," no less than of the general theory of evolution, that all changes of form or structure, all increase in the size of an organ or in its complexity, all greater specialization or physiological division of labour, can only be brought about, in as much as it is for the good of the being so modified. Mr. Darwin himself has taken care to

impress upon us, that "natural selection" has no power to produce absolute perfection but only relative perfection, no power to advance any being much beyond his fellow beings, but only just so much beyond them as to enable it to survive them in the struggle for existence. Still less has it any power to produce modifications which are in any degree injurious to its possessor, and Mr. Darwin frequently uses the strong expression, that a single case of this kind would be fatal to his theory. If, therefore, we find in man any characters, which all the evidence we can obtain goes to show would have been actually injurious to him on their first appearance, they could not possibly have been produced by natural selection. Neither could any specially developed organ have been so produced if it had been merely useless to him, or if its use were not proportionate to its degree of development. Such cases as these would prove, that some other law, or some other power, than "natural selection" had been at work. But if, further, we could see that these very modifications, though hurtful or useless at the time when they first appeared, became in the highest degree useful at a much later period, and are now essential to the full moral and intellectual development of human nature, we should then infer the action of mind, foreseeing the future and preparing for it, just as surely as we do, when we see the breeder set himself to work with the determination to produce a definite improvement in some cultivated plant or domestic animal. I would further remark that this enquiry is

as thoroughly scientific and legitimate as that into the origin of species itself. It is an attempt to solve the inverse problem, to deduce the existence of a new power of a definite character, in order to account for facts which according to the theory of natural selection ought not to happen. Such problems are well known to science, and the search after their solution has often led to the most brilliant results. In the case of man, there are facts of the nature above alluded to, and in calling attention to them, and in inferring a cause for them, I believe that I am as strictly within the bounds of scientific investigation as I have been in any other portion of my work.

The Brain of the Savage shown to be Larger than he Needs it to be.

Size of Brain an important Element of Mental Power.—The brain is universally admitted to be the organ of the mind; and it is almost as universally admitted, that size of brain is one of the most important of the elements which determine mental power or capacity. There seems to be no doubt that brains differ considerably in quality, as indicated by greater or less complexity of the convolutions, quantity of grey matter, and perhaps unknown peculiarities of organization; but this difference of quality seems merely to increase or diminish the influence of quantity, not to neutralize it. Thus, all the most eminent modern writers see an intimate connection between the diminished size of the brain in the lower races of man-

kind, and their intellectual inferiority. The collections of Dr. J. B. Davis and Dr. Morton give the following as the average internal capacity of the cranium in the chief races:—Teutonic family, 94 cubic inches; Esquimaux, 91 cubic inches; Negroes, 85 cubic inches; Australians and Tasmanians, 82 cubic inches; Bushmen, 77 cubic inches. These last numbers, however, are deduced from comparatively few specimens, and may be below the average, just as a small number of Finns and Cossacks give 98 cubic inches, or considerably more than that of the German races. It is evident, therefore, that the absolute bulk of the brain is not necessarily much less in savage than in civilised man, for Esquimaux skulls are known with a capacity of 113 inches, or hardly less than the largest among Europeans. But what is still more extraordinary, the few remains yet known of pre-historic man do not indicate any material diminution in the size of the brain case. A Swiss skull of the stone age, found in the lake dwelling of Meilen, corresponded exactly to that of a Swiss youth of the present day. The celebrated Neanderthal skull had a larger circumference than the average, and its capacity, indicating actual mass of brain, is estimated to have been not less than 75 cubic inches, or nearly the average of existing Australian crania. The Engis skull, perhaps the oldest known, and which, according to Sir John Lubbock, "there seems no doubt was really contemporary with the mammoth and the cave bear," is yet, according to Professor Huxley, "a fair average skull,

which might have belonged to a philosopher, or might have contained the thoughtless brains of a savage." Of the cave men of Les Eyzies, who were undoubtedly contemporary with the reindeer in the South of France, Professor Paul Broca says (in a paper read before the Congress of Pre-historic Archæology in 1868)—"The great capacity of the brain, the development of the frontal region, the fine elliptical form of the anterior part of the profile of the skull, are incontestible characteristics of superiority, such as we are accustomed to meet with in civilised races;" yet the great breadth of the face, the enormous development of the ascending ramus of the lower jaw, the extent and roughness of the surfaces for the attachment of the muscles, especially of the masticators, and the extraordinary development of the ridge of the femur, indicate enormous muscular power, and the habits of a savage and brutal race.

These facts might almost make us doubt whether the size of the brain is in any direct way an index of mental power, had we not the most conclusive evidence that it is so, in the fact that, whenever an adult male European has a skull less than nineteen inches in circumference, or has less than sixty-five cubic inches of brain, he is invariably idiotic. When we join with this the equally undisputed fact, that great men—those who combine acute perception with great reflective power, strong passions, and general energy of character, such as Napoleon, Cuvier, and O'Connell, have always heads far above the average size, we must feel satisfied that

volume of brain is one, and perhaps the most important, measure of intellect; and this being the case, we cannot fail to be struck with the apparent anomaly, that many of the lowest savages should have as much brains as average Europeans. The idea is suggested of a surplusage of power; of an instrument beyond the needs of its possessor.

Comparison of the Brains of Man and of Anthropoid Apes.—In order to discover if there is any foundation for this notion, let us compare the brain of man with that of animals. The adult male Orang-utan is quite as bulky as a small sized man, while the Gorilla is considerably above the average size of man, as estimated by bulk and weight; yet the former has a brain of only 28 cubic inches, the latter, one of 30, or, in the largest specimen yet known, of 34½ cubic inches. We have seen that the average cranial capacity of the lowest savages is probably not less than *five-sixths* of that of the highest civilized 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; civilized 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 civilized

Europeans. Thus, while the largest Teutonic skull in Dr. Davis' collection is 112·4 cubic inches, there is an Araucanian 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 the one side, and with the Orang, Chimpanzee, or Gorilla, on the other, and see whether there is any relative proportion between brain and intellect.

Range of intellectual power in Man.—First, let us consider what this wonderful instrument, the brain, is capable of in its higher developments. In Mr. Galton's interesting work on "Hereditary Genius," he remarks on the enormous difference between the intellectual power and grasp of the well-trained mathematician or man of science, and the average Englishman. The number of marks obtained by high wranglers, is often more than thirty times as great as that of the men at the bottom of the honour list, who are still of fair mathematical ability; and it is the opinion of skilled examiners, that even this does not represent the full difference of intellectual power. If, now, we descend to those savage tribes who only count to three or five, and who find it impossible to comprehend the addition of two and three without having the objects actually before them, we feel that the chasm between them and the good mathematician is so vast, that a thousand to one will probably not fully express it. Yet we know that the mass of brain might be nearly the same in

both, or might not differ in a greater proportion than as 5 to 6; whence we may fairly infer that the savage possesses a brain capable, if cultivated and developed, of performing work of a kind and degree far beyond what he ever requires it to do.

Again, let us consider the power of the higher or even the average civilized man, of forming abstract ideas, and carrying on more or less complex trains of reasoning. Our languages are full of terms to express abstract conceptions. Our business and our pleasures involve the continual foresight of many contingencies. Our law, our government, and our science, continually require us to reason through a variety of complicated phenomena to the expected result. Even our games, such as chess, compel us to exercise all these faculties in a remarkable degree. Compare this with the savage languages, which contain no words for abstract conceptions; the utter want of foresight of the savage man beyond his simplest necessities; his inability to combine, or to compare, or to reason on any general subject that does not immediately appeal to his senses. So, in his moral and æsthetic faculties, the savage has none of those wide sympathies with all nature, those conceptions of the infinite, of the good, of the sublime and beautiful, which are so largely developed in civilized man. Any considerable development of these would, in fact, be useless or even hurtful to him, since they would to some extent interfere with the supremacy of those perceptive and animal faculties on which his very existence often depends, in the

severe struggle he has to carry on against nature and his fellow-man. Yet the rudiments of all these powers and feelings undoubtedly exist in him, since one or other of them frequently manifest themselves in exceptional cases, or when some special circumstances call them forth. Some tribes, such as the Santals, are remarkable for as pure a love of truth as the most moral among civilized men. The Hindoo and the Polynesian have a high artistic feeling, the first traces of which are clearly visible in the rude drawings of the palæolithic men who were the contemporaries in France of the Reindeer and the Mammoth. Instances of unselfish love, of true gratitude, and of deep religious feeling, sometimes occur among most savage races.

On the whole, then, we may conclude, that the general moral and intellectual development of the savage, is not less removed from that of civilized man than has been shown to be the case in the one department of mathematics; and from the fact that all the moral and intellectual faculties do occasionally manifest themselves, we may fairly conclude that they are always latent, and that the large brain of the savage man is much beyond his actual requirements in the savage state.

Intellect of Savages and of Animals compared.—Let us now compare the intellectual wants of the savage, and the actual amount of intellect he exhibits, with those of the higher animals. 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 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 orang-utan, 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 powers 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. And if this is true of existing savages, how much more true must

it have been of the men whose sole weapons were rudely chipped flints, and some of whom, we may fairly conclude, were lower than any existing race; while the only evidence yet in our possession shows them to have had brains fully as capacious as those of the average of the lower savage races.

We see, then, that whether we compare the savage with the higher developments of man, or with the brutes around him, we are alike driven to the conclusion that in his large and well-developed brain he possesses an organ quite disproportionate to his actual requirements—an organ that seems prepared in advance, only to be fully utilized as he progresses in civilization. A brain slightly larger than that of the gorilla would, according to the evidence before us, fully have sufficed for the limited mental development of the savage; and we must therefore admit, that the large brain he actually possesses could never have been solely developed by any of those laws of evolution, whose essence is, that they lead to a degree of organization exactly proportionate to the wants of each species, never beyond those wants—that no preparation can be made for the future development of the race—that one part of the body can never increase in size or complexity, except in strict co-ordination to the pressing wants of the whole. The brain of prehistoric and of savage man seems to me to prove the existence of some power, distinct from that which has guided the development of the lower animals through their ever-varying forms of being.

The Use of the Hairy Covering of Mammalia.

Let us now consider another point in man's organization, the bearing of which has been almost entirely overlooked by writers on both sides of this question. One of the most general external characters of the terrestrial mammalia is the hairy covering of the body, which, whenever the skin is flexible, soft, and sensitive, forms a natural protection against the severities of climate, and particularly against rain. That this is its most important function, is well shown by the manner in which the hairs are disposed so as to carry off the water, by being invariably directed downwards from the most elevated parts of the body. Thus, on the under surface the hair is always less plentiful, and, in many cases, the belly is almost bare. The hair lies downwards, on the limbs of all walking mammals, from the shoulder to the toes, but in the orang-utan it is directed from the shoulder to the elbow, and again from the wrist to the elbow, in a reverse direction. This corresponds to the habits of the animal, which, when resting, holds its long arms upwards over its head, or clasping a branch above it, so that the rain would flow down both the arm and fore-arm to the long hair which meets at the elbow. In accordance with this principle, the hair is always longer or more dense along the spine or middle of the back from the nape to the tail, often rising into a crest of hair or bristles on the ridge of the back. This character prevails through the entire series of the mammalia, from the marsupials to the quadru-

mana, and by this long persistence it must have acquired such a powerful hereditary tendency, that we should expect it to reappear continually even after it had been abolished by ages of the most rigid selection; and we may feel sure that it never could have been completely abolished under the law of natural selection, unless it had become so positively injurious as to lead to the almost invariable extinction of individuals possessing it.

The constant absence of Hair from certain parts of Man's Body a remarkable Phenomenon.

In man the hairy covering of the body has almost totally disappeared, and, what is very remarkable, it has disappeared more completely from the back than from any other part of the body. Bearded and beardless races alike have the back smooth, and even when a considerable quantity of hair appears on the limbs and breast, the back, and especially the spinal region, is absolutely free, thus completely reversing the characteristics of all other mammalia. The Ainos of the Kurile Islands and Japan are said to be a hairy race; but Mr. Bickmore, who saw some of them, and described them in a paper read before the Ethnological Society, gives no details as to where the hair was most abundant, merely stating generally, that "their chief peculiarity is their great abundance of hair, not only on the head and face, but over the whole body." This might very well be said of any man who had hairy limbs and breast, unless it was specially stated that his back was

hairy, which is not done in this case. The hairy family in Birmah have, indeed, hair on the back rather longer than on the breast, thus reproducing the true mammalian character, but they have still longer hair on the face, forehead, and inside the ears, which is quite abnormal; and the fact that their teeth are all very imperfect, shows that this is a case of monstrosity rather than one of true reversion to the ancestral type of man before he lost his hairy covering.

Savage Man feels the Want of this Hairy Covering.

We must now enquire if we have any evidence to show, or any reason to believe, that a hairy covering to the back would be in any degree hurtful to savage man, or to man in any stage of his progress from his lower animal form; and if it were merely useless, could it have been so entirely and completely removed as not to be continually reappearing in mixed races? Let us look to savage man for some light on these points. One of the most common habits of savages is to use some covering for the back and shoulders, even when they have none on any other part of the body. The early voyagers observed with surprise, that the Tasmanians, both men and women, wore the kangaroo-skin, which was their only covering, not from any feeling of modesty, but over the shoulders to keep the back dry and warm. A cloth over the shoulders was also the national dress of the Maories. The Patagonians wear a cloak or mantle over the shoulders, and the Fuegians often wear a small piece of skin on the

back, laced on, and shifted from side to side as the wind blows. The Hottentots also wore a somewhat similar skin over the back, which they never removed, and in which they were buried. Even in the tropics most savages take precautions to keep their backs dry. The natives of Timor use the leaf of a fan palm, carefully stitched up and folded, which they always carry with them, and which, held over the back, forms an admirable protection from the rain. Almost all the Malay races, as well as the Indians of South America, make great palm-leaf hats, four feet or more across, which they use during their canoe voyages to protect their bodies from heavy showers of rain; and they use smaller hats of the same kind when travelling by land.

We find, then, that so far from there being any reason to believe that a hairy covering to the back could have been hurtful or even useless to pre-historic man, the habits of modern savages indicate exactly the opposite view, as they evidently feel the want of it, and are obliged to provide substitutes of various kinds. The perfectly erect posture of man, may be supposed to have something to do with the disappearance of the hair from his body, while it remains on his head; but when walking, exposed to rain and wind, a man naturally stoops forwards, and thus exposes his back; and the undoubted fact, that most savages feel the effects of cold and wet most severely in that part of the body, sufficiently demonstrates that the hair could not have ceased to grow there merely because it was useless, even if it

were likely that a character so long persistent in the entire order of mammalia, could have so completely disappeared, under the influence of so weak a selective power as a diminished usefulness.

Man's Naked Skin could not have been produced by Natural Selection.

It seems to me, then, to be absolutely certain, that "Natural Selection" could not have produced man's hairless body by the accumulation of variations from a hairy ancestor. The evidence all goes to show that such variations could not have been useful, but must, on the contrary, have been to some extent hurtful. If even, owing to an unknown correlation with other hurtful qualities, it had been abolished in the ancestral tropical man, we cannot conceive that, as man spread into colder climates, it should not have returned under the powerful influence of reversion to such a long persistent ancestral type. But the very foundation of such a supposition as this is untenable; for we cannot suppose that a character which, like hairiness, exists throughout the whole of the mammalia, can have become, in one form only, so constantly correlated with an injurious character, as to lead to its permanent suppression—a suppression so complete and effectual that it never, or scarcely ever, reappears in mongrels of the most widely different races of man.

Two characters could hardly be wider apart, than the size and development of man's brain, and the distribution of hair upon the surface of his body; yet

they both lead us to the same conclusion—that some other power than Natural Selection has been engaged in his production.

Feet and Hands of Man, considered as Difficulties on the Theory of Natural Selection.

There are a few other physical characteristics of man, that may just be mentioned as offering similar difficulties, though I do not attach the same importance to them as to those I have already dwelt on. The specialization and perfection of the hands and feet of man seems difficult to account for. Throughout the whole of the quadrumana the foot is prehensile; and a very rigid selection must therefore have been needed to bring about that arrangement of the bones and muscles, which has converted the thumb into a great toe, so completely, that the power of opposability is totally lost in every race, whatever some travellers may vaguely assert to the contrary. It is difficult to see why the prehensile power should have been taken away. It must certainly have been useful in climbing, and the case of the baboons shows that it is quite compatible with terrestrial locomotion. It may not be compatible with perfectly easy erect locomotion; but, then, how can we conceive that early man, *as an animal*, gained anything by purely erect locomotion? Again, the hand of man contains latent capacities and powers which are unused by savages, and must have been even less used by palæolithic man and his still ruder predecessors. It has all the appearance of

an organ prepared for the use of civilized man, and one which was required to render civilization possible. Apes make little use of their separate fingers and opposable thumbs. They grasp objects rudely and clumsily, and look as if a much less specialized extremity would have served their purpose as well. I do not lay much stress on this, but, if it be proved that some intelligent power has guided or determined the development of man, then we may see indications of that power, in facts which, by themselves, would not serve to prove its existence.

The voice of man.—The same remark will apply to another peculiarly human character, the wonderful power, range, flexibility, and sweetness, of the musical sounds producible by the human larynx, especially in the female sex. The habits of savages give no indication of how this faculty could have been developed by natural selection; because it is never required 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 civilized 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.

The Origin of some of Man's Mental Faculties, by the preservation of Useful Variations, not possible.

Turning to the mind of man, we meet with many difficulties in attempting to understand, how those mental faculties, which are especially human, could have been acquired by the preservation of useful variations. At first sight, it would seem that such feelings as those of abstract justice and benevolence could never have been so acquired, because they are incompatible with the law of the strongest, which is the essence of natural selection. But this is, I think, an erroneous view, because we must look, not to individuals but to societies; and justice and benevolence, exercised towards members of the same tribe, would certainly tend to strengthen that tribe, and give it a superiority over another in which the right of the strongest prevailed, and where consequently the weak and the sickly were left to perish, and the few strong ruthlessly destroyed the many who were weaker.

But there is another class of human faculties that do not regard our fellow men, and which cannot, therefore, be thus accounted for. Such are the capacity to form ideal conceptions of space and time, of eternity and infinity—the capacity for intense artistic feelings of pleasure, in form, colour, and composition—and for those abstract notions of form and number which render geometry and arithmetic possible. How

were all or any of these faculties first developed, when they could have been of no possible use to man in his early stages of barbarism? How could "natural selection," or survival of the fittest in the struggle for existence, at all favour the development of mental powers so entirely removed from the material necessities of savage men, and which even now, with our comparatively high civilization, are, in their farthest developments, in advance of the age, and appear to have relation rather to the future of the race than to its actual status?

Difficulty as to the Origin of the Moral Sense.

Exactly the same difficulty arises, when we endeavour to account for the development of the moral sense or conscience in savage man; for 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 truth for its own sake, and practice it regardless of consequences?

Yet, it is a fact, that such a mystical sense of wrong does attach to untruthfulness, not only among the higher classes of civilized people, but among whole tribes of utter savages. Sir Walter Elliott tells us (in his paper "On the Characteristics of the Population of Central and Southern India," published in the Journal of the Ethnological Society of London, vol. i., p. 107) that the Kurubars and Santals, barbarous hill-tribes of Central India, are noted for veracity. It is a common saying that "a Kurubar *always* speaks the truth;" and Major Jervis says, "the Santals are the most truthful men I ever met with." As a remarkable instance of this quality the following fact is given. A number of prisoners, taken during the

Santal insurrection, were allowed to go free on parole, to work at a certain spot for wages. After some time cholera attacked them and they were obliged to leave, but every man of them returned and gave up his earnings to the guard. Two hundred savages with money in their girdles, walked thirty miles back to prison rather than break their word! My own experience among savages has furnished me with similar, although less severely tested, instances; and we cannot avoid asking, how is it, that in these few cases "experiences of utility" have left such an overwhelming impression, while in so many others they have left none? The experiences of savage men as regards the utility of truth, must, in the long run, be pretty nearly equal. How is it, then, that in some cases the result is a sanctity which overrides all considerations of personal advantage, while in others there is hardly a rudiment of such a feeling?

The intuitional theory, which I am now advocating, explains this by the supposition, that there is a feeling—a sense of right and wrong—in our nature, antecedent to and independent of experiences of utility. Where free play is allowed to the relations between man and man, this feeling attaches itself to those acts of universal utility or self-sacrifice, which are the products of our affections and sympathies, and which we term moral; while it may be, and often is, perverted, to give the same sanction to acts of narrow and conventional utility which are really immoral,—as when the Hindoo will tell a lie, but will sooner starve than

eat unclean food; and looks upon the marriage of adult females as gross immorality.

The strength of the moral feeling will depend upon individual or racial constitution, and on education and habit;—the acts to which its sanctions are applied, will depend upon how far the simple feelings and affections of our nature, have been modified by custom, by law, or by religion.

It is difficult to conceive that such an intense and mystical feeling of right and wrong, (so intense as to overcome all ideas of personal advantage or utility), could have been developed out of accumulated ancestral experiences of utility; and still more difficult to understand, how feelings developed by one set of utilities, could be transferred to acts of which the utility was partial, imaginary, or altogether absent. But if a moral sense is an essential part of our nature, it is easy to see, that its sanction may often be given to acts which are useless or immoral; just as the natural appetite for drink, is perverted by the drunkard into the means of his destruction.

Summary of the Argument as to the Insufficiency of Natural Selection to account for the Development of Man.

Briefly to resume my argument—I have shown that the brain of the lowest savages, and, as far as we yet know, of the pre-historic races, is little inferior in size to that of the highest types of man, and immensely superior to that of the higher animals; while it is

universally admitted that quantity of brain is one of the most important, and probably the most essential, of the elements which determine mental power. Yet the mental requirements of savages, and the faculties actually exercised by them, are very little above those of animals. The higher feelings of pure morality and refined emotion, and the power of abstract reasoning and ideal conception, are useless to them, are rarely if ever manifested, and have no important relations to their habits, wants, desires, or well-being. They possess a mental organ beyond their needs. Natural Selection could only have endowed savage man with a brain a little superior to that of an ape, whereas he actually possesses one very little inferior to that of a philosopher.

The soft, naked, sensitive skin of man, entirely free from that hairy covering which is so universal among other mammalia, cannot be explained on the theory of natural selection. The habits of savages show that they feel the want of this covering, which is most completely absent in man exactly where it is thickest in other animals. We have no reason whatever to believe, that it could have been hurtful, or even useless to primitive man; and, under these circumstances, its complete abolition, shown by its never reverting in mixed breeds, is a demonstration of the agency of some other power than the law of the survival of the fittest, in the development of man from the lower animals.

Other characters show difficulties of a similar kind, though not perhaps in an equal degree. The structure

of the human foot and hand seem unnecessarily perfect for the needs of savage man, in whom they are as completely and as humanly developed as in the highest races. The structure of the human larynx, giving the power of speech and of producing musical sounds, and especially its extreme development in the female sex, are shown to be beyond the needs of savages, and from their known habits, impossible to have been acquired either by sexual selection, or by survival of the fittest.

The mind of man offers arguments in the same direction, hardly less strong than those derived from his bodily structure. A number of his mental faculties have no relation to his fellow men, or to his material progress. The power of conceiving eternity and infinity, and all those purely abstract notions of form, number, and harmony, which play so large a part in the life of civilised races, are entirely outside of the world of thought of the savage, and have no influence on his individual existence or on that of his tribe. They could not, therefore, have been developed by any preservation of useful forms of thought; yet we find occasional traces of them amidst a low civilization, and at a time when they could have had no practical effect on the success of the individual, the family, or the race; and the development of a moral sense or conscience by similar means is equally inconceivable.

But, on the other hand, we find that every one of these characteristics is necessary for the full development of human nature. The rapid progress of civilization under favourable conditions, would not be

possible, were not the organ of the mind of man prepared in advance, fully developed as regards size, structure, and proportions, and only needing a few generations of use and habit to co-ordinate its complex functions. The naked and sensitive skin, by necessitating clothing and houses, would lead to the more rapid development of man's inventive and constructive faculties; and, by leading to a more refined feeling of personal modesty, may have influenced, to a considerable extent, his moral nature. The erect form of man, by freeing the hands from all locomotive uses, has been necessary for his intellectual advancement; and the extreme perfection of his hands, has alone rendered possible that excellence in all the arts of civilization which raises him so far above the savage, and is perhaps but the forerunner of a higher intellectual and moral advancement. The perfection of his vocal organs has first led to the formation of articulate speech, and then to the development of those exquisitely toned sounds, which are only appreciated by the higher races, and which are probably destined for more elevated uses and more refined enjoyment, in a higher condition than we have yet attained to. So, those faculties which enable us to transcend time and space, and to realize the wonderful conceptions of mathematics and philosophy, or which give us an intense yearning for abstract truth, (all of which were occasionally manifested at such an early period of human history as to be far in advance of any of the few practical applications which have since grown out of them), are

evidently essential to the perfect development of man as a spiritual being, but are utterly inconceivable as having been produced through the action of a law which looks only, and can look only, to the immediate material welfare of the individual or the race.

The inference I would draw from this class of phenomena is, that a superior intelligence has guided the development of man in a definite direction, and for a special purpose, just as man guides the development of many animal and vegetable forms. The laws of evolution alone would, perhaps, never have produced a grain so well adapted to man's use as wheat and maize; such fruits as the seedless banana and bread-fruit; or such animals as the Guernsey milch cow, or the London dray-horse. Yet these so closely resemble the unaided productions of nature, that we may well imagine a being who had mastered the laws of development of organic forms through past ages, refusing to believe that any new power had been concerned in their production, and scornfully rejecting the theory (as my theory will be rejected by many who agree with me on other points), that in these few cases a controlling intelligence had directed the action of the laws of variation, multiplication, and survival, for his own purposes. We know, however, that this has been done; and we must therefore admit the possibility that, if we are not the highest intelligences in the universe, some higher intelligence may have directed the process by which the human race was developed, by means of more subtle agencies than we are acquainted with. At the same

time I must confess, that this theory has the disadvantage of requiring the intervention of some distinct individual intelligence, to aid in the production of what we can hardly avoid considering as the ultimate aim and outcome of all organized existence—intellectual, ever-advancing, spiritual man. It therefore implies, that the great laws which govern the material universe were insufficient for his production, unless we consider (as we may fairly do) that the controlling action of such higher intelligences is a necessary part of those laws, just as the action of all surrounding organisms is one of the agencies in organic development. But even if my particular view should not be the true one, the difficulties I have put forward remain, and I think prove, that some more general and more fundamental law underlies that of "natural selection." The law of "unconscious intelligence" pervading all organic nature, put forth by Dr. Laycock and adopted by Mr. Murphy, is such a law; but to my mind it has the double disadvantage of being both unintelligible and incapable of any kind of proof. It is more probable, that the true law lies too deep for us to discover it; but there seems to me, to be ample indications that such a law does exist, and is probably connected with the absolute origin of life and organization. *(Note A.)*

The Origin of Consciousness.

The question of the origin of sensation and of thought can be but briefly discussed in this place, since it is a subject wide enough to require a separate volume for

its proper treatment. No physiologist or philosopher has yet ventured to propound an intelligible theory, of how sensation may possibly be a product of organization; while many have declared the passage from matter to mind to be inconceivable. In his presidential address to the Physical Section of the British Association at Norwich, in 1868, Professor Tyndall expressed himself as follows:—

"The passage from the physics of the brain to the corresponding facts of consciousness is unthinkable. Granted that a definite thought, and a definite molecular action in the brain occur simultaneously, we do not possess the intellectual organ, nor apparently any rudiment of the organ, which would enable us to pass by a process of reasoning from the one phenomenon to the other. They appear together, but we do not know why. Were our minds and senses so expanded, strengthened, and illuminated as to enable us to see and feel the very molecules of the brain; were we capable of following all their motions, all their groupings, all their electric discharges, if such there be, and were we intimately acquainted with the corresponding states of thought and feeling, we should be as far as ever from the solution of the problem, 'How are these physical processes connected with the facts of consciousness?' The chasm between the two classes of phenomena would still remain intellectually impassable."

In his latest work ("An Introduction to the Classification of Animals,") published in 1869, Professor Huxley unhesitatingly adopts the "well founded doctrine, that

life is the cause and not the consequence of organization." In his celebrated article "On the Physical Basis of Life," however, he maintains, that life is a property of protoplasm, and that protoplasm owes its properties to the nature and disposition of its molecules. Hence he terms it "the matter of life," and believes that all the physical properties of organized beings are due to the physical properties of protoplasm. So far we might, perhaps, follow him, but he does not stop here. He proceeds to bridge over that chasm which Professor Tyndall has declared to be "intellectually impassable," and, by means which he states to be logical, arrives at the conclusion, that our "*thoughts are the expression of molecular changes in that matter of life which is the source of our other vital phenomena.*" Not having been able to find any clue in Professor Huxley's writings, to the steps by which he passes from those vital phenomena, which consist only, in their last analysis, of movements of particles of matter, to those other phenomena which we term thought, sensation, or consciousness; but, knowing that so positive an expression of opinion from him will have great weight with many persons, I shall endeavour to show, with as much brevity as is compatible with clearness, that this theory is not only incapable of proof, but is also, as it appears to me, inconsistent with accurate conceptions of molecular physics. To do this, and in order further to develop my views, I shall have to give a brief sketch of the most recent speculations and discoveries, as to the ultimate nature and constitution of matter.

The Nature of Matter.

It has been long seen by the best thinkers on the subject, that atoms,—considered as minute solid bodies from which emanate the attractive and repulsive forces which give what we term matter its properties,—could serve no purpose whatever; since it is universally admitted that the supposed atoms never touch each other, and it cannot be conceived that these homogeneous, indivisible, solid units, are themselves the ultimate *cause* of the forces that emanate from their centres. As, therefore, none of the properties of matter can be due to the atoms themselves, but only to the forces which emanate from the points in space indicated by the atomic centres, it is logical continually to diminish their size till they vanish, leaving only localized centres of force to represent them. Of the various attempts that have been made to show how the properties of matter may be due to such modified atoms (considered as mere centres of force), the most successful, because the simplest and the most logical, is that of Mr. Bayma, who, in his "Molecular Mechanics," has demonstrated how, from the simple assumption of such centres having attractive and repulsive forces (both varying according to the same law of the inverse squares as gravitation), and by grouping them in symmetrical figures, consisting of a repulsive centre, an attractive nucleus, and one or more repulsive envelopes, we may explain all the general properties of matter; and, by more and more complex arrangements, even

the special chemical, electrical, and magnetic properties of special forms of matter.* Each chemical element will thus consist of a molecule formed of simple atoms, (or as Mr. Bayma terms them to avoid confusion, "material elements") in greater or less number and of more or less complex arrangement; which molecule is in stable equilibrium, but liable to be changed in form by the attractive or repulsive influences of differently constituted molecules, constituting the phenomena of chemical combination, and resulting in new forms of molecule of greater complexity and more or less stability.

Those organic compounds of which organized beings are built up, consist, as is well known, of matter of an extreme complexity and great instability; whence result the changes of form to which it is continually subject. This view enables us to comprehend the *possibility*, of the phenomena of vegetative life being due to

* Mr. Bayma's work, entitled "The Elements of Molecular Mechanics," was published in 1866, and has received less attention than it deserves. It is characterised by great lucidity, by logical arrangement, and by comparatively simple geometrical and algebraical demonstrations, so that it may be understood and appreciated with a very moderate knowledge of mathematics. It consists of a series of Propositions, deduced from the known properties of matter; from these are derived a number of Theorems, by whose help the more complicated Problems are solved. Nothing is taken for granted throughout the work, and the only valid mode of escaping from its conclusions is, by either disproving the fundamental Propositions, or by detecting fallacies in the subsequent reasoning.

an almost infinite complexity of molecular combinations, subject to definite changes under the stimuli of heat, moisture, light, electricity, and probably some unknown forces. But this greater and greater complexity, even if carried to an infinite extent, cannot, of itself, have the slightest tendency to originate consciousness in such molecules or groups of molecules. If a material element, or a combination of a thousand material elements in a molecule, are alike unconscious, it is impossible for us to believe, that the mere addition of one, two, or a thousand other material elements to form a more complex molecule, could in any way tend to produce a self-conscious existence. The things are radically distinct. To say that mind is a product or function of protoplasm, or of its molecular changes, is to use words to which we can attach no clear conception. You cannot have, in the whole, what does not exist in any of the parts; and those who argue thus should put forth a definite conception of matter, with clearly enunciated properties, and show, that the necessary result of a certain complex arrangement of the elements or atoms of that matter, will be the production of self-consciousness. There is no escape from this dilemma,—either all matter is conscious, or consciousness is something distinct from matter, and in the latter case, its presence in material forms is a proof of the existence of conscious beings, outside of, and independent of, what we term matter. *(Note B.)*

Matter is Force.—The foregoing considerations lead us to the very important conclusion, that matter is

essentially force, and nothing but force; that matter, as popularly understood, does not exist, and is, in fact, philosophically inconceivable. When we touch matter, we only really experience sensations of resistance, implying repulsive force; and no other sense can give us such apparently solid proofs of the reality of matter, as touch does. This conclusion, if kept constantly present in the mind, will be found to have a most important bearing on almost every high scientific and philosophical problem, and especially on such as relate to our own conscious existence.

All Force is probably Will-Force.—If we are satisfied that force or forces are all that exist in the material universe, we are next led to enquire what is force? We are acquainted with two radically distinct or apparently distinct kinds of force—the first consists of the primary forces of nature, such as gravitation, cohesion, repulsion, heat, electricity, &c.; the second is our own will-force. Many persons will at once deny that the latter exists. It will be said, that it is a mere transformation of the primary forces before alluded to; that the correlation of forces includes those of animal life, and that *will* itself is but the result of molecular change in the brain. I think, however, that it can be shown, that this latter assertion has neither been proved, nor even been proved to be possible; and that in making it, a great leap in the dark has been taken from the known to the unknown. It may be at once admitted that the *muscular force* of animals and men, is merely the transformed energy

derived from the primary forces of nature. So much has been, if not rigidly proved, yet rendered highly probable, and it is in perfect accordance with all our knowledge of natural forces and natural laws. But it cannot be contended that the physiological balance-sheet has ever been so accurately struck, that we are entitled to say, not one-thousandth part of a grain more of force has been exerted by any organized body or in any part of it, than has been derived from the known primary forces of the material world. If that were so, it would absolutely negative the existence of will; for if will is anything, it is a power that *directs* the action of the forces stored up in the body, and it is not conceivable that this *direction* can take place, without the exercise of some force in some part of the organism. However delicately a machine may be constructed, with the most exquisitely contrived detents to release a weight or spring by the exertion of the smallest possible amount of force, *some* external force will always be required; so, in the animal machine, however minute may be the changes required in the cells or fibres of the brain, to set in motion the nerve currents which loosen or excite the pent up forces of certain muscles, *some force* must be required to effect those changes. If it is said, "those changes are automatic, and are set in motion by external causes," then one essential part of our consciousness, a certain amount of freedom in willing, is annihilated; and it is inconceivable how or why there should have arisen any consciousness or any apparent will, in such purely

automatic organisms. If this were so, our apparent WILL would be a delusion, and Professor Huxley's belief—"that our volition counts for something as a condition of the course of events," would be fallacious, since our volition would then be but one link in the chain of events, counting for neither more nor less than any other link whatever.

If, therefore, we have traced one force, however minute, to an origin in our own WILL, while we have no knowledge of any other primary cause of force, it does not seem an improbable conclusion that all force may be will-force; and thus, that the whole universe, is not merely dependent on, but actually *is*, the WILL of higher intelligences or of one Supreme Intelligence. It has been often said that the true poet is a seer; and in the noble verse of an American poetess, we find expressed, what may prove to be the highest fact of science, the noblest truth of philosophy:

> God of the Granite and the Rose!
> Soul of the Sparrow and the Bee!
> The mighty tide of Being flows
> Through countless channels, Lord, from thee.
> It leaps to life in grass and flowers,
> Through every grade of being runs,
> While from Creation's radiant towers
> Its glory flames in Stars and Suns.

Conclusion.

These speculations are usually held to be far beyond the bounds of science; but they appear to me to be more legitimate deductions from the facts of science,

than those which consist in reducing the whole universe, not merely to matter, but to matter conceived and defined so as to be philosophically inconceivable. It is surely a great step in advance, to get rid of the notion that *matter* is a thing of itself, which can exist *per se*, and must have been eternal, since it is supposed to be indestructible and uncreated,—that force, or the forces of nature, are another thing, given or added to matter, or else its necessary properties,—and that mind is yet another thing, either a product of this matter and its supposed inherent forces, or distinct from and co-existent with it;—and to be able to substitute for this complicated theory, which leads to endless dilemmas and contradictions, the far simpler and more consistent belief, that matter, as an entity distinct from force, does not exist; and that FORCE is a product of MIND. Philosophy had long demonstrated our incapacity to prove the existence of matter, as usually conceived; while it admitted the demonstration to each of us of our own self-conscious, ideal existence. Science has now worked its way up to the same result, and this agreement between them should give us some confidence in their combined teaching.

The view we have now arrived at seems to me more grand and sublime, as well as far simpler, than any other. It exhibits the universe, as a universe of intelligence and will-power; and by enabling us to rid ourselves of the impossibility of thinking of mind, but as connected with our old notions of matter,

opens up infinite possibilities of existence, connected with infinitely varied manifestations of force, totally distinct from, yet as real as, what we term matter.

The grand law of continuity which we see pervading our universe, would lead us to infer infinite gradations of existence, and to people all space with intelligence and will-power; and, if so, we have no difficulty in believing that for so noble a purpose as the progressive development of higher and higher intelligences, those primal and general will-forces, which have sufficed for the production of the lower animals, should have been guided into new channels and made to converge in definite directions. And if, as seems to me probable, this has been done, I cannot admit that it in any degree affects the truth or generality of Mr. Darwin's great discovery. It merely shows, that the laws of organic development have been occasionally used for a special end, just as man uses them for his special ends; and, I do not see that the law of "natural selection" can be said to be disproved, if it can be shown that man does not owe his entire physical and mental development to its unaided action, any more than it is disproved by the existence of the poodle or the pouter pigeon, the production of which may have been equally beyond its undirected power.

The objections which in this essay I have taken, to the view,—that the same law which appears to have sufficed for the development of animals, has been alone the cause of man's superior physical and mental nature,—will, I have no doubt, be over-ruled and explained

away. But I venture to think they will nevertheless maintain their ground, and that they can only be met by the discovery of new facts or new laws, of a nature very different from any yet known to us. I can only hope that my treatment of the subject, though necessarily very meagre, has been clear and intelligible; and that it may prove suggestive, both to the opponents and to the upholders of the theory of Natural Selection.

NOTES.

NOTE A. (*Page* 360.)

Some of my critics seem quite to have misunderstood my meaning in this part of the argument. They have accused me of unnecessarily and unphilosophically appealing to "first causes" in order to get over a difficulty—of believing that "our brains are made by God and our lungs by natural selection;" and that, in point of fact, "man is God's domestic animal." An eminent French critic, M. Claparède, makes me continually call in the aid of—"*une Force supérieure*," the capital F, meaning I imagine that this "higher Force" is the Deity. I can only explain this misconception by the incapacity of the modern cultivated mind to realise the existence of any higher intelligence between itself and Deity. Angels and archangels, spirits and demons, have been so long banished from our belief as to have become actually unthinkable as actual existences, and nothing in modern philosophy takes their place. Yet the grand law of "continuity," the last outcome of modern science, which seems absolute throughout the realms of matter, force, and mind, so far as we can explore them, cannot surely fail to be true beyond the narrow sphere of our vision, and leave an infinite chasm between man and the Great Mind of the universe. Such a supposition seems to me in the highest degree improbable.

Now, in referring to the origin of man, and its possible determining causes, I have used the words "some other power"—"some intelligent power"—"a superior intelligence"—"a controlling intelligence," and only in reference to the origin of universal forces and laws have I spoken of the will or power of "one Supreme Intelligence." These are the only expressions I have used in alluding to the power

which I believe has acted in the case of man, and they were purposely chosen to show, that I reject the hypothesis of "first causes" for any and every *special* effect in the universe, except in the same sense that the action of man or of any other intelligent being is a first cause. In using such terms I wished to show plainly, that I contemplated the possibility that the development of the essentially human portions of man's structure and intellect may have been determined by the directing influence of some higher intelligent beings, acting through natural and universal laws. A belief of this nature may or may not have a foundation, but it is an intelligible theory, and is not, *in its nature*, incapable of proof; and it rests on facts and arguments of an exactly similar kind to those, which would enable a sufficiently powerful intellect to deduce, from the existence on the earth of cultivated plants and domestic animals, the presence of some intelligent being of a higher nature than themselves.

NOTE B. (Page 365.)

A friend has suggested that I have not here explained myself sufficiently, and objects, that *life* does not exist in matter any more than *consciousness*, and if the one can be produced by the laws of matter, why may not the other? I reply, that there is a radical difference between the two. Organic or vegetative life consists essentially in chemical transformations and molecular motions, occurring under certain conditions and in a certain order. The matter, and the forces which act upon it, are for the most part known; and if there are any forces engaged in the manifestation of vegetative life yet undiscovered (which is a moot question), we can conceive them as analogous to such forces as heat, electricity, or chemical affinity, with which we are already acquainted. We can thus clearly *conceive* of the transition from dead matter to living matter. A complex mass which suffers decomposition or decay is dead, but if this mass has the power of attracting to itself, from the surrounding medium, matter like that of which it is composed, we have the first rudiment of vegetative life. If the

mass can do this for a considerable time, and if its absorption of new matter more than replaces that lost by decomposition, and if it is of such a nature as to resist the mechanical or chemical forces to which it is usually exposed, and to retain a tolerably constant form, we term it a living organism. We can *conceive* an organism to be so constituted, and we can further conceive that any fragments, which may be accidentally broken from it, or which may fall away when its bulk has become too great for the cohesion of all its parts, may begin to increase anew and run the same course as the parent mass. This is growth and reproduction in their simplest forms; and from such a simple beginning it is possible to conceive a series of slight modifications of composition, and of internal and external forces, which should ultimately lead to the development of more complex organisms. The LIFE of such an organism may, perhaps, be nothing added to it, but merely the name we give to the result of a balance of internal and external forces in maintaining the permanence of the form and structure of the individual. The simplest conceivable form of such life would be the dewdrop, which owes its existence to the balance between the condensation of aqueous vapour in the atmosphere and the evaporation of its substance. If either is in excess, it soon ceases to maintain an individual existence. I do not maintain that vegetative life *is* wholly due to such a complex balance of forces, but only that it is *conceivable* as such.

With CONSCIOUSNESS the case is very different. Its phenomena are not comparable with those of any kind of *matter* subjected to any of the known or conceivable *forces* of nature; and we cannot *conceive* a gradual transition from absolute unconsciousness to consciousness, from an unsentient organism to a sentient being. The merest rudiment of sensation or self-consciousness is infinitely removed from absolutely non-sentient or unconscious matter. We can conceive of no physical addition to, or modification of, an unconscious mass which should create consciousness; no step in the series of changes organised matter may undergo,

which should bring in sensation where there was no sensation or power of sensation at the preceding step. It is because the things are utterly incomparable and incommensurable that we can only conceive of *sensation* coming to matter from without, while *life* may be conceived as merely a specific combination and co-ordination of the matter and the forces that compose the universe, and with which we are separately acquainted. We may admit with Professor Huxley that *protoplasm* is the "matter of life" and the cause of organisation, but we cannot admit or conceive that *protoplasm* is the primary source of sensation and consciousness, or that it can ever of itself become *conscious* in the same way as we may perhaps conceive that it may become *alive*.