

CHAPTER XIX,

THE VARIATION AND NATURAL SELECTION
ARGUMENT, CONTINUED.*Mr. Darwin's Supporters.*

Mr. Alfred B. Wallace.—Creation by Law.—The Duke of Argyll.—Reign of Law.—The Universe, according to Wallace, self-regulating.—Madagascar Long-nosed Moths.—The *Angræcum sesquipedale* and its nectary.—Mr. Wallace's mode of making Moths' noses.—River beds.—Humming Birds.—Beauty of form and colour.—Separately and for themselves provided for in Nature.—Types or patterns in nature.—The Vertebrate type as adapted to infinite variety of life.—Difficulties of Mr. Wallace in reconciling beauty of form or colour upon his principles with Mr. Darwin's maxim, *Natura non facit saltum*.—Mr. Wallace's inapt reference to Bull-dogs and Greyhounds.

IN leaving the latest works of Mr. Darwin, we are naturally led to ask what testimony has been brought forward in favour of his theory by one who was termed by Dr. Hooker in the Norwich address, 'Mr. Darwin's true knight.'

Mr. Wallace has published several papers in various scientific journals. I propose to limit my notice to two: 'On Creation by Law'¹ and 'The Philosophy of Birds' Nests.'² The observations upon *creation by law* are chiefly answers to the trenchant arguments

¹ *Journal of Science*, Oct. 1866.

² *Intellectual Observer*, vol. xi. p. 413.

of the Duke of Argyll against Mr. Darwin's hypothesis in his well-known work, 'The Reign of Law.'

Mr. Wallace shelters himself in the beginning by the remarkable statement that the 'noble author represents the feelings and expresses the ideas of that large class who take a keen interest in the progress of science in general, and especially that of natural history, but have never themselves studied nature in detail, or acquired that personal knowledge of the structure of allied forms—the wonderful gradations from species to species and from group to group, and the infinite variety of the phenomena of "variation" in organic beings—which are absolutely necessary for a full appreciation of the facts and reasonings contained in Mr. Darwin's book.'

It is impossible to condemn too strongly this style of reasoning. Does Mr. Wallace mean that those who have studied the scales on butterflies' wings or the feathers in birds' changing and ever variable plumage, are the only people to whom the truths of Darwinism are appreciable? Are not all the works of Mr. Darwin open to the Duke of Argyll, and does he not show by his argument that he thoroughly understands them? Is the great knowledge in comparative anatomy in all its phases of such men as Agassiz or Flourens to be compared for a single moment with that of amateurs in Darwinism? And what is the chief line of objection taken by the Duke of Argyll? Exactly that which we shall see

presently is the argument taken by Agassiz, viz. the ever-present proof of mind in the various and varied organisms of the world. But Mr. Wallace is a warm disciple of Mr. Herbert Spencer, and we have shown how abhorrent to his train of thought is the presence of a Creator or Providence in nature.

Mr. Wallace is not long before he makes us acquainted with this fact, which, in strict fairness of argument, ought to place him out of the pale of discussion. The Duke, he says, believes in the personal application of general laws in producing 'variety, harmony, design, and beauty.' 'I believe, on the contrary, that the universe is so constituted as to be *self-regulating*; that as long as it contains life the forms under which that life is manifested have an *inherent* power of adjustment to each other and to surrounding nature; and that this adjustment necessarily leads to the greatest possible amount of variety and beauty and enjoyment, because it does depend upon general laws and not on a continual supervision and re-arrangement of details.'¹

According to this statement, Mr. Wallace would account for the plan or design of nature as having been produced by secondary laws; a statement I hold to be utterly without proof and untenable.

Further on Mr. Wallace alludes to the beautiful *contrivances* and designs exhibited, according to Mr. Darwin's well-known researches, in the fertilisation of

¹ *Op. cit.* p. 473.

orchids, and he asks, 'Is it not then an extraordinary idea to imagine the Creator of the universe *contriving* the various complicated parts of these flowers as a mechanic might contrive an ingenious toy or a difficult puzzle?' Not in the least extraordinary, I say, to those who believe in special creation—very difficult certainly to those who do not. This is simply the question. Mr. Wallace says that these contrivances are the effect of general laws implanted in the original speck of organic matter which is all these transmutationists allow the Creator to have formed. But he makes the sad blunder of letting the case go against him by his own admissions, because if these contrivances are the effect of creative *laws*, they are equally the 'special' work of the Creator, and therefore there would be nothing 'extraordinary' in the matter as suggested by Mr. Wallace.

Mr. Wallace next takes us all the way to Madagascar. In the beginning of his paper he favours us with a plate—in which a few ghastly-looking moths of the humming sphinx family are represented as thrusting their enormous proboscides into the nectaries of an orchis, *Angræcum sesquipedale*.

A very taking picture it appears, with the morning sun shining through the mysterious depths of the forest. It would be still prettier were it *true*. Unfortunately however, both for Mr. Wallace's theory and for his discretion, the picture is altogether a sham. The orchis is there sure enough, with its long nectary conspicuously

displayed, but the moth with its long 'nose' (the misnomer is that of the learned in the variation of organic beings, not mine) is altogether a myth. No such moth is known to be in existence, but Mr. Wallace with exquisite naïveté suggests that naturalists who go to Madagascar should search for it! Search for what? the reader will naturally exclaim. Why, the mythical thing created in Mr. Wallace's picture, and placed there to prove the truth of Darwinism! After this it will perhaps amuse those who are uninitiated in the mysteries of Darwinian biology to know how the long nectary was manufactured, and how the moth—that is to be—obtained its long proboscis. Mr. Wallace only starts when the nectary of the *Angræcum* was half its present length, which is, I think, especially unkind, for one actually feels a longing to know how he accounts for a nectary at all. Well, then, when this nectary was about six inches long, it was chiefly fertilised by a species of moth which appeared (how kind of it) at the time of the plant's flowering and whose proboscis was of the same length. Then, among these flowers some would have nectaries longer than six inches, others shorter—so says Mr. Wallace and so requires his theory; and the short ones, having no moth's nose to carry down the pollen, would not get fertilised, because, the nectar only occupying about an inch of the nectary, the happy moth could get it all without going to the bottom! Pardon me, Mr. Wallace, such a thing would be utterly impossible. How such

an argument could be advanced by anyone aiming at scientific precision is marvellous. But the long nectaried flowers would be well fertilised and the longest would, on the average, be the best fertilised of all! And thus Mr. Wallace accounts for the 'preservation of the fittest' and the ultimate extension of the nectary to a foot in length! Turn now a moment to the mythical moth with a proboscis twelve inches or more in length. How came he (supposing he is ever found) to get such a 'nose'? Mr. Wallace describes it to have been quite an easy matter, and it was done in this wise. By the process above detailed, the nectaries would get too long for the moths, never be fertilised, and die out.

Now remember that it is assumed this fertilisation takes place by the chance conveyance of pollen grain upon the moth's proboscis; which, of course, in any case is washed off the moment the proboscis reaches the nectary. And yet we have here Mr. Darwin's right-hand man—the claimant to equal honours as to the introduction of this hypothesis of transmutation—we have here this 'true knight' asking sensible people to believe that if one nectary were a little shorter than another, then the longer proboscis of the moth would not have occasion to go down to the bottom of the nectary, and *therefore* the orchis would not be fertilised!

In the course of a somewhat long life's reading and observation, I must confess that I never knew a great biological question supported upon such utterly

groundless and absurd data. But to proceed with the moth's history.

Well, by-and-by, the nectaries increasing in size and the proboscides remaining stationary, the plant would cease to exist in nature were there no other moths living with longer proboscides.

Now just in the nick of time these mythical lepidoptera step in and drive away the degraded short-noses, who would thus be destroyed in the 'struggle for existence,' and the 'long noses' would remain masters of the field. And so the game would be carried on, and the 'long nectaries' and 'long noses' would be perpetuated, while the short ones would go out, until we get a nectary a foot long and a moth with a proboscis of at least eleven inches; which is, however, as I stated before, at present a scientific desideratum, inasmuch as Mr. Wallace is obliged to admit that the largest proboscis he has ever known is that of a South American species in the British Museum, which measures *nine inches and a quarter*. This is what Mr. Wallace calls beautiful 'self-acting adjustment,' and he is quite shocked at the idea of the Duke of Argyll that this could be done by a direct act of the Creator's power, and actually says that the Duke has no proof either to give or suggest that his view is the right one! So delighted is Mr. Wallace with his explanation of how nectaries and proboscides are evolved, that he rushes into the altogether inappropriate and inapplicable illustration which *inorganic*

nature gives us in the formation of river beds. He says that any one ignorant of geology who examines a river system would remark that it had evidently been 'created by mind,' and would listen with 'incredulity to the geologist who assured him that the adaptation and adjustment he so much admired was an inevitable result of the action of general laws;' and further on he suggests that the Duke of Argyll would agree with the geologist. What the opinion of the Duke of Argyll may be I have no means at present of knowing, as I am not aware that he has thought it worth while to answer Mr. Wallace's remarks; but I will take the liberty of saying that a much greater man than either Mr. Wallace or Mr. Darwin—I mean Newton—did not think it beneath the dignity of the science he so much enlarged, or derogatory to him as a philosopher, to declare that the force, the laws of which he himself discovered—that of gravitation—was inexplicable on any other theory than that which ascribed it to the hand of God. And yet this gravitation is the principal force concerned in the formation of these river systems! But Mr. Wallace does not believe in the necessity of a special Providence, or even its existence. 'I for one,' he says, 'cannot believe that the world would come to chaos if left to law alone.' What he means by law we gather from the context, and by his agreement with Mr. Spencer in the operation of physical forces, which he correlates with those of life; in other

words the doctrine of evolution, as enunciated by Mr. Herbert Spencer.

Now it would be an insult to the good sense and feeling of my readers were I to enter here into a defence of a special Providence, and of a continuing, ever-present, ever-active mind, which presides over and directs the formation, the adaptation, and the disposition in space of all organised as well as unorganised nature. Mr. Wallace says this cannot be proved. In fact, his theory must altogether fall to pieces if it be true. With a mind thus strongly biassed in one direction, he cannot admit such proofs as are given by Agassiz, or which are demonstrable by the formation of a wheat-straw, or the opening of the thoracic duct into the veins of the neck of his own body. He says, 'The theory of continual interference is a limitation of the Creator's power.'

Talking of adaptation and varieties of colour he remarks that the Duke does not attempt 'to explain this except by reference to the fact that "purpose" and "contrivance" are everywhere visible, and by the illogical deduction that they could only have arisen from the direct action of some mind, because the direct action of our minds produces similar contrivances.' I feel quite sure that if such remarks as these required an answer at all, the Duke of Argyll is able to answer them most triumphantly. It is some consolation to reflect that in a scientific discussion there are but few men who would make them at all.

Passing from 'mind' and 'contrivance' as applied to structure, Mr. Wallace finds equal fault with the Duke of Argyll in his remarks about 'beauty.' The Duke, with 999 in every 1,000 reflecting and thoughtful men, states, with regard to 'humming birds,' that there is no connection which can be either traced or conceived between their splendour and any function essential to life—this splendour is confined to the male sex almost exclusively.

But, says Mr. Wallace, Mr. Darwin *has* met the statement and has shown 'by observation and reasoning how beauty of colour and form may have a direct influence on the most important of all the functions of life, that of reproduction.'

The Duke of Argyll responds that the colour of the various humming birds is quite irrespective or unconnected with their difference in structure, and then continues to remark: 'Plumes of blue are of no more value in the "struggle for existence" than plumes of green. Spangles of the emerald are no better in the battle of life than the spangles of the ruby. A crest of flame does not enable the humming bird to reach the curious recesses of an orchid better than a crest of sapphire. But all these are beautiful, and their beauty is various, and therefore all these are given.' . . . 'It would be to doubt the evidence of our senses and of our reason, or else to assume hypotheses of which there is no proof whatever, if we were to doubt that mere ornament, or mere variety are as much an end

and aim in the workshop of nature as they are known to be in the workshop of the goldsmith and the jeweller. Why should they not? The love and the desire of them is universal in the mind of man.'¹

After describing the various beauties of those exquisite creatures (the humming birds), the Duke proceeds:—

‘There is not the smallest ground for believing—on the contrary, there is every reason to disbelieve—that all these changes or any of them *have any other use than the use of beauty*,’ and he quotes as a conclusive proof of this what I have before mentioned, viz., that ‘all this splendid ornament is almost always confined to one sex.’

The Duke then dwells upon the beautiful adaptation to special purposes so conspicuous in the group. ‘They feed mainly on insects which frequent the flowers of the New World, and some of these have nectar chambers of most curious plan. To get access to them requires a peculiar apparatus, and this apparatus the humming birds are provided with, both in the forms of bill and in the powers of wing. *So special is the adaptation that some kinds of humming birds seem to be made to match a few plants which are perhaps confined to a single mountain.*’² As an instance in which ornament takes the place of pictorial representation, the Duke instances the secondary feathers of the Argus pheasant, which are decorated with a series of conspicuous spots

¹ *Reign of Law*, 230.

² *Op. cit.* 231.

or 'eyes,' so coloured as to imitate the effects of balls. 'The shadows and the high lights are placed exactly where an artist would place them so as to represent a sphere.' The 'eyes' of the peacock's train are wonderful examples of ornament, but they do not represent anything except their own harmonies of colour. The 'eyes' of the Argus pheasant are like the 'ball-and-socket' ornament which is common in the decorations of human art.

'It is no answer to this argument in respect to beauty that we are constantly discovering the use of beautiful structures in which the beauty only and not the usefulness had been hitherto perceived. The harmonies on which all beauty probably depend are so mutually connected in nature, that 'use' and ornament may often both arise out of the same conditions.'¹

I have already dealt at length with sexual selection, but, as bearing upon the Duke's argument, I must reiterate the following facts. In the first place, we have no proof whatever that the insect or bird sees colours in the sense that we do; and in the second place we have positive and distinct proof that the bird's plumage is more or less influenced by the condition of the genital organs. Thus birds assume, as a rule, a more marked and distinctive plumage in the breeding season, and the well-known dissections of Yarrell have fixed the phenomenon of the female's

¹ *Reign of Law (Good Words, 1865), p. 230.*

assumption of male attire in the pheasant to disease of the ovaries. Here, then, we obtain a clue to the elucidation of at least one cause connected with the organisation of the bird which has more or less influence over the tints of the plumage. And as a rule the influence is uniform and regular.

Just as the insect puts on the colour of the lichen, so does the ptarmigan assume that of the rocks or snow among which it dwells, and these changes begin when the bird breeds in the spring, and end when it goes into snowy quarters for the winter. As the Duke of Argyll observes:—‘The evidence is indeed abundant that ornament and variety are provided for in nature for themselves and by themselves, separate from all other use whatever. Any theory on the origin of species which is too narrow to hold this fact must be taken back for enlargement and repair. At the very best it must be incomplete. But here the question arises, Is there any ground for anything at all on the “origin” of species, such for example as the various kinds of humming bird? Beauty, variety, fitness for a peculiar mode of life—in these we see a purpose; but is there any indication of a method according to which the purpose has been pursued? . . . There is indeed immense variety, but it is variety within the bounds of law.’ And then, after detailing the peculiarity of structure in the humming birds—viz. the peculiar form and constant number of ten either rudimentary or developed feathers of the tail, which, the Duke observes truly, more than

in other species, suggests the operation of some physical law—he remarks :—

‘ Now this is only one example of a great class of facts of continual recurrence in nature. The forces which are combined for the moulding of organic forms have been so *combined as to mould them after certain types or patterns*. It constantly happens that particular parts of any given type which are indispensable to one animal are of no use whatever to another. Where they are of no use they are enlarged, developed, expanded. For example, the forearm of all the mammalia, and even of all the lizards, terminates in five jointed bones or fingers. But in many animals the whole five are not needed, but only some one, two or three. In such cases the remainder are dwarfed, but rudimentally the whole number are always to be traced. Even in the horse, where only one of the five is directly used, and where this one is enlarged and developed into a hoof, parts corresponding to the remaining four fingers can be detected in the anatomy of the limb. In many cases the science of fossil remains enables us to trace the intermediate forms through which existing animals can be connected with animals long since extinct. It must be remembered that the fact of this connection is quite a separate thing from any theory, such as Mr. Darwin’s, as to its physical cause.’

‘ Professor Owen pointed out, in public lectures delivered some years before the publication of Mr. Darwin’s book, the existence of fossil animals which

showed an increasing approximation to the forms of the horse and of the ox; and he showed that this approximation was related in time, as it seemed to be in purpose, with the coming need of them for the service of man.'

'All these facts should convince us that we must enlarge our ideas as to what is meant by "use" in the economy of nature. In the first place it must be so interpreted as to include ornament; and in the second place it must include also not merely actual use, *but potential use, or the capacity of being turned to use in new creations.* In this point of view rudimentary or aborted organs need no longer puzzle us, for in respect to purpose they may be read either in the light of history or in the light of prophecy. They indicate either what has already been or what may yet come to be. Why new creations should not have been made wholly new; why they should have been always moulded on some pre-existing form; why one fundamental groundwork should have been adhered to for all vertebrated animals, we cannot understand. But as a matter of fact it is so. For it appears that creative purpose has been effected through the instrumentality of forces so combined as to arrange the particles of organic matter in definite forms; which forms include many separate parts capable of arrestment or development, according as special organs are required for the discharge of special functions. Each new creation seems to have been a new application of these old materials. Each

new house of life has been built on these new foundations. Among the many wonders of nature, there is nothing more wonderful than this—the adaptability of the one Vertebrate type to the infinite variety of life to which it serves as an organ and a home. . . . Here again the laws of nature are seen to be nothing but combinations of force *with a view to purpose*; combinations which indicate complete knowledge, not only of what is, but of what is to be, and which foresees the end from the beginning.’¹

I have quoted these admirable opinions and arguments at length to show, in the first place, how exactly they agree with the view held by Agassiz; and secondly, because they perfectly coincide with those of the large body of scientific men who have not hitherto been tainted with the Darwinian heresy.

But they do not satisfy Mr. Wallace. This gentleman remarks that the Duke’s argument is founded on the supposed analogy of the Creator’s mind to ours, as regards the love of beauty for its own sake; and then he asks why the Creator has made things ugly like the ‘elephant, rhinoceros, and camel.’ Now there is a double error in these remarks of Mr. Wallace. Neither the Duke of Argyll nor any other scientific writer that I am acquainted with has ever ventured to say that the Creator’s mind is the same as ours. Most men would regard such a statement as simply

¹ *Reign of Law (Good Words, 1865, p. 232).*

blasphemous. What Agassiz and the Duke have argued is, that there is evidence in every step of creation, and in every phase of organic development, of foreknowledge, design, and reason. And they venture to say that these Divine faculties are not seen in chance variation, pampered monstrosities, 'struggle for existence,' 'survival of the fittest,' and development by physical forces, as enunciated in Mr. Spencer's dogma of evolution.

Secondly, it is a great and unpardonable error to say that there is anything in nature, when viewed with a scientific eye, and with a mind imbued with a love and reverence for the Great Artificer, which can be termed ugly in the strict meaning of the word. Nor is there any excuse for applying the epithet to one of the most wonderful and beautiful structures in creation—that of the elephant.

But with regard to beauty, there is one fact which Mr. Wallace has entirely overlooked in the papers I am now criticising, and which has been quoted as worthy of praise by Dr. Hooker, when President of the British Association. According to Darwin's theory, *natura non facit saltum*. He states over and over again, that all the results we have seen have been produced in nature by variations so slight as to be practically unnoticeable. How does Mr. Wallace reconcile this fact with his theory that the beauty of the male plumage has been produced by variation, which gave him greater advantage over his fellows in

the matter of pairing? If we cannot see gradual variation, it ceases to be an element in the 'survival of the fittest' among male humming birds.

Were nature to take a sudden jump, and evolve a gorgeous male bird or insect with attractive colourings, we could understand how the female, should she see as we do, might like a vain woman be attracted by a gilded waistcoat or a red coat. But it must be remembered that Mr. Wallace and those who agree with him have to evolve their full-fledged gallant by inconceivably minute changes occurring through vast eons of time. And this must, I opine, be utterly fatal to their theory. There is no use in telling us that a small speck of blue here, or a shade of sapphire there, or a microscopical spot of colour anywhere, will prove more attractive to the female, and give the evolving humming-bird an advantage in the struggle for existence.¹

Mr. Wallace has also attempted to strengthen his case by assuming that the believer in special creation assigns to the Creator the mere variations which occur in species, or in the monstrosities produced in this direction by human agency; and he goes out of his way to urge forward in proof that, if men wanted a bull-dog to torture another animal, a greyhound to catch a hare, or a bloodhound to hunt down their oppressed fellow-creatures, that the variations from the original stock

¹ This was written before the appearance of Mr. Darwin's last work, but I have seen no reason to alter the text.

were the direct agencies of the Creator as much as the creation of species. Mr. Wallace has no grounds for making the assertion as a matter of fact that all our domestic dogs have arisen from the 'same original stock.' Even Mr. Darwin admits a plurality of progenitors for this animal,¹ and that the Creator should be held responsible for the brutal employment of the bull-baiter or the slave-owner is most unwarrantable.

¹ *Animals and Plants under Domestication*, vol. i. p. 33.

CHAPTER XX.

THE VARIATION AND NATURAL SELECTION
ARGUMENT, CONTINUED.*Mr. Darwin's Supporters.*

Mr. Alfred B. Wallace, continued.—Philosophy of Birds' nests.—Not built by instinct, according to Wallace.—M. Flourens' remark upon such a theory.—The Arab's tent.—The Patagonian hut.—Built by 'imitation.'—The Egyptian mud houses.—The Pyramids.—Birds' nests.—Material of.—Swallows build their nests of mud, because they fly over ponds in search of flies.—Absurdity of such opinions.—Young Birds learn to build their nests from their parents.—Mr. Wallace's separation from Darwin in regard to the Creation of Man.—The subject considered.—Its teleological significance.

TURNING from Mr. Wallace's remarks on 'Creation by Law,' let us examine his article on the 'Philosophy of Birds' Nests.' Mr. Wallace adopts Mr. Darwin's view that there is no such thing as instinct at all, in the sense in which we understand the word. He considers it the 'result of small contingent consequences, as produced by natural selection.'

Well may M. Flourens remark upon this singular theory: 'On ne peut prendre cela au sérieux, l'élection naturelle élisant un instinct.'

La poésie a ses licences; mais
Celle-ci passe un peu les bornes que j'y mets.'

Mr. Wallace states his theory thus:—

I believe, in short, that birds do *not* build their nests by instinct; that man does *not* construct his dwellings by reason; that birds do change and improve when affected by the same causes that make men do so; and that mankind neither alter nor improve when they exist under conditions similar to those which are almost universal among birds.’¹

Mr. Wallace supports this remarkable statement by asserting that the Arab builds the same tent he did 2,000 or 3,000 years ago; the mud villages of the Egyptians are the same as those in the time of the Pharaohs; ‘the Patagonians’ rude shelter of leaves—the hollowed bank of the South African earthmen, we cannot conceive ever to have been inferior to what they are now.’

Mr. Wallace says that these various structures are not built by instinct, but by ‘simple imitation’ from one generation to another; and then he proceeds to abolish his entire argument by telling us that these various tribes had nothing else at hand wherewith to build themselves habitations. ‘The turf, or snow, or stones—the palm leaves, bamboo, or branches which are the materials of houses in various countries, are used because nothing else is readily to be obtained. The Egyptian peasant has none of these—nor even wood. What then can he use but mud?’

And so, because these people build themselves

¹ *Int. Obs.*, vol. xi. p. 413

homes of the best structure with the best materials at their command, they are denied the use of reason or instinct in their construction. It is all the result of mere imitation! Will Mr. Wallace kindly inform us where the Egyptians who live in mud cottages found a copy to guide them in building the Pyramids? Are these structures the result of reason or mere imitation? Is there no mark of improvement between the mud cottage and these wonderful structures?

Man, as a reasoning being, accommodates his architecture to his wants, his means, his civilization, and the circumstances of his existence. The bird builds its nest in obedience to the operation of an innate instinct, which is directed, like the movements of man, by a Higher Power, and is so adapted to the purposes of its existence. But let us hear Mr. Wallace himself upon birds' nests:—

‘Each species uses materials *it can most readily obtain*, and builds in situations most congenial to its habits.’

This is not true—it has not even a soul of truth in it. Every schoolboy knows that each bird selects particular materials, with which it always, when left alone, constructs its nest. The nightingale selects its leaves and twigs—the goldfinch its moss, and lichen, and feathers—the willow wren and chiffchaff their dried grass—the whitethroat its bents and lichens—the rook its sticks—the swallow its mud—the kingfisher its bones—not because these things occur in the imme-

diate neighbourhood, but because they are impelled to do so by an instinct which they cannot resist. Fancy a swallow, as Mr. Wallace remarks, building its nest of mud *because* it finds it on the margin of the ponds over which it flies in search of food!—the rook because, in digging for worms, it comes in contact with roots and fibres! Not one word is said of the adaptation of the materials to the position or character of the nest—the mud to be used as plaster, the sticks to be laid across branches of trees as rafters! Then, again, in the situation of the nests we are told, gravely, ‘The titmouse, haunting fruit trees and rocks, and searching in cracks and crannies for insects, is naturally led to build in holes where it has shelter and security, while its great activity and the perfection of its tools (bill and feet) enable it easily to form a beautiful receptacle for its eggs and young!’

But Mr. Wallace begins to feel an awkward difficulty—viz., that the swallow, or the wren, or the finch, or the tit, build all their nests in the same situation, of the same form, and with the same materials as their forefathers and immediate progenitors have done, without even having had the opportunity of *imitation*, like the human being. How is the difficulty to be got over? *First of all he denies the truth of the above*, as I have given it. He says it is ‘*always assumed without proof and even against proof.*’ Cage-birds do not build nests, like those which they do when at liberty; and he thinks little ‘Pecksy’ and ‘Topsy’

learn how to build their nests when they are living in them! In case I should not be believed, I will give his own words; and mind, I am quoting all this simply because the paper has been commended by Dr. Hooker, the President of the great British Association for the Advancement of Science.

Mr. Wallace says: 'During the time they [the young birds] are learning to fly, returning often to the nest [a false fact in natural history, as every school-boy knows—birds seldom or never return into a nest they have once left], they must be able to examine it inside and out! [as though they were going to pass through a competitive examination], and as their daily search for food invariably leads them among the materials of which it is constructed [another awful blunder in natural history], and among places similar to that in which it is placed [another awful blunder], is it so very wonderful that, when they want one themselves, they should make one like it?'

This puts me so much in mind of the wonderful whale story introduced by Mr. Darwin in his first edition, but prudently withdrawn in the second, of bears swimming about with their mouths open, catching flies, being gradually converted into whales, that I am inclined to think Mr. Wallace is ambitious of a similar immortality in trying to make us believe his wonderful tales of the self-education of young tom-tits.

Mr. Wallace does not believe in instinct because it must be innate, and therefore disturb 'Mr. John

Stuart Mill's sensationalism and all the modern philosophy of experience.' Mr. Wallace, however, thinks that birds' nests are built by the same mode of reasoning as that used by man in building his houses! 'I simply hold that the phenomena presented by their mode of building their nests, when fairly compared with those exhibited by the great mass of mankind in building their homes, indicate no essential difference in the kind or nature of the mental faculties employed!'

I have dealt with Mr. Wallace's arguments on their merits, and I have condemned them. Before concluding, however, let me do justice to that gentleman. In his later writings he has separated from Mr. Darwin at an all-important point—viz., the Creation of Man. Mr. Wallace does not believe that 'natural selection' could have effected this great work. His reasons for this are most potent; but I may say, *en passant*, they are equally applicable to the whole cycle of created things.

It is found, and will be demonstrated further on, that the difference between the brain of the savage and the civilized man, in size, is not great; and Mr. Wallace makes the pregnant remark that, as the savage has a larger brain than his needs require, it could not have been produced by natural selection. He also refers to the nakedness of man's skin, and to the different construction of his feet and hands, asking how, even though the construction of the hand and

foot might have assisted the animal to stand erect, of what use would the erect posture be to the animal? He also alludes to the human larynx and ear, the latter of which is treated at length further on. Most thankful ought all scientific men be to Mr. Wallace for these unanswerable teleological remarks.¹

But a word about the brain of the savage being larger than his needs. Mr. Mivart would call this 'anticipatory development.'

Does it not read to us another and a grander lesson? Does it not tell us that the savage has organs of mind which require development by education and civilisation? Can any language be plainer than that shown by the brain of the savage? Does it not show that these beings are not to be slain and exterminated because they are savage? Ay—plainer, I say, than language can describe or eloquence illustrate does this grand biological fact tell us that the savage has the means given him by his Creator by which the blessings of education can evolve within him the thoughts, the feelings, the actions, the responsibilities, and the hopes of civilisation.

¹ *Natural Selection*, p. 322 *et seq.*

many generations as yet unborn have come and gone. There is nothing, however, to prevent man's becoming as long lived as the oak if he will persevere for many generations in the steps which can alone lead to this result. Another interesting achievement which should be more quickly attainable, though still not in our own time, is the earlier maturity of those animals whose rapid maturity is an advantage to us, but whose longevity is not to our purpose.

The question—Evolution or Direct Creation of all species?—has been settled in favour of Evolution. A hardly less interesting and important battle has now to be fought over the question whether we are to accept the evolution of the founders of the theory—with the adjuncts hinted at by Dr. Darwin and Mr. Matthew, and insisted on, so far as I can gather, by Professor Hering and myself—or the evolution of Mr. Darwin, which denies the purposiveness or teleology inherent in evolution as first propounded. I am assured that such of my readers as I can persuade to prefer the old evolution to the new will have but little reason to regret their preference.

P.S.—As these sheets leave my hands, my attention is called to a review of Professor Haeckel's 'Evolution of Man,' by Mr. A. R. Wallace, in the 'Academy' for April 12, 1879. "Professor Haeckel maintains," says Mr. Wallace, "*that the struggle for existence in nature evolves new forms without design, just as the will of man produces new varieties in cultivation with design.*" I

maintain in preference with the older evolutionists, that in consequence of change in the conditions of their existence, *organisms design new forms for themselves, and carry those designs out in additions to, and modifications of, their own bodies.*

“The science of rudimentary organs,” continues Mr. Wallace, “which Haeckel terms ‘dysteleology, or the doctrine of purposelessness,’ is here discussed, and a number of interesting examples are given, the conclusion being that they prove the mechanical or monistic conception of the origin of organisms to be correct, and the idea of any ‘all-wise creative plan an ancient fable.’” I see no reason to suppose, or again not to suppose, an all-wise creative plan. I decline to go into this question, believing it to be not yet ripe, nor nearly ripe, for consideration. I see purpose, however, in rudimentary organs as much as in useful ones, but a spent or extinct purpose—a purpose which has been fulfilled, and is now forgotten—the rudimentary organ being repeated from force of habit, indolence, and dislike of change, so long as it does not, to use the words of Buffon, “stand in the way of the fair development” of other parts which are found useful and necessary. I demur, therefore, to the inference of “purposelessness” which I gather that Professor Haeckel draws from these organs.

In the ‘Academy’ for April 19, 1879, Mr. Wallace quotes Professor Haeckel as saying that our “highly purposive and admirably-constituted sense-organs have developed without premeditated aim; that they have originated by the same mechanical process of Natural

Selection, by the same constant interaction of Adaptation and Heredity [what *is* Heredity but another word for unknown causes, unless it is explained in some such manner as in 'Life and Habit' ?] by which all the other purposive contrivances of the animal organization have been slowly and gradually evolved during the struggle for existence."

I see no evidence for "premeditated aim" at any modification very far in advance of an existing organ, any more than I do for "premeditated aim" on man's part at any as yet inconceivable mechanical invention; but as in the case of man's inventions, so also in that of the organs of animals and plants, modification is due to the accumulation of small, well-considered improvements, as found necessary in practice, and the conduct of their affairs. Each step having been purposive, the whole road has been travelled purposively; nor is the purposiveness of such an organ, we will say, as the eye, barred by the fact that invention has doubtless been aided by some of those happy accidents which from time to time happen to all who keep their wits about them, and know how to turn the gifts of Fortune to account.