NATURAL SELECTION IN REGARD TO MAN.

THE writer has as sincerer espect for **Mr. A. R.** Wallace as for any living scientist. His original discovery of what is now known as "Darwinism," and his clear presentation of the same; his vigorous grasp of whatever subject he has in hand, and the crystal transparency of his style; his courtesy as a critic, and the modesty of his claims as a discoverer, — all conspire to render this science-author an object of the highest regard. But they say, "Genius is erratic;" and to this, or some other cause, is it to be attributed that our author has not "pursued the even tenor of his way" in such manner as to leave no doubt of his logical consistency.

In regard to the entire biological tree up to the fruitage, man, Mr. Wallace finds no need to look for the action of other than natural forces to account for the phenomena; and even when he comes to man, he pursues the same course, and we feel that the work is, in a general way, complete, when suddenly he turns upon his darling, natural selection, and attempts to show cause why man could not have been the product of that law.

The present writer does not affirm that Mr. Wallace is absolutely right in regard to the lower forms of the organic world; he does not affirm that Darwinism, together with any other known principles of evolution, do fully and satisfactorily account for the origin of species and for all the eccentric forms and functions of animate nature: but he does affirm, that, if natural law accounts for the origin of any species at all, it accounts for the origin of man. There are no more difficulties in the one case than in the other; and we are confident that the critics of Darwinism have raised objections to its validity in the vegetable and animal worlds as difficult to meet as any which Mr. Wallace makes to its validity in the case of man.

THE INTELLECT SUPERSEDING CHANGE OF FORM.

Some years since ("Anthropological Journal," May, 1864) Mr. Wallace took the original, ingenious, and suggestive posi-

tion, that the human form must have preceded the human intellect in the career of evolution. He maintained that whenever the intellect came into play its resources of contrivance would take the place of, and dispense with, further changes of form. We will let Mr. Wallace himself state the position: "I have also endeavored to show how the same power which has modified animals has acted on man; and have, I believe, proved, that, as soon as the human intellect became developed above a certain low stage, man's body would cease to be materially affected by natural selection, because the development of his mental faculties would render important modifications of its form and structure unnecessary."

Having paid some attention to the literature of the subject, we are not aware that any evolutionist has controverted this view. In his late work on "Natural Selection," the author makes no mention of adverse criticism. Much that he presents in connection with this subject is very suggestive, and some of it no doubt true; but, so far as the main position is concerned, we must regard it as untenable.

The difficulty is not, as we think, in conceiving how man was evolved by the natural forces from anthropoid forms, but in conceiving how these anthropoid forms were evolved from those which were still lower in the scale. The writer has far more difficulty in conceiving how the semi-erect posture could gradually arise from the horizontal without intellect, than in conceiving how the erect posture could arise from the semi-erect simultaneously with the evolution of intellect.

We are told that some of the anthropoid animals used clubs for defense, boughs for shelter, and stones to crack nuts with. Here is intellect, contrivance; but the change of form did not come to a stand-still there and then. Would not even this much of intelligence, small as it is, have facilitated rather than have retarded the progress of change toward the upright form? In all instances in which the animal had occasion to stand on the solid earth, and so to use its upper extremities, whatever should give relief and freedom to those extremities would be an advantage, and, according to the doctrines of selection, would be transmitted. Shorter arms than the apes have, and greater

stability in erectness of attitude, would give greater freedom of play to the upper extremities. So far, then, from intellect superseding change of form, it would appear to render such change more liable to occur under the influence of natural selection.

Now add a little more intelligence, and still a little more, till the creature is able to construct a rude hut, to keep up a fire by adding fuel, to cook food with a hot stone, and use a shell for a drinking-cup. These and kindred acts would call the arms and hands into more frequent requisition, and the demand for the erect position would be correspondingly increased. Any variations in this direction would be seized upon by heredity and transmitted; and thus, through the action of the intellect on the form, the upright position would at length be assumed.

Taking this view of the case, we cannot share our author's opinion about the difficulty of accounting by natural selection for the origin of the human foot. It might be difficult to see how the quadrumana's posterior hands could become feet without the co-operation of intellect. If he remained forever an inhabitant of the trees, no such change could take place; but would not the development of intelligence help to bring him down from his lofty abode, and place him more habitually on firm footing? After sufficient intelligence had been evolved to enable him to turn a greater variety of the earth's products to account for food, and to fetch down the fruit of the trees without constantly climbing them,* — hence assuming the upright position and standing much on the ground, rendering every change in the direction of the human foot an advantage, — the transformation in question would inevitably take place on the principles of natural selection.

In this connection it is no part of our duty to attempt to account for the evolution of intellect, inasmuch as the position of the writer criticised is that the human form was achieved in the course of development previous to the rise of the intellect, since the presence of the intellect would be incompatible with the further evolution of the form. In the chapter already referred to, Mr. Wallace fully recognizes the development of the

* And we might perhaps add, to climb by various artificial devices which primitive people are known to use, as hoops of wild vine and fetters of bark.

intellect by natural selection, maintaining that with the rise of intelligence selection would quit the body, and begin to act exclusively on the mind. With our author, we believe that the intelligence was just as much an affair of evolution as the form; but we differ from him, thinking it probable that both were evolved together, reciprocally acting upon each other, and rendering evolution more rapid, perhaps, than it had ever been before.

With regard to sympathy acting in concert with intellect to prevent further change of form, we think Mr. Wallace fails entirely to make his point good. We had thought if there was one thing more especially to be learned from the study of the savage character, it was that sympathy goes a very little way with that sort of people. Savages throw the drudgeries of life on the weaker sex: their children are little cared for, and the feeble must perish; habitually harassed by wild animals and wild men, the least endowed in courage, cunning, strength, and agility are constantly falling sacrifices to their unprotected manner of life; long fasts and frequent famines still further cull out the ill-adapted, and keep down the number of savages to a standard which is proportionate to the extent of their territory. We do not see but natural selection would have a perfectly legitimate influence on the physical constitution of savage man as we know him, to say nothing of those older peoples who had still less of intellect and sympathy. The fact is, such tender sympathy as Mr. Wallace imagines coming into play to stop the evolution of form is a product of the very highest civilization: it has no logical application to the case in hand.

We believe that Mr. Wallace is in error in maintaining that the activities of the growing intelligence put an end to the evolution of form. We believe, generally speaking, that such form continued to develop as long as there was any imperfection to be remedied. There are mechanical limits to the perfection of organic forms; and for an intelligent being inhabiting this planet, and subject to the cosmical forces and the limitations of matter, we do not believe that infinite wisdom is capable of devising, or infinite power of executing, a form any better fitted for his purposes than that which man possesses. In this appears the

reason why it stopped in the career of its evolution: it was not possible for it to become essentially better.

Mr. Wallace himself recognizes this principle when he admits the limit of improvement by selection in the case of the race-horse, greyhound, and other animals, which have reached the acme of speed, and can be improved no further. The limit is a necessary one, existing in the nature of things.

Of course reference is here had to the human form in general. The physique of the Caucasian has points of superiority above that of the Negro; and it is against Mr. Wallace's view, that the Caucasian intellect is likewise superior.

PREHISTORIC MAN'S SUPERABUNDANCE OF BRAIN.

This brings us to another point which we believe to be erroneous. Mr. Wallace maintains that the savage as we know him, and as his relics in the post-pliocene represent him, has more brain than any savage needs for his mode of life. He thinks that the life of some of the lower animals makes almost as large a draft on the resources of intelligence as does the life of the savage, yet the brain of the latter is immensely larger than that of the former. What need, then, for all this brain?

In the first place, we do not agree with Mr. Wallace that the life of the savage is so nearly on an intellectual level with that of the shrewdest animals. The savage that builds a hut may not seem to evince greater contrivance than the bird that builds a nest or the beaver that builds a dam. But there is probably this difference, that the skill of the animal is usually confined to one series of acts. When the beaver has shown us his dam, we have seen pretty much the extent of his contrivance, — if contrivance it be. Not so, however, with the savage when he has shown us his hut. He can show us a trick at fishing as well, — a trick which quite surpasses that of the jaguar which drops its saliva on the water to allure its prey; (?) for the man uses a hook of his own construction. It would be a wonderful tiger or monkey that would think of such a thing as that. The lion may catch a deer as well as the savage; but to this end the latter works himself a lance-head or an arrow-point out of stone, with a degree of skill which almost baffles the civilized man success-

fully to imitate. A lion would have a hard tussle to secure a bison; the savage may quietly let him into a pitfall which he digs with tools of his own making; and the intellectual difference between the two acts is immense. The animal gets on the sunny side of a rock to warm himself; the savage extemporizes a fire for himself, twirling it out of dry wood by means of friction; and even prehistoric savages were not so destitute as to do without fire. The animal is protected by its fleetness, by its ability to climb, by its great strength, or by some natural weapon of defense, while savage man has to fall back on the resources of his larger brain for the means of holding his own in the struggle for existence.

Some of the oldest of the cave-dwellers used needles having eyes to sew with; and the language of the lowest known savages is manifold superior to that used by the most intelligent of the brutes. Now, surely if the brain of the anthropoid ape be represented by 10, we should not marvel that the brain of the savage should go as high as 26, — a little more than two and a half times as large.

But this is not the sum of our author's difficulties. The psychical activities of the civilized man so far transcend the psychical activities of the savage that we should expect a greater difference in the volume of brain than actually obtains between them. The scale is something like this: anthropoid, 10; savage, 26; civilized, 32. According to Mr. Wallace, while the first two numbers are too far apart properly to represent the psychical activities of the anthropoid and savage, the last two are too near to correspond to the psychical activities of the savage and civilized man.

We admit at once the great remove at which the civilized man stands in this respect from the savage man. But there are some considerations which Mr. Wallace has overlooked. Though admitting other conditions as affecting mental power, he constantly refers to volume as the standard of comparison. We grant the importance of volume, but in an inquiry of this kind it can hardly be regarded as paramount. The question of intellect or intelligence concerns more especially the relative volume of the frontal lobe of the brain, — relative, not only with regard

to its development in savages and civilizees, but relative with regard to the posterior lobe. If volume determines the degree of power, then a greatly predominant posterior brain would give a great predominance of the functions pertaining to the posterior lobe. These functions are probably animal in character. On the contrary, a large development of the frontal lobe, in comparison with the posterior, would afford a greater measure of the psychical functions which pertain to the frontal brain. These functions are probably intellectual. This much, at least, we have to guide us in this inquiry, that in savages the frontal lobe averages a lower development in comparison with other parts of the brain than in civilized races. Civilization arches the forehead, giving greater room for the brain of this region. The additional brain thus acquired belongs mainly to the middle and upper folds of the frontal lobe, the seat, perhaps, of the higher activities of the mind, — reflection and sympathy. Not only is there more brain in these folds, but they are more richly convoluted in the cultured man. By this complexity of convolution a greater quantity of gray matter is packed into the same compass, and consequently there is more of this vital element of the brain than even the greater size of the forehead would indicate.

The above argument is not materially affected by any theory concerning the brain, whether it act as a unit, according to Gratiolet and Murphy, or whether it act by localized functions, as almost all believe. We do not look for the signs of intellectual nobility in the back head, but in the forehead. And, even if the brain act as a unit, the larger development of the forehead must enable it to act more strongly in the intellectual direction.

We think we may here find in the brain sufficient ground for all the difference in intellectual function between the savage and civilized man. The greater arching of the forehead and the greater volume of contained brain; (2) the addition being chiefly in the middle and upper folds, the seat of the higher intellectual faculties; (3) the more richly convoluted folds giving a still greater volume to the gray matter which is believed to be the general seat of psychical activity. Add to this (4) the finer texture of the entire organism of the cultured man, which finer texture we should expect would pertain more especially to the

nervous system in general and to the brain in particular;* and, without going further, we seem to have differences of cerebral structure between the savage and civilized brain quite sufficient to account for the differences in their mental manifestations.

We can take no other view of it. If selection accounts for animal development, it accounts for human development. The causal relations suggested by all the facts of the case appear to be as natural and fitting as in the other realms of nature.

But how does Mr. Wallace handle the alleged facts in regard to the brain which he presents as at variance with the theory of selection? First alleged fact: the too great difference between anthropoid and savage brains to correspond with the psychical powers evinced by each. Second alleged fact: the too little difference between the savage and civilized brain to correspond with the psychical functions displayed by each. Mr. Wallace's explanation: Till we reach man, the natural forces, acting in a natural way, will account for the development of the organic world; but, when we come to man, they fail to account for the phenomena, whereupon some new force, or new management of the forces, comes into requisition. This new agency is a conscious spiritual power by virtue of which man was endowed from the beginning with a redundancy of brain,—with more than he had use for. This was purposely done with reference to a future end. The time was foreseen when this large amount of brain would all be needed, and it was provided a long time beforehand so as to be in readiness. Man may have carried this superfluous brain for a few hundred thousand, or even for a few million, expectant years; no matter, if useless all this incon-

* The skulls of the cave-dwellers of Les Eyzies, who lived during the reindeer period, are of interest in this connection. We have no room for detail from the reports of P. Broca and A. Ecker; but may state that we have evidence in the remains of these prehistoric people of a large brain along with unmistakable signs of wildness and coarseness of structure.

Arctic people, however unintellectual, have immense heads. This is true of the Esquimaux, who cannot count higher than five. The brain partakes of the general lethargy of the system, showing the importance of taking condition, as well as size of the brain, into consideration in estimating its power.

ceivable time, it would nevertheless be indispensable to the civilized man when the time for civilization should come.

This does not seem to be so fitting and appropriate as the manner in which nature had previously regulated the development of plant and animal life, preserving what was fit to be preserved, and dropping very soon what was cumbrous or for which there was no use. And we do not hesitate to say, that, if man had been endowed with any superabundance of brain at that remote period, it would have required not only the original act of supramundane power to give the endowment, but constant vigilance and the ceaseless outflow of creative energy from the spheres to prevent it from falling away in consequence of its uselessness. It is singular that such a doctrine could be seriously put forth in the presence of physiological science; and in saying this we do not forget the lesson of "rudimentary" organs. This is the usual trick of the supernatural powers when they are invoked to help out with a philosophical difficulty. They do some needless thing with a design, and then have to keep constantly doing to prevent the design from falling through with. Speaking after the manner of men, a great deal of trouble and care would have been saved in this case to have left man without his big brain till he had use for it, and then to have bestowed it. We believe that it was done just in this way, not suddenly by supernatural power, but gradually by natural forces behaving in a most scientific and natural manner.

Again, if man's brain was spiritually devised for a future purpose, why was it not made the full average civilized size at once? And, if civilization has developed the brain to the extent of a few cubic inches above the average of the savage brain, what rational ground for doubt that all the psychical functions which civilized man performs more than the savage may have had corresponding and adequate additions in quantity, position, and quality of brain?

WANT OF THE HAIRY COVERING ON MAN.

Another of the author's arguments relates to the want of hair on the body of the savage. This must have been an inconvenience, and consequently could not have been the result of selec-

tion. The back of animals is better supplied with this natural covering than any other part, while in the case of man it is the reverse.

We admit the difficulty of dealing with this argument. But the writer appears to allow too little weight to the fact of man's upright position, which in a great measure certainly relieves his back from exposure. Moreover, one of the creature's first acts after the rise of human intelligence, as evinced by the love of the ornamental in children and savages, would be to throw the skin which he had taken from his game over his own shoulders, imagining himself, very proudly, to be an animal. This he could afford for every day, only decorating his head with the horns on special occasions. With such a covering on the back, together with the freedom from exposure of the upright position, there would be no use for a natural covering, and through natural selection it would be lost, as is the case with the woolly covering of northern animals on becoming acclimatized in the south.

Mr. Wallace shows that savages do cover the back and shoulders a great deal, that they do it indiscriminately where it is hot as well as where it is cold, indicating that it is done, not as he supposes, for comfort, but for style. Savages are more solicitous everywhere about some trifle of hideous decoration than about the means of solid comfort; and to this end they cover themselves with skins, leaves, feathers, and paint.

We may look at this objection from another point of view. The development of the savage's comparatively large brain may have necessitated a corresponding development of sensitiveness in the nervous system, which may not be compatible with the hairy covering. The large aggregation of nervous substance in the human cranium and the nakedness of the human body may be an example of correlation, in which the former could not be present without the latter.*

But if we should not explain satisfactorily to ourselves the

* Mr. Wallace's argument, that reversions to hairiness of the entire body do not occur, is hardly sustained by the fact. C. Staniland Wake enumerates this as in many instances a physical character of the Australians, one of the lowest races, giving as authority Sherzer, the Austrian naturalist, Wilkes, and others (Journal of Anthropology, January, 1871).

relation of the hairlessness of the savage to the principle of natural selection, we have only to place it alongside of other difficulties which Darwinism has to deal with in other departments of the organic world.

UTILITARIANISM IN NATURE.

We have only taken up such difficulties as Mr. Wallace urges with the most confidence; if we could deal successfully with these, the others must fall. We will not follow him into the region of abstract notions and the moral sentiments. In his work on Natural Selection, Mr. Wallace is an intense utilitarian as long as he deals with the organic world below man; but, as soon as he reaches man, utilitarianism loses its completeness of virtue. We are as much a utilitarian in the one case as in the other, believing that man's brain, abstractions, and sentiments came to him by a natural course of evolution, and can be scientifically accounted for with as few difficulties as the evolution of organic forms.

CONTRADICTORY.

Making an exception in man's case to the operation of natural selection appears to be an after-thought of Mr. Wallace. The last chapter of his book, that on "The Limits of Natural Selection as Applied to Man," bears the spirit of a different psychological product from that which precedes it (excepting the last paragraph) on "The Action of Natural Selection on Man." We will give but one illustration: "Natural selection could only have endowed savage man with a brain a little superior to that of an ape, whereas he actually possesses one very little inferior to that of a philosopher."

In the previous chapter he argues that, at a certain stage of intelligence, selection would leave the body and act solely on the mind, brain, and cranium, making them what we find them in savages. "His brain alone would have increased in size and complexity, and his cranium have undergone corresponding changes of form, while the whole structure of the lower animals was being changed. This will enable us to understand how the fossil crania of Denise and Engis agree so closely with existing forms, although they undoubtedly existed in company with mam-

malia now extinct." Here is recognized the long time required for the natural evolution of the human brain, and on this fact he bases an argument for man's existence in the earlier tertiaries.

CONCLUDING REMARKS.

This examination of Mr. Wallace's peculiar views had to be brief and general, necessarily dispensing with the multiplication of details and reference to authorities. The aim has necessarily been to suggest rather than to prove or disprove. We remind the reader that we have discussed the subject on the assumption that the Darwinian hypothesis is adequate, or very nearly adequate, to account for the evolution of all physical forms. This, we believe, has been until quite recently, if not still, Mr. Wallace's view: it may be true, but the present writer does not arrogate to himself the claim of sufficient knowledge of the subject so to affirm. Natural selection has its difficulties. No one, perhaps, states most of these with more force than Mr. Darwin himself. Mr. St. George Mivart has recently made good use of these difficulties, while at the same time acknowledging a good deal of truth and potency in the hypothesis. Of similar character are the labors of Mr. Joseph John Murphy, who recognizes the general adequacy of natural selection, but thinks it fails to account for the rise of intelligence. Mr. Wallace does not hesitate to attack the most formidable objections on the lower planes of the subject: it is when man is concerned that he changes his tactics.*

We may present the following as probably not far from the truth. Lamark did not labor in vain. His hypothesis of *progression*, or the evolution of the higher from the lower forms, has, as Lyell admits, a truth in it, which will stand. Geoffrey Saint Hilaire did not labor in vain. His advocacy of the natural relationship of organic forms to each other, in opposition to

* In a later production than any in his volume on Natural Selection, his review of Murphy's Habit and Intelligence, Mr. Wallace appears to refer the rise of specific forms in general to a power which science has usually ignored. With reference to the agency which may come in "when required to direct the forces of matter to special ends," he recognizes "the theory that there are various grades of conscious and personal intelligences at work in nature, guiding the forces of matter and mind for their purposes as man guides them for his."

the notion of design fitting structures for an end, was no doubt attended with good results in the direction of taking the philosophy of organic phenomena out of the region of myth, and placing it on the solid basis of science. We need not say that Darwin and Wallace have not labored in vain. The doctrine of the struggle for existence, and the survival of the fittest, adds so much to what was previously known on the subject of the origin of specific forms that it appears to constitute a monopoly of such knowledge. It has inaugurated a new era in natural history. As with all movements in a new direction, the advocates of natural selection may sometimes have made more of it than the case will allow. Still, the difficulties have to be acknowledged; and perhaps some thinking naturalist will one day tell us of some other law which will clear up those difficulties, — a principle which will appear to be as simple and palpable as that of natural selection, when pointed out to us, but which till then we could not see. But, if such a principle ever come to view, we are very confident it will be a natural, and not a supernatural one. This much we have a right to affirm on the warrant of deduction. With the conscious individual intelligence, or intelligences, of Wallace, the unconscious and formative intelligence of Murphy, the intelligent will of Owen, the something like intelligence of Mivart, the present writer is not favorably impressed. They appear to be the vestiges of denser mists which obscured the morning. When we appeal to the supernatural or anthropomorphous to clear up a mystery in nature, we virtually confess to inevitable obscurity, however much we persuade ourselves that we thus clear it up. The method is subjective and suspicious. People who are ignorant of anatomy and paleontology do not find a big tooth or bone but they refer it to some giant man-like being; so, when some of our philosophers meet with a phenomenon in nature which they cannot explain, they refer it to some giant form of intelligence.

We may remind the reader, in conclusion, that evolution and natural selection are not synonymous terms. The latter might be disproved and evolution still be true, — the evolution of new species from allied species previously existing, the evolution of higher from lower mind. Evolution is generic, natural selection specific. Evolution was known and advocated by the greatest

geniuses before the discovery of the law of natural selection by Wallace and Darwin. This discovery was received with a hearty welcome because it helped to show more definitely and satisfactorily how evolution may take place. And whatever has been, or may be done to show the inadequacy of natural selection to account for all the phenomena of changes in the organic world, it will nevertheless remain a great truth applicable to, and illustrative in, other fields of thought as well as in that of natural history. With one exception, it will remain the most suggestive, the farthest-reaching philosophical discovery of the age.

Since the foregoing was written the first volume of Darwin's "Descent of Man" (D. Appleton & Co., 549 and 451 Broadway, New York) has been received. Part I., embracing more than half of the volume, relates to the evolution of man from some lower form, and we have read it with an intense interest. We might use it with advantage to the preceding article, but the reading of Darwin's chapters has not made us wish to unsay anything; and, as the article is already long enough, we let it stand precisely as it is.

This new work of Darwin's does not discuss the antiquity of man. The author takes that for granted, referring in his introduction to the works of Lyell, Lubbock, and others.

Part II. of the work is devoted to the discussion of Sexual Selection and its application to man.

J. Stahl Patterson.