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[p. 11a]

### ‘Wallace on Darwinism.’

*Darwinism: An Exposition of the Theory of Natural Selection, With Some of its Applications.* By Alfred Russel Wallace. With maps and illustrations. New-York: Macmillan & Co.

It is characteristic of Mr. Wallace’s modesty that he should give the name of “Darwinism” to his new volume. Mr. Darwin and Mr. Wallace were each discoverers of the theory of evolution. The general idea had indeed been entertained by others as well, but to Darwin and Wallace belong the honor of having seen the scope and depth of it. Years ago Mr. Wallace conceded to Darwin the leadership in this work, holding that this great man had an industry, a skill in collecting facts, and a power of statement which especially fitted him for it. In 1870 Mr. Wallace published a small volume, entitled: “Some Contributions to the Theory of Evolution.” The ideas of this earlier work run as a thread through the pages of the new volume. The present work contains the conclusions upon this great subject of thirty years thought and observation.

There are chapters on “Variation Under Domestication,” “Natural Selection,” “The Infertility of Crosses,” “Origin and Use of Color in Animals,” “Warning Coloration and Mimicry,” &c. The accounts of protecting and warning coloration and mimicry are as interesting as any parts of the book. Certain colors protect by their inconspicuousness; others warn by their brilliancy; still other animals mimic the warning coloration of species so protected, and benefit by their immunity. This coloration is, of course, the result of selection and survival. Species are constantly throwing off variations. Certain of these variations escape destruction and survive. The animals of the desert are examples of color which is protective by reason of inconspicuousness. These animals all have the color of the sand of the desert, all animals differently colored having been destroyed by their enemies. Some striking instances of this kind of coloration are mentioned by Mr. Wallace. There are some instances of animals which are brilliantly colored in order to render them inconspicuous. The sun birds of Africa live among flowers and have a plumage as brilliant as flowers; they thus escape the hawks, which are their chief enemies. But the intention of brilliant coloration is usually to render conspicuous and to warn. Certain animals might injure those attacking them and would not be acceptable food for them. Yet these animals may be killed before their destroyers learn their real nature. Hence the use of warning coloration. Mr. Wallace mentions the American skunk as an instance of this kind of coloration and attributes its impudent aspect to its long ages of protection:

“While staying a few days, in July, 1887, at the Summit Hotel on the Central Pacific Railway, I strolled out one evening after dinner, and on the road, not fifty yards from the house, I saw a pretty little white and black animal with a bushy tail coming towards me. As it came on at a slow pace and without any fear, although it evidently saw me, I thought at first that it must be some tame creature, when it suddenly occurred to me that it was a skunk. It came on till within five or six yards of me, then quietly climbed over a dwarf wall and disappeared under a small outhouse, in search of chickens, as the landlord afterwards told me. This animal possesses, as is well known, a most offensive secretion, which it has the power of ejecting over its enemies, and which effectually protects it from attack. The odor of this substance is so penetrating

that it taints and renders useless everything it touches, or in its vicinity. Provisions near it become uneatable, and clothes saturated with it will retain the smell for several weeks, even though they are repeatedly washed and dried. A drop of the liquid in the eyes will cause blindness, and Indians are said not unfrequently to lose their sight from this cause. Owing to this remarkable power of offence the skunk is rarely attacked by other animals, and its black and white fur, and the bushy white tail carried erect when disturbed, form the danger signals by which it is easily distinguished in the twilight or moonlight from unprotected animals. Its consciousness that it needs only to be seen to be avoided gives it that slowness of motion and fearlessness of aspect which are, as we shall see, characteristic of most creatures so protected.”

Mimicry is of course the result of warning coloration. Certain butterflies—the Heliconidæ, for instance—are inedible by insects. It is to their interest to warn off insects. Hence their brilliant coloring. But the Pieridæ are edible, and they imitate the coloration of the Heliconidæ in order to share their protection. Mr. Bates, a recent observer in South America, says that in some cases the resemblance is so exact as to be absolutely “staggering.” But Mr. Wallace considers the most remarkable example of mimicry to be that of certain harmless snakes which mimic poisonous ones:

“The genus Elaps, in tropical America, consists of poisonous snakes which do not belong to the viper family (in which are included the rattlesnakes and most of those which are poisonous), and which do not possess the broad triangular head which characterizes the latter. They have a peculiar style of coloration, consisting of alternate rings of red and black, or red, black, and yellow, of different widths and grouped in various ways in the different species; and it is a style of coloration which does not occur in any other group of snakes in the world. But in the same regions are found three genera of harmless snakes, belonging to other families, some few species of which mimic the poisonous Elaps, often so exactly that it is with difficulty one can be distinguished from the other.”

Mr. Wallace’s remarks on the geological evidences of evolution are especially interesting, for here the theory finds not only support and encouragement but demonstration. Mr. Wallace and Prof. Huxley concur in thinking that the truth of evolution has been established by geology. The claim is made that it rests upon as sure a foundation as the Copernican theory of the motions of the heavenly bodies. The pedigree of the horse, as shown in geological formations, is one of the best demonstrations yet discovered of evolution. It is a curious fact that, although no horse inhabited America when discovered by Europeans, abundant remains of extinct horses have been found in the post-tertiary deposits of North and South America. From these an almost continuous series of modified forms can be traced in the tertiary formation till we reach at the very base of the series, a primitive form so unlike our perfected animal that, if we had not the intermediate links, few persons would believe that the one was the ancestor of the other. Some of the earliest known horses are about the size of foxes.

The chapter on the struggle for existence contains Mr. Wallace’s latest conclusions and suggestions on that subject. He dwells upon the complex nature of this struggle and shows from what remote causes the life of a single species may suffer. For instance, Sir Charles Lyell observed that if, by the attacks of seals, salmon are reduced in numbers, otters living far inland will be deprived of their customary food and will destroy many young birds and quadrupeds that otherwise might have escaped; thus the result of an increase of marine animals is the destruction of land animals hundreds of miles away. Cats and clover are things sufficiently removed from each other. Many flowers, of which red clover is one, require to be fertilized by insects in order to produce seed, and this fertilization can in some cases only be effected by one species of insect to which the flower has become especially adapted. The red clover is fertilized almost exclusively by bumble bees. The flowers produce no seed if the bees are prevented from visiting

them. Now the field mice destroy the combs and nests of bumblebees. But the number of mice depends upon the number of cats. Col. Newman, an English observer, has found that the nests of bumblebees are more plentiful near towns and villages than elsewhere, and he attributes this to the greater number of cats, which kill the mice. Hence there is a connection between a good supply of cats and a good yield of red clover.

The pampas of South America afford an illustration of the struggle for existence in which both plants and animals are concerned. Mr. Wallace does not accept the view of Mr. Darwin and Prof. Asa Gray regarding the absence of trees from these vast plains. They attributed this to the inability of the tropical South American forms of vegetation to grow on these plains and to the fact that there was no other source from which a supply could be obtained. Mr. Wallace regards this explanation as unsatisfactory, because there are ample forests in the temperate regions of the Andes from which suitable vegetation could have been obtained and because it is inconsistent with what is known of the rapid adaptation of species to new conditions. Mr. Wallace prefers a more recent explanation given by Mr. Edwin Clark, a civil engineer, who has resided nearly two years in the country. This is simply that the young trees have been destroyed by animals. The plains are covered with droves of horses and cattle and are overrun by numberless wild rodents. During the long droughts these animals strip the country of vegetation. During Mr. Clark's visit, in one of these droughts no less than fifty thousand head of horses and cattle perished, after tearing deep out of the soil every trace of vegetation. Of course the horses and cattle are a comparatively late importation, but the rodents were there before them. The fact that trees, when fenced in, grow luxuriantly on these pampas is an indication of the correctness of this explanation.

Another interesting point discussed is that of the relations of the increase of organisms to the struggle for existence. The organisms increase in a geometrical ratio. The fact is of course evidence of the tremendous nature of the struggle. If it were not for this struggle, where would be all this superfluity of life? An illustration of this rapid increase of life is Linnæus's assertion that three flesh flies could eat up a dead horse quicker than a lion. One flesh fly could produce 20,000 larvae and those grow to full size in five days. According to Linnæus, it would take a lion longer than that to eat a horse. But great fertility is not necessary to rapid increase. Our American passenger pigeon produces generally one egg, and at most two. Many birds, such as the tree-creeper, lay six to seven eggs. Yet these birds are nothing like so numerous as the passenger pigeons, the reason no doubt being that they have more enemies than the pigeons. It is well known what vast quantities of these birds have existed in this country. The American naturalist Alexander Wilson, has left this striking description of an assemblage of pigeons at one time seen in Kentucky:

“Not far from Shelbyville, in the State of Kentucky, about five years ago, there was one of these breeding places, which stretched through the woods in nearly a north and south direction, was several miles in breadth, and was said to be upward of 40 miles in extent. In this tract almost every tree was furnished with nests wherever the branches could accommodate them. The pigeons made their first appearance there about the 10th of April, and left it altogether with their young before the 25th of May. As soon as the young were fully grown and before they left the nests numerous parties of the inhabitants from all parts of the adjacent country came with wagons, axes, beds, cooking utensils, many of them accompanied by the greater part of their families, and encamped for several days at this immense nursery. Several of them informed me that the noise was so great as to terrify their horses, and that it was difficult for one person to hear another without bawling in his ear. The ground was strewn with broken limbs of trees, eggs, and young squab pigeons, which had been precipitated from above, and on which herds of hogs were fattening.

Hawks, buzzards, and eagles were sailing about in great numbers, and seizing the squabs from the nests at pleasure; while, from twenty feet upward to the top of the trees, the view through the woods presented a perpetual tumult of crowding and fluttering multitudes of pigeons, their wings roaring like thunder, mingled with the frequent crash of falling timber; for now the axemen were at work cutting down those trees that seemed most crowded with nests, and contrived to fell them in such a manner, that in their descent they might bring down several others; by which means the falling of one large tree sometimes produced 200 squabs little inferior in size to the old birds, and almost one heap of fat. On some single trees upwards of a hundred nests were found, each containing one squab only, a circumstance in the history of the bird not generally known to naturalists.”

Perhaps Mr. Wallace’s remarks upon the ethical aspect of the struggle for existence will attract more attention than any other part of his book. Most critics have agreed in representing this struggle to involve a vast amount of cruelty and pain. Prof. Huxley even is of this number. In a recent article of his in the *Nineteenth Century*, he says that “since thousands of times a minute, were our ear sharp enough, we should hear sighs and groans of pain like those heard by Dante at the gate of hell, the world cannot be governed by what we call benevolence.” Mr. Winwood Reade thus characterized the struggle: “Pain, grief, disease, and death: are these the inventions of a loving God? That no animal shall rise to excellence except by being fatal to the life of others; is this the law of a kind Creator?” Now, Mr. Wallace takes the opposite view to this. He considers the struggle for existence to be merciful rather than cruel. Accepting the view that reproduction is necessary to progress, he holds that this struggle results in the greatest amount of happiness and the least amount of pain. He considers that the “torments” and “miserics” of animals have little real existence, but are the imaginings of men and women, who attribute them their own sensations. In the first place, they are spared the pain we suffer in anticipating death—a pain usually greater than the reality. Their deaths are often violent, and there is evidence to show that violent deaths are comparatively painless. Every one is familiar with Livingstone’s account of his sensations when seized by a lion. “Growling horribly close in my ear,” says Livingstone, “he shook me as a terrier dog does a rat. The shock produced a stupor similar to that which seems to be felt by a mouse after the first shake of the cat.” Livingstone held that, by a dispensation of Providence, the carnivora communicate this stupor to their victims. But this absence of pain, combined with perfect clearness of mind, is not peculiar to those seized by wild animals. Mr. Whymper, the celebrated Alpine climber, describes an accident to himself during one of his preliminary explorations of the Matterhorn, when he fell several hundred feet, bounding from rock to rock till he was fortunately imbedded in a snow drift near the edge of a tremendous precipice. Mr. Whymper says that although he felt blow after blow and was perfectly conscious while falling, he did not suffer pain, but merely thought, with perfect calmness, that a few more blows would finish him. We believe that many people will be able to corroborate this view from their own experience. Almost any person who has been brought face to face with sudden danger has experienced this combined absence of fear and clearness of mind. But it will be doubted whether Mr. Wallace makes out quite so good a case for the victims of hunger. The 50,000 horses and cattle mentioned above, which perished of starvation in a single drought on the South American pampas, must have suffered. But, further, animals, Mr. Wallace considers, have a very keen and full enjoyment of their lives. The daily search for food, which employs all their faculties and exercises every organ of their bodies, is a source of happiness. Certainly, all men when they repair to a savage state of life experience a happiness they never enjoyed amid the artificial comforts of civilization. This normal state of happiness, furthermore, is not alloyed, as with us, by poverty and ill-health and unsatisfied longings. Mr. Wallace says:

“Where we err is, in giving to animals feelings and emotions which they do not possess. To us the very sight of blood and of torn or mangled limbs is painful, while the idea of the suffering implied by it is heartrending. We have a horror of all violent and sudden death, because we think of the life full of promise cut short, of hopes and expectations unfulfilled, and of the grief of mourning relatives. But all this is quite out of place in the case of animals, for whom a violent and a sudden death is in every way the best. Thus the poet’s picture of

“‘Nature red in tooth and claw  
With ravine’

is a picture the evil of which is read into it by our imaginations, the reality being made up of full and happy lives usually terminated by the quickest and least painful of deaths.

“On the whole, then, we conclude that the popular idea of the struggle for existence entailing misery and pain on the animal world is the very reverse of the truth. What it really brings about is the maximum of life and of the enjoyment of life with the minimum of suffering and pain. Given the necessity of death and reproduction, and without these there could have been no progressive development of the organic world, and it is difficult even to imagine a system by which a greater balance of happiness could have been secured. And this view was evidently that of Darwin himself, who thus concludes his chapter on the struggle for existence: ‘When we reflect on this struggle, we may console ourselves with the full belief that the war of nature is not incessant, that no fear is felt, that death is generally prompt, and that the vigorous, the healthy, and the happy survive and multiply.’”

Mr. Wallace’s work is, of course, a contribution of the first importance to the literature of the subject. At the same time it would be difficult to find a book more entertaining to the general reader. He writes with the sincerity and the easy mastery which come of fullness of knowledge. There can be no more interesting guide in that great wonderland of science in which he has been so long one of the chief discoverers.

[\[Return\]](#)

*The Alfred Russel Wallace Page*, Charles H. Smith, 2015.