

*WALLACE ON 'DARWINISM.'*

I HAVE read with deep interest, as, doubtless, have many other persons, Mr. Wallace's volume entitled *Darwinism*, which appeared in the month of March last year. No one has a higher right to teach the world on this recondite subject; and when it is borne in mind that Mr. Wallace was himself an independent discoverer of the principle associated with the name of Darwin, and that, nevertheless, no sentence indicative of rivalry or jealousy—in fact, no sentence laying claim to original discovery—occurs throughout the book, it is impossible not to be struck with a feeling of reverence towards a writer who combines such remarkable ability with no less remarkable modesty. Reference is made to this point in an article in the *Contemporary Review* (August, 1889) by Professor Romanes, who writes thus:—

It was in the highest degree dramatic that the great idea of natural selection should have occurred independently and in precisely the same form to two working naturalists; that these naturalists should have been countrymen; that they should have agreed to publish their theory on the same day; and last, but not least, that, through the many years of strife and turmoil which followed, these two English naturalists consistently maintained towards each other such feelings of magnanimous recognition that it is hard to say whether we should most admire the intellectual or the moral qualities which, in relation to their common labours, they have displayed.

Professor Romanes further lays stress upon the fact, that whereas opinion has lately tended, as between the two naturalists, towards Wallace and away from Darwin, there is no sign of triumph in the book.

If ever there was an occasion (writes Professor Romanes) when a man of science might have felt himself justified in expressing a personal gratification at the turning of a tide of scientific opinion, assuredly such an occasion is the present; and, in whichever direction the truth may eventually be found to lie, historians of science should not omit to notice that in the very hour when his lifelong belief is gaining so large a measure of support, Mr. Wallace quietly accepts the fact without one word of triumph.

It is very pleasant to read this record of forgetfulness of self in the feeling of complete devotion to the cause of science and of truth: possibly instances of such self-forgetfulness are not so uncommon as they are sometimes supposed to be.

But Mr. Wallace needs no compliments from me, and it is not for the purpose of paying them that I have taken pen in hand. My purpose is rather to commit to paper certain thoughts which have occurred to me during the reading of his most interesting volume, and which it may perhaps be worth while to record. It seems to me that the publication of Mr. Wallace's work affords an occasion for taking stock, as it were, of that which the author describes as 'Darwinism.' It is needless to say that in the author's use of the word there is nothing vague, much less disparaging, in this term. The term is used in a certain definite sense, and is intended to express, not evolution in general, but evolution by those special processes to which Mr. Darwin believed evolution to be due. It is, I think, manifest that much advantage may accrue even from a declaration at the hands of such an authority as Mr. Wallace of what 'Darwinism' is; but besides this, it is specially advantageous, now that a quarter of a century has passed since the great revolution in thought on this class of subject commenced, that we should know what is the real position of the controversy; there has been sufficient time for the smoke and din of the battle to pass away, and we can now form a better estimate than was possible in earlier days of the actual result of the engagement. I propose, therefore, to offer some remarks upon Mr. Wallace's volume, chiefly from the point of view just indicated; observing in general that the conclusion which seems to me to be of chief importance is this—that while Mr. Wallace holds to Darwin's views in the most important particulars, he does not regard 'Darwinism' as any explanation of some of the most important phenomena which the living world presents.

This observation, however, must stand on one side for the present. The point which must occupy us just now is the actual meaning of 'Darwinism,' upon which possibly not a few persons have somewhat hazy notions. Let me quote Mr. Wallace: '—

In order to show the view Darwin took of his own work, and what it was that he alone claimed to have done, the concluding passage of the introduction to the *Origin of Species* should be carefully considered. It is as follows: 'Although much remains obscure, and will long remain obscure, I can entertain no doubt, after the most deliberate and dispassionate judgment of which I am capable, that the view which most naturalists until recently entertained, and which I formerly entertained—namely, that each species has been independently created—is erroneous. I am fully convinced that species are not immutable; but that those belonging to what are called the same genera are the lineal descendants of some other and generally extinct species, in the same manner as the acknowledged varieties of any one species are the descendants of that species. Furthermore, I am convinced that Natural Selection has been the most important, but not the exclusive, means of modification.' It should be especially noted, adds Mr. Wallace, that all which is here claimed is now almost universally admitted, while the criticisms of Darwin's works refer almost exclusively to those numerous questions which, as he himself says, *will long remain obscure.*

Mr. Wallace then proceeds to explain precisely what is meant by *natural selection*, and what therefore the Darwinian theory really is.

The theory of natural selection rests on two main classes of facts, which apply to all organised beings without exception, and which thus take rank as fundamental principles or laws. The first is the power of rapid multiplication in a geometrical progression; the second, that the offspring always vary slightly from the parents, though generally very closely resembling them. From the first fact or law there follows, necessarily, a constant struggle for existence; because, while the offspring always exceed the parents in number, generally to an enormous extent, yet the total number of living organisms in the world does not, and cannot, increase year by year. Consequently, every year, on the average, as many die as are born, plants as well as animals; and the majority die premature deaths. They kill each other in a thousand different ways; they starve each other by some consuming the food that others want; they are destroyed largely by the powers of nature—by cold and heat, by rain and storm, by flood and fire. There is thus a perpetual struggle among them which shall live and which shall die; and this struggle is tremendously severe, because so few can possibly remain alive—one in five, one in ten, often only one in a hundred or one in a thousand.

Then comes the question, Why do some live rather than others? If all the individuals of each species were exactly alike in every respect, we could only say it is a matter of chance. But they are not alike. We find that they vary in many different ways. Some are stronger, some swifter, some hardier in constitution, some more cunning. An obscure colour may render concealment more easy for some, keener sight may enable others to discover prey or escape from an enemy better than their fellows. Among plants the smallest differences may be useful or the reverse. The earliest and strongest shoots may escape the slug; their greater vigour may enable them to flower and seed earlier in a wet autumn; plants best armed with spines or hairs may escape being devoured; those whose flowers are most conspicuous may be soonest fertilised by insects. We cannot doubt that, on the whole, any beneficial variation will give the possessors of it a greater probability of living through the tremendous ordeal they have to undergo. There may be something left to chance, but on the whole *the fittest will survive*.<sup>2</sup>

Upon this statement of what 'Darwinism' is, coming to us as it does from the highest authority, certain observations suggest themselves.

In the first place, objection may be taken to the phrase, *the fittest will survive*. The phrase, if I am not mistaken, was not originally devised by Mr. Darwin, and seems open to criticism. For fitness implies something of moral superiority; you cannot measure it in respect of length, or breadth, or strength, or any other quality capable of being tested by strictly physical conditions. Moreover, there is some danger of being betrayed by the phrase into the error of arguing in a circle; for, in the case of not a few creatures which have survived, it is difficult to give any good reason for their survival except upon the assumption of their fitness as proved by the very fact of their survival. Thus their fitness leads to their survival, and this survival leads to the conclusion that they must have been the fittest. Which is arguing in a circle. Still further, it is not difficult to suggest examples in which the expression, *survival of the*

<sup>2</sup> Pp. 10, 11.

*fittest*, manifestly breaks down. Sir Isaac Newton was, as is well known, a very delicate child, difficult to rear. Suppose that Newton and a powerful navy, or coal porter, or grenadier, had been compelled to rough it as children at Dotheboys Hall or some similar establishment, which would have survived? Not Newton; and yet it may be fairly argued that in many respects he would have been the fittest. Nor is this imaginary case an altogether unfair test of the propriety of the phrase; for it is impossible to give any true definition of fitness which shall exclude all moral and intellectual qualities, all qualities in fact which are of the highest value, and which shall simply include those elements of toughness and wiriness, and strength of sinew or stomach, which are chiefly calculated to prolong life in trying circumstances.

Putting out of consideration, however, the propriety of the language by which survival in the struggle for life, whether amongst vegetables or animals, is expressed, it is to be admitted that the principle indicated is a true one. That is to say, it may be regarded as admitted by all persons whose studies and natural powers render their opinion of any real value, that modification by natural selection is an element in that evolution of living forms of which the evidence appears to be irresistible. Natural selection is a *vera causa*; the question is, What is the extent of its action? how much can it do?

Darwin considered it necessary to supplement *natural* by that which he termed *sexual* selection; in doing which he was quite consistent, because he speaks (as we have already seen) of natural selection as 'the most important, but not the exclusive means of modification' of species. This supplemental hypothesis, however, does not commend itself to Mr. Wallace's judgment.

Mr. Darwin (he writes), as is well known, imputed most of the colours and varied patterns of butterflies' wings to sexual selection—that is, to a constant preference, by female butterflies, for the more brilliant males; the colours thus produced being sometimes transmitted to the males alone, sometimes to both sexes. *This view has always seemed to me unsupported by evidence, while it is also quite inadequate to account for the facts.*

Again, after explaining his own views on the subject of ornamental appendages of birds and other animals, he writes:—

The various facts and arguments now briefly set forth afford an explanation of the phenomena of male ornament as being due to the general laws of growth and development, and make it *unnecessary to call to our aid so hypothetical a cause as the cumulative action of female preference.*

Whether the views put forward by Mr. Wallace do in reality render unnecessary the Darwinian hypothesis of sexual selection will not be here discussed; it is sufficient to note that the conclusions of Mr. Darwin in this not unimportant matter have, after abundant time for examination and reflection, been rejected by the naturalist who more perhaps than any other has a right to criticise him.

But Mr. Wallace rejects also the evolutionist views of another very competent naturalist, Professor Romanes; and it will aid in the development of the purpose of this paper if I refer in passing to this rejection. The theory of Professor Romanes is described by him under the phrase *physiological selection*: it is not necessary in this place to explain what the theory is; it is sufficient to say it is regarded as highly important by Professor Romanes, and as utterly unfounded by Mr. Wallace. It would be impertinent on my part to offer any opinion as between these two authorities; but the conclusion may be fairly drawn, that there is probably much at present unknown in the subject of evolution, as well as not a little doubt with regard to some fields of inquiry into which our knowledge is supposed to extend.

But the most striking and interesting feature of Mr. Wallace's book, from what I may describe as the *human* point of view, is to be found in that part of his work in which he denies, and (as he believes) proves himself to be justified in denying, the application of the principle of natural selection to the evolution of the human faculties. This denial is a fact of the first order of magnitude; and I confess that I can see no ground for the language of strong depreciation in which Professor Romanes, in the article already referred to, describes this portion of Mr. Wallace's book. He speaks of the substance of the concluding chapters as being 'sadly like the feet of clay in a figure of iron, marring by its manifest weakness what would otherwise have been a completed and self-consistent monument of strength.' No argument in the article justifies this condemnation; and it is, perhaps, not too much to say, that many of his readers will find in the condemned portion of Mr. Wallace's book that which has the deepest interest for themselves, while it must not be forgotten that the views put forward are alleged by Mr. Wallace to rest upon proofs which he formally submits for examination. Let us see then what this clay formation contains.

Mr. Wallace fully accepts 'Mr. Darwin's conclusion as to the essential identity of man's bodily structure with that of the higher mammalia, and his descent from some ancestral form common to men and to the anthropoid apes.' But he observes that, 'although perhaps nowhere distinctly formulated, his (Mr. Darwin's) whole argument tends to the conclusion that man's entire nature and all his faculties, whether moral, intellectual, or spiritual, have been derived from their rudiments in the lower animals, in the same manner and by the action of the same general laws as his physical structure has been derived.' This conclusion Mr. Wallace considers to be not 'supported by adequate evidence, and to be directly opposed to many well-ascertained facts.'

I will not endeavour to reproduce the whole of Mr. Wallace's argument on this subject, but will present what appears to me to be

the pith of it; and I do this with the greater satisfaction, because what is here advanced seems to harmonise with what I have already written in criticising the phrase, *survival of the fittest*.

Let us confine ourselves, for simplicity's sake, to one human faculty, namely, the mathematical. The problem is, how to produce a mathematician by the process of natural selection. The reader must bear in mind clearly, what the theory of natural selection is, as already expounded. It is the survival in the struggle for life of those individuals which possess variations from their fellows favourable to their preservation. In order, therefore, that the mathematical faculty should be evolved by the process of natural selection, it is necessary to suppose that those individuals, which have an advantage in the possession of rudimentary mathematical faculties somewhat in excess of their fellows, should be the survivors in the struggle for life. The mere possession of this rudimentary advantage must be an aid towards life preservation. This in itself is hard to understand; but it becomes harder still when we bear in mind the rareness of the mathematical gift. In our own time it would be perhaps an over-estimate to say, that the mathematical faculty existed in any marked degree in one per cent. of the population; assume such a proportion to have generally held in human history, then it would be necessary to suppose that these rare specimens of rudimentary mathematical ability had some very decided advantage in the struggle for life; but what ground is there for such a supposition? Grant that ten men in a tribe of a thousand had discovered how to count upon their fingers, or suppose them to have discovered some elementary geometrical theorem, how would this help them when a neighbouring tribe attacked them, or when famine and pestilence were abundant? It is difficult or impossible to say.

And the same argument would seem to apply to other human faculties, music and all forms of art, writing, even speech. Consider speech for a moment as the most universal and most distinctive of human faculties. Here the problem is just the reverse of that which occurred in the case of mathematics: in that the favourable variation to be preserved is rare, in this the variation scarcely exists; the faculty of speech is universal; how then can there be a survival of the fittest, where all are equally fit?

It seems difficult to resist this kind of argument, and I should not be surprised to find the opinion gain ground, and ultimately become established, that while the human faculties have undoubtedly been developed gradually, the development cannot in any way be traced to the process of natural selection.

But if it be once admitted that the principle of natural selection is inadequate to explain the development of specially human qualities, there is a temptation to go back to the consideration of the powers and instincts of some of the inferior creatures, and to inquire whether

natural selection may not be inadequate also in their case, as in that of man. I confess that I have never been able to perceive how the principle can be brought to bear upon such phenomena as the architecture of insects—for example, that of bees and wasps. What, I suppose, ought to have happened is this, that some variation of an ancient form of bee made a rough approximation to a modern honeycomb, that they who made the best honeycomb were the fittest to survive, and that in this way by slow degrees and by natural selection a race of bees was produced capable of performing the geometrical wonders which modern bees perform. But there are two difficulties. First, in conceiving the original start of insects in the direction of architecture; and secondly, in perceiving the connection between good architects and survival in the struggle for life. Certain bees might make their wax go further than other bees, and our actual bees use their wax with absolutely mathematical economy; but it is difficult to perceive how this economy is helpful in the struggle for life. Can we get over these difficulties? If it were a case of some device for self-preservation, the conclusion might be different. For example, if we can imagine some variation of a race of spiders devising, in ever so rough a form, those curious houses which have attained such perfection in the hands of the trap-door spider, we can also easily believe that this variation would be likely to survive, and that while less ingenious spiders became the prey of their enemies, those which were concealed in their cunning castles would escape. But there is nothing parallel to this in the case of wasps and bees; here we have a beautiful geometrical problem somehow solved, apparently without connection between the solution and the preservation of life. One of two conclusions seems inevitable—either the geometrical skill has belonged in its perfection to bees and wasps ever since those insects existed; or else the geometrical skill has been developed by some internal law of growth, independently of all questions of natural selection.

There is another class of natural phenomena upon which Mr. Wallace writes much that is deeply interesting, but to which it may possibly be questioned whether the principle of survival by natural selection is applicable—namely, the phenomena of mimicry. Of course it is quite intelligible, to take an instance, that a living creature which is very much like a leaf will escape many enemies, and even have such an advantage in the struggle for life that many other living creatures would be like leaves if they could. But when we endeavour to go back in imagination to the commencement of the mimicking process, we must conceive of a creature not at all like a leaf, but amongst whose offspring there are certain individuals which have a slightly leaflike appearance, and that these survive in preference to others not having the appearance in question. This conception involves two difficulties. First, the notion of certain

individuals having a slightly leaflike appearance is eccentric and hard to accept. It is different from that of individuals varying by length of leg, or strength of wing, or what not. It is a variation, so to speak, not of degree but of kind. And, secondly, it is difficult to see why a resemblance to a leaf, admitted to be slight, and therefore one would imagine not easily perceived, should be any substantial protection from enemies, and so an appreciable advantage in the struggle for life.

Similar difficulties occur with regard to other cases of mimicry. My space does not permit me to examine them in detail; but I have come to the conclusion that, while mimicry may probably be always connected with some advantage which it confers on the animal, it is difficult to conceive of the mimicking transformation being originally brought into operation by any process of natural selection.

This failure of the principle of natural selection to explain much that is connected with the evolution both of men and of inferior creatures may lead us to inquire, to what extent the principle satisfies ætiological requirements even in those cases in which its application appears most complete. The modification and multiplication of species requires three conditions to be postulated: (1) an original species; (2) the power of multiplying that species by reproduction; and (3) the occurrence of variations in the successive generations.

Now (1) the existence of the original living germ or germs must, I suppose, be left by universal consent in mystery. Mr. Darwin treated of the *Origin of 'Species,'* not the *Origin of 'living things.'* This latter question is not likely ever to come within the reach of human science; certainly it has not done so yet. Given the existence of the material universe, or the existence of living things, and there is abundance of opening for discovery with respect to the laws of matter and the laws of life; but matter and life must first be given. This is sufficiently obvious; but it is worth noting, because there is sometimes a tendency to make a confusion between creation and the laws of created things; whereas it is obvious that creation is one thing, and the law governing created things is quite another. But (2) as the original existence of living things is a mystery, so also is the reproduction of them. The continuity of life on the earth's surface, ensured in various ways more or less resembling each other, and all agreeing in this, that there is apparently no tendency in vital power to degenerate or wear itself out in the course of ages, is, as it were, a standing mystery of creation. The scientific man has nothing to do with this mystery; to him it is simply a fact or phenomenon; but he who tries to go beyond phenomena and to get at the cause behind them will recognise reproduction as being ætiologically equivalent to continuous creation. The great feature, however, of the principle of natural selection is (3) the occurrence of variations. Mr. Wallace lays great stress on the abundance of the

variations which occur in nature, and the corresponding importance of this element in the Darwinian theory; and he is obviously wise in doing so. But it is well to observe that it is impossible to regard variations either on the one hand as a necessary feature of reproduction, or on the other as simply fortuitous. With regard to the latter supposition, it is, certainly, difficult to conceive of chance as being a principal factor, say, in the production of a horse, to say nothing of a man. But even the former supposition is not quite an easy one; it is difficult to see why variations capable of being made permanent should occur, and why (if there be offspring at all) the offspring should not be exactly like the parent; in not a few cases this seems to be the law of living things. What I wish to point out, however, is this, that from the ætiological point of view there ought to be a *cause* for variations as well for other phenomena; and that, therefore, when we use the phenomenon of variations as a part of the machinery of natural selection, we do not get rid of the task of inquiring, as philosophers, why those useful variations occurred. In fact, in this as in many other instances, what is done is to shift the process one stage backward, but to leave the question of the primary cause very much where it was. Variations are abundant, says the student of natural history, and advantageous variations are preserved and made permanent by the process of natural selection: let it be granted. But the philosopher may still say, How comes it that advantageous variations should occur? Must not this occurrence be the result of some pre-established principle or law of development?

Take the case of the horse, which Mr. Wallace has dwelt upon at some length, and has illustrated by a diagram. The evolution of the horse of historical times and of the present day from the *orohippus* of the Eocene period, as exhibited to the eye by Mr. Wallace's diagram, is as interesting a presentation of a physical pedigree as can well be conceived. We see, as it were, the progress of Nature's work: the transformation from several toes to one toe, which was, in reality, the operation of thousands of years, is visible as a connected continuous process from beginning to end. But what the diagram does not, and cannot, put in evidence is this—namely, the marvellous beauty of the horse in his ultimate condition. So far as any conclusions can be drawn from the diagram, the top and the bottom of the page stand upon an equal footing; there would seem to be no reason why *orohippus* should not have been derived from *equus* by expansion, as easily as *equus* has been derived from *orohippus* by contraction. When, however, we look, not at the *equus* of science, but at the *horse* of the hunting-field or the racecourse, or at our own stable friend, who has carried us safely for hundreds of miles, we perceive that, somehow or other, we have, in these modern days, an animal of the most perfect kind with regard to speed, beauty, and mechanical perfection. We feel convinced that it would be in every

way a mistake that he should develop toes and become *orohippus*; we are sure that *orohippus* has rightly been improved off the face of the earth in order to make room for *equus*. All this is, in the best sense of the phrase, in accordance with the principle of the survival of the fittest; but I confess that I find it difficult to realise the transformation of *orohippus* into *equus* upon the pure and simple notion of advantageous variations in the struggle for life; for, in truth, if the question be one of mere survival, it is difficult to say, when the earth was inhabited by wild creatures, in what manner the possession of one toe instead of three or four should give *equus* any advantage over *orohippus*. One can quite understand that a jury of Newmarket jockeys would decide that *equus* was fittest to survive; but in the absence of human judgment the conclusion is not so easy to reach. At all events, it seems more probable that the transformation was originally ideally contained in the conception of this class of creature, and that *equus* may be regarded as bearing to *orohippus* something of the same kind of relation as is borne by a frog to a tadpole, or by a moth to a caterpillar.

May it not well be that predetermined transformation has as real a place in the genesis of species as it certainly has in that of individual creatures? Nothing, perhaps, strikes most minds as more surprising than insect and reptile transformation. That a crawling animal should, by a complicated process, involving a condition of motionless helplessness, be ultimately transformed into a creature of active life spent in flying through the air, or that toads and frogs should find it necessary to pass through the fish-like life of tadpoles—this class of facts may well puzzle the thinking mind; but the advantage of them is that they *are* facts; no one can dispute them; and taking our stand upon them we may guess that the processes of Nature are analogous, in cases in which we cannot distinctly prove that they are so. May it not be, then, that the Eocene period of creation presented a condition of things out of which a higher condition was evolved, not simply by the perpetuation of advantageous variations, but much more by virtue of an internal principle of growth, similar to, or at least comparable with, the principle which develops the foetus or which transforms tadpoles and caterpillars? Adopting this view, we should have in both cases a limit towards which transformations tended; as the butterfly is the ultimate form of the caterpillar, and the caterpillar was the forerunner and necessary ancestor of the butterfly, so *equus* may perhaps be regarded as the ultimate form of *orohippus*, and *orohippus* as the forerunner and necessary ancestor of *equus*. At all events, this view of the facts seems to be tenable, and it is free from certain difficulties by which the hypothesis of natural selection pure and simple is undoubtedly beset.

The question of growth, evolution, development, by an internal power similar to, and comparable with, that which we see daily and

hourly at work all round about us, leads to the discussion of another and very interesting question—namely, whether man can perfectly be described as ‘derived from the lower animals.’ The expression is Mr. Wallace’s. He speaks of ‘man in his bodily structure’ as having been ‘derived from the lower animals, of which he is the culminating development.’<sup>3</sup> I venture to question whether this is a correct statement of the facts of the case. I am not venturing to throw doubt upon Mr. Wallace’s scientific deductions; on the other hand, their correctness shall for the sake of argument, if on no other ground, be fully granted; all the more readily in consideration of the important limitations of the principle of natural selection made in the case of man, as already noticed and discussed. What I venture to doubt is, whether the process of human evolution, as accepted by Mr. Wallace, can be rightly described by the terms which he applies to it. Certainly there is something in the conception of such derivation from which the feelings of most of us not unnaturally shrink, and from which they would gladly be free, if freedom can be had consistently with scientific truth. There is something in it of that ‘letting the house of a brute to the soul of a man,’ of which Lord Tennyson sings in his most recent volume. It may be worth while, therefore, to consider whether the phrase, ‘derivation from the lower animals,’ is one which can be maintained as rightly expressing the truth, which it is intended to express, concerning the physical history of our race.

Now it is manifest that if we look back, so far as is possible, into the remote past, when the first germ of animal life appeared upon the globe, two conditions of things, and two only, are conceivable. Either (A) there was a single germ of life, from which all subsequent living forms have been evolved or developed; or (B) there were several or many germs of life, from which in separate streams, so to speak, the evolution of living creatures took place. Mr. Darwin inclined, I think, to the latter supposition; but either A or B must be accepted by all evolutionists of all schools. Let us consider them successively.

A. If we make the supposition that living forms commenced upon the globe from a single germ, then it follows that all living creatures now existing—insects, fishes, birds, beasts, man—have been evolved by some process or processes from one and the same origin: whether the process of variation and natural selection be sufficient to account for the development, it is not necessary for the purpose of this argument to decide; it is sufficient to say, and this can scarcely be denied, that by some process or processes the development has taken place. Therefore, ascending to the hypothesis now under consideration, it will be true that the lower animals and man had a common origin; but this is manifestly a different thing from assert-

ing that man is 'derived from the lower animals.' If we go up to the hypothetical origin of life, or the single germ, this latter assertion is obviously untrue, because, as by hypothesis there was then only one germ, there could be no distinction of superior or inferior; but if we stop short of the origin and observe the condition of things at any period subsequent to the hypothetical beginning, we shall find progress being made towards the development of man and simultaneous progress being made towards the development of the lower animals. But it does not follow that, because this simultaneous development is taking place, therefore we can say that one form of life is developed from the other; it might be as correct to say that the inferior animals were developed from man, as man from the inferior animals. Take an illustration from that which is possible in the case of rivers. Conceive of two rivers running into the sea: trace their course, and suppose that ultimately you come to the same source in the distant mountains; it would not be correct to say that one of these rivers was derived from the other. The correct statement would be that they sprang from one and the same source, that they had different histories, and that they terminated in different streams.

When we speak of the lower animals, do we not in fact postulate the existence of man? Lower than what? Surely lower than man: therefore inferiority cannot be predicated until man's existence has been assumed, or has become a fact; and therefore to speak of man being derived from the lower animals in the remote past, when, if you only go far enough, there is no higher or lower, would seem to be a confusing use of language.

If it be urged that the objection now made to the phraseology used by Mr. Wallace is merely a verbal quibble, I venture to argue on the other hand that there is not a little importance in the objection. I quite admit that if the creation of man be a merely fortuitous fact, a lucky hit, so to speak, in the infinite variety of living forms developed from a single original living germ—if, in fact, creation be without the high purpose which human life, as distinguished from all other forms of life, seems to make manifest—it is scarcely worth while to argue the question whether man was derived from the inferior animals or not. But if man be the intended crown of creation, existing in the determinate counsel and foreknowledge of God from the beginning, then it does seem to be worth while to argue that the derivation of man and beast from the same living germ is not the same thing as the derivation of one from the other. A sane man may have the misfortune to have an idiot brother; the sane man and the idiot are derived from the same parents, but it would be incorrect to say that one was derived from the other. May there not be some analogy between a case of this kind, and the case of man and beast?

B. So much, then, for the hypothesis of one original germ of life ; the argument becomes perhaps more simple if we adopt the second hypothesis, namely, that of several or many germs.

For in this case it is not unreasonable to suppose that specific differences existed amongst the original germs. I confess that the notion of the development of all forms of life from one original germ offers to my own mind an almost insuperable difficulty. The arguments drawn from the experimental facts of variation and natural selection, from the observed progression of animal forms in successive geological strata, and the like, seem to me quite inadequate to explain the development of insects, fishes, birds, mammals, from one stock. Consequently, to my own mind it is a relief to be able to think of several, and if of several then possibly of any number, of original germs. The hypothesis is not opposed to, but quite in accordance with, Mr. Darwin's own views ; in fact, he was far too cautious a man to dogmatise concerning the unity of the origin of living forms, when all attempt at the examination of the question of origin would necessarily carry him far beyond the limits of possible experiment. Let us then adopt provisionally the hypothesis of a multiplicity of germs of life ; and if we do this, there is nothing wild or strange in the supposition that the germ of man was different from other germs. It would be beyond all that scientific caution would justify to assume that, given a number of original germs of life, it is matter of chance into what each will develop. It is contrary, I think, to the whole analogy of Nature to suppose that a living germ, which is to all intents and purposes an ovum or egg, may ultimately develop into an oak, or a fish, or a man, according to its surroundings or according to mere chance. At all events, it is much more probable, much more according to analogy, that each germ should have its specific character, and that so man should have been man in intention and preparation from the very beginning of things. It may have been—in fact, according to the supposition of evolution it must have been—that in the early condition of life upon the globe there was no man (in the full and proper sense of the word) in existence, but his progenitors would be there ; and what is submitted is this, that those progenitors were undeveloped men, and not 'lower animals.' What they visibly were scientific discovery has not yet put in evidence ; it is admitted that there is a 'missing link' between the present and the past. Some scientific men hope that the link may be found, some think that it is hidden under the sea ; but, whatever the truth may be with regard to this point, what is maintained is this, that, on the hypothesis of a multiplicity of original germs of life, it is more probable than otherwise that certain germs contained the promise of men, others of 'lower animals ;' and that, if so, it is incorrect to speak of the lower animals as the progenitors of men.

This view of the case, though founded upon a criticism of Mr.

Wallace's language, would seem nevertheless to be consistent with his real views concerning the origin of man. In the last chapter of his work, entitled 'Darwinism Applied to Man,' to which reference has been already made, it is contended, as we have seen, that the principle of natural selection will not account for the development of the human faculties. I recur to that chapter chiefly for the purpose of making two extracts, which will, I think, tend to strengthen the arguments which have been already advanced. After rehearsing three stages of progress in creation—the change from the inorganic to the organic; the introduction of sensation or consciousness, constituting the fundamental distinction between the animal and vegetable kingdoms; and the existence in man of a number of his most characteristic and noblest faculties, those which raise him above the brutes and open up possibilities of almost indefinite advancement—Mr. Wallace writes thus:—

These three distinct stages of progress from the inorganic world of matter and motion up to man, point clearly to an unseen universe—to a world of spirit, to which the world of matter is altogether subordinate.<sup>1</sup>

And again:

Those who admit my interpretation of the evidence now adduced—strictly scientific evidence in its appeal to facts which are clearly what ought *not* to be on the materialistic theory—will be able to accept the spiritual nature of man, as not in any way inconsistent with the theory of evolution, but as dependent upon those fundamental laws and causes which furnish the very materials for evolution to work with.<sup>2</sup>

Declarations such as these, coming from such an authority, must doubtless be very comforting to those minds which feel themselves compelled to receive the evidence for evolution but shrink from materialism, which feel convinced that materialism cannot be true and yet have an uneasy suspicion that evolution points to it as a logical conclusion. But if we admit with Mr. Wallace that variation and natural selection are not adequate to explain the evolution of man's higher qualities and faculties, we are not merely delivered from the acceptance of materialism, we are invited and even compelled (as has been urged in a former part of this paper) to review the whole question of the extent of the application of Mr. Darwin's great principle. He would be a rash man who, in the face of Mr. Darwin, Mr. Wallace, and the whole generation of naturalists who have followed in their steps, should deny that natural selection was a *vera causa* in creative work; but there is no rashness or audacity in maintaining what Mr. Darwin did not deny, and what Mr. Wallace emphatically affirms, namely, that there is needed for the explanation of phenomena something beyond, and essentially different from, the process of natural selection. All seems to point beyond matter into the region of mind, beyond mechanical sequence to purpose,

<sup>1</sup> Page 476.

<sup>2</sup> *Ibid.*

beyond all *veræ causæ* to the *causa causarum*, beyond Nature to God.

I will close this paper by recording an incident which was communicated to me some years ago in the course of conversation by Dr. Thompson, the late Master of Trinity College, Cambridge.

Dr. Thompson was walking, in his college days, with two companions, one of whom was Alfred Tennyson; of the name of the other I am not sure. The path by which they went was one which all Cambridge men know, namely, that which leads from the backs of the colleges through the fields towards Coton. After passing the brook, which used to be crossed (and perhaps is now) by a rude wooden bridge, it was perceived that Tennyson had lagged behind. He had paused by the side of the brook, brought his eyes as near as he could to the surface of the water, and was examining with intense interest the subaqueous life which the little stream contained. After a time he rejoined his companions, and this was his utterance when he joined them: 'What an imagination God has!' The words must have made a deep impression upon my informant's mind; otherwise he would not have retained them in memory, and would not have thought it worth while to repeat them to me. They made a similar impression upon myself when so repeated; and I cannot but regard them as containing a true philosophy of Nature. Whatever may be the power of natural selection, and whatever causes may be at work to produce the varied scene of life which the world contains, you need some underlying cause, both of life itself and of reproduction and variation, and of all natural phenomena; and if causally the existence of the universe may be attributed to God's will and purpose, so the endless variety of vital manifestations may be attributed to that which in the case of man we should call imagination.

In reality, whatever may be the actual historical genesis of Nature, we seem to need a quasi-Platonic doctrine of antecedent ideas in the divine mind as the basis, the underlying condition, of the existence of things as we see them. It is matter for fair discussion amongst naturalists how much may be attributed to natural selection, how much to sexual, how much to physiological, and so forth. But such discussions cannot go to the root of things; they do not reach the original thought out of which the works of Nature, as we call them, originally spring. Michael Angelo, as we are told, used to sit with his hammer and chisel before his marble block, and shape it without any previous modelling process into the figure which he intended to produce; other sculptors, I believe, with only this one grand exception, make their model in clay, and thence proceed by semi-mechanical steps to the finished work; but Michael Angelo and all other sculptors have alike the seminal idea in their minds, and the manner of its evolution is comparatively a matter of detail. Something of the same kind may be said of the production of natural things. It may

be possible for naturalists to discover some of the steps by which the finished work comes to be what it is; but the actual origin of natural things—the wonders of life, the varied beauties of the universe, above all, the mind of man, which is capable of understanding, appreciating, and discussing the problems to which natural things give rise—is to be sought in no region lower than that which may, with all reverence, be described as the mind, or as the imagination of God.

H. CARLISLE.