

THE DESCENT OF MAN.*

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The Descent of Man, and Selection in Relation to Sex. By Charles Darwin,
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"The main conclusion arrived at in this work, and now held by many naturalists who are well competent to form a sound judgment, is that man is descended from some less highly-organized form; . . . the grounds of facts upon which this conclusion rests will never be shaken; the close resemblance of the embryo of man to that, for instance, of a dog—the construction of his skull, limbs, and whole frame, on the same plan with that of other mammals—the occasional reappearance of various structures which man does not normally possess, but which are common to the quadrumana, and a crowd of analogous facts—all point in the plainest manner to the conclusion that man is the co-descendant with other mammals of a common progenitor."

"Judging from the habits of savages and of the greater number of the quadrumana, primeval men, and even the ape-like progenitors of man, probably lived in society" (vol. i. p. 148). [According to most accounts, however, the anthropoid apes are *not* very social.] "There can be hardly a doubt that the inhabitants of these countries, which include nearly the whole civilized world, were once in a barbarous condition" (p. 176). "The highest form of religion, the grand idea of God hating sin and loving righteousness, was unknown during primeval times" (p. 175, p. 62). [And he further argues that all morality and conscience sprang by "natural selection from purely selfish sources" (p. 157).] "It would be impossible to fix upon the stage when ape would become man through a series of connecting forms, and it is a matter of very little importance" (p. 226). "The problem of the first advance of savages toward civilization is at present much too difficult to be solved" (p. 161).

"By considering all these things, we can partly recall in imagination the former condition of our early progenitors, and infer that man is descended from a hairy quadruped, furnished with a tail and pointed ears, probably arboreal in its habits, and an inhabitant of the Old World. This creature, if its whole structure had been examined by a naturalist, would have been classed among the quadrumana as surely as would the common and still more ancient progenitor of the Old and New World monkeys. The quadrumana, and all the higher mammals, are probably derived from an ancient marsupial animal, and this, through a long line of diversified forms, either from some reptile-like or some amphibian-like creature, and this again from some fish-like animal. In the dim obscurity of the past, we can see that the early progenitor of all the vertebrata must have been an aquatic animal provided with branchiæ, with the two sexes united in the same individual, and with the most important organs of the body (such as the brain and heart) imperfectly developed. This animal seems to have been more like the larvæ of our existing marine ascidians than any other known form."

We may here remark that the omission of Birds from this genealogical tree is less a defect than at first appears; for, although we are far from being willing to give up the old class of Aves and consider Birds as only outlying and rather aberrant members of the new combination Sauropsida (which includes turtles, lizards, alligators, pterodactyls, and ichthyosaurs), yet their whole organization brings them so near to the higher reptiles that it is easier to regard them as a divergent branch from the stem which afterward produced the mammalia, and at last man.

A careful study of the "Descent of Man" has added many to the general and special difficulties of natural selection which arose during the examination of the "Origin of Species;" but we have space for only a few cases. Our author gives no sufficient grounds for his belief that our "ape-like progenitor" possessed a caudal appendage. Man has a rudiment of a tail which in the embryo projects like that of a dog; but since it does not increase, the subsequent development of the legs throws it into obscurity, whence it but rarely emerges as a "small external rudiment of a tail" (i. p. 45). "No explanation has ever been given of the loss of the tail by certain apes and by man;" but the "great diversity in its length (consisting in some monkeys of five, and in others of twenty-five vertebæ) indicates that it is of not much importance to them, and, therefore, apt to become more or less rudimentary" (i. p. 144). But how, then, can we account for the great length of the tail in some Old World monkeys (with whom it is not prehensile as with the New World species), since we are further told (p. 145) that "modifications which are of no service to an organism cannot have been acquired through natural selection;" and again, if, "being of little importance, they are likely to become rudimentary," they become exceptions to the other general rule given in vol. ii., p. 370: "Modifications formerly of importance, but no longer of any special use, will be long inherited." Our author seems to base his conclusion that our ape-like progenitor possessed a tail, only upon its occasional reappearance as a rudiment ascribable to reversion; but surely a few more generations back can be no obstacle, since he thinks the human nose had its commencement in the Hoolock Gibbon (which is less man-like in other respects than the noseless gorilla and chimpanzee), while it is carried to a ridiculous extreme in the *semnopithecus nasica*, a yet lower monkey, which possesses a tail of considerable length.

These, and other cases which we must omit, are not given as in any way militating against the general hypothesis of Derivation, but only to show the inconsistencies into which we are led in the effort to account for

the origin of organisms by means of natural selection of "minute infinitesimal variations."

In the "Origin of Species" two pages were devoted to that kind of selection which is called "sexual;" but the conviction of the necessity of some auxiliary to natural selection, together with the accumulation of evidence of its importance, has led our author to devote the greater part of his last work to the elucidation of sexual selection, and to conclude that of all the causes which have led to the differences between the races of man, and, to a certain extent, between man and animals, it has been by far the most efficient. The terms "natural" and "sexual selection" are defective, as our author admits, since both are natural, as contrasted with artificial selection by man, but they are defined as follows:

"Natural selection depends on the success of both sexes, at all ages, in relation to the general conditions of life; sexual selection depends on the success of certain individuals of the same sex in relation to the propagation of the species" (ii. p. 380).

The latter is further defined:

"The sexual struggle is of two kinds: in the one, it is between the individuals of the same sex, generally the male sex, in order to drive away or kill their rivals, the females remaining passive; while in the other, the struggle is likewise between the individuals of the same sex, in order to excite or charm those of the opposite sex, generally the females, which no longer remain passive, but select the more agreeable partners" (ii. p. 280).

The result is summed up as follows (ii. p. 384):

"Courage, pugnacity, perseverance, strength, and size of body, weapons of all kinds, musical organs—both vocal and instrumental—bright colors, stripes and marks, and ornamental appendages, have all been indirectly gained by the one sex or the other through the influence of love and jealousy, through the appreciation of the beautiful in sound, color, or form, and through the exertion of a choice."

It would appear, then, that selection is through love or through war, but that in either case the successful competitor is the more likely to perpetuate whatever individual peculiarities he may possess as to strength, weapons, or ornament, and thus originate a new variety which, by wider and wider divergence, will, in course of time, be entitled to rank as a new species, and may finally differ generically as to family, ordinal, class, and branch characters from the parent stock. Supposing this to be true, Darwin is right in denying the existence of anything like species, genera, etc., excepting as more or less different varieties ("Origin of Species," 62, 155, 432, and 433); and this is totally incompatible with the view so forcibly stated by Agassiz: "Individuals alone have a *material* existence; species, genera, and all higher groups exist only as categories of thought in the supreme intelligence; but as such have as truly an independent existence, and are as unvarying as thought itself after it has been once expressed."

Let us glance, however, at some special difficulties of the theory of "selection in relation to sex." The male salmon fight with each other for the females, and the larger may naturally be supposed to have the advantage, yet the males are *smaller* than the females (vol. ii. p. 7), as is generally the case with fishes, and Darwin admits that this fact is surprising. In some cases, even, there is antagonism between natural and sexual selection; for instance, "stags are loaded with an additional weight of many pounds, and will be greatly retarded in their flight from wild beasts." . . . "Male birds have sometimes acquired ornamental plumes at the cost of retarded flight, and at the cost of some loss of power in their battles with rival males" (ii. p. 248); and although our author would account for these and other cases by assuming that these spreading antlers enabled the stags best provided with them to overcome their rivals, and that this was of more consequence than the ability to escape their pursuers, yet the admitted and inexplicable facts of caprice on the part of the females of many species (ii. p. 256), causing them to prefer some other than the conqueror, make the explanation less satisfactory. A still more difficult case is that of the "spike-horn bucks," which seem to be increasing in number among the Adirondacks. "The spike-horn is a more effective weapon than the antler in combat of all kinds, and far less likely to hinder escape from beasts of prey. Undoubtedly the first specimen was merely an accidental freak of nature. But his spike-horns gave him an advantage, and enabled him to propagate his peculiarity" (vol. ii. p. 245). Now, when the remote ancestors of these deer first began to acquire horns, it is more likely, upon any kind of hypothesis, that the horns were spiked or simple than branching. If they are more useful now, why were they not then? and how did antlers originate and become the rule? Again, if the other kind of sexual selection be appealed to, we must assume that the females had an inherent admiration for antlers, and



selected such individuals as had them. But aside from the general difficulty of accounting by natural selection for any such latent preference, why is it not equally operative at the present day? In fact, our author acknowledges the difficulty in these cases, and we recommend a careful study of the explanation given for the long and backward-curving horns of the oryx leucoryx (on page 241 of vol. ii.), as an instance of the unsatisfactory nature of all reasoning from natural selection when applied to particular cases. Everywhere some other condition is required, for which no sufficient cause is assigned.

Darwin not only ascribes to selection the power of producing men from monkeys, but also of originating all the many shades of difference as to color, length, and distribution of hairy covering, form of features, limbs, and skull, which distinguish the human races—differences which some regard as specific in their character. But he seems to make it harder than is necessary for us to agree with him, by holding that all these race distinctions have arisen since the birth of the first human beings, whereas more time would have been allowed by supposing that several "ape-like progenitors," in different parts of the world, produced as many races of men. We are led to say this because Mivart is inclined to doubt whether even the millions of years which geology allows would be sufficient for the production of the human races by the slow process of selection.

As to color, if we suppose black to have been gained by sexual selection (ii. 365), what was the original color? and if, "with the lowest savages, the people of each tribe admire their own characteristic qualities" (p. 367), how can we account for any divergence from the original color of the skin so as to form races? The same inconsistency between the above general law and the existing facts is found in respect to all the characters that distinguish the races of men, for since these race distinctions are confessedly of no value in respect to ordinary natural selection, we can only account for the preservation and perpetuation of differences in color, length of hair, etc., by assuming an inherent preference in the minds of the women for things which had not previously existed, and in direct contravention of the rule above given.

We will not discuss in detail the difficulties which Wallace has found in the way of the production of human beings through the unaided operation of selection, but refer the reader to his most instructive work.* Darwin alludes to these objections, and attempts to refute them, in which we do not think he is successful; on the contrary, we are more than ever inclined to believe that selection is insufficient not merely for man, but for all other organisms, and would call attention to the following remarkable admissions of our author:

"Variability is the necessary basis for the action of selection, and is wholly independent of it (ii. 381). With respect to the causes of variability, we are in all cases very ignorant (i. 107). The laws of inheritance determine the manner of transmission of sexual characters (ii. 381). These laws, from unknown causes, are very liable to change (i. 286). Stripes may be due to the action of some unknown cause (ii. 291). An unexpected residuum of change, perhaps a large one, must be left to the assumed uniform action of those unknown agencies which occasionally induce strongly marked and abrupt deviations of structure in our domestic productions (i. 148, and i. 240). In the greater number of cases, we can only say that the cause of each slight variation and of each monstrosity lies much more in the nature or constitution of the organism than in the nature of the surrounding conditions, though new and changed conditions certainly play an important part in exciting organic changes of all kinds" (ii. 371).

Here is almost all that is required by Mivart, and is, as was said by him of admissions in the later edition of the "Origin of Species," "nearly tantamount to a change of front in the face of the enemy;" and as most of these admissions occur in connection with the attempt to apply the doctrine of selection to a single species, and that the highest, it may be said, without intending a pun, that the theory is disproved by the "argumentum ad hominem." Surely, if Darwin is obliged to fall back upon unknown agencies, and upon such vague hypotheses as pangenesis, to furnish the means of originating species by natural selection, why should we not, like Mivart, ascribe to them the sole power of producing species, and restrict selection to the preservation of favorable individual variations within the species?

It is objected to the view of Mivart that it is merely giving a name to a hypothetical principle, and means no more than to say that "opium is narcotic because of its soporific quality." Why not? There are many things of which we merely know that they are such and such, and do so and so. The progress of science simply lessens their number, but can never do more than reduce them to one, the invisible First Cause. Hence,

* "Contributions to the Theory of Natural Selection."

if the origin of species requires the co-operation of any unknown law or force, as Darwin himself admits, there are reasons for supposing that some such unknown law is the principal cause, and that selection merely aids it. At any rate, it is no more inconceivable that, by the operation of such unknown laws, a fox should produce a dog, or an ape a man, than that, from equally unknown causes, a human being should give birth to a hideous monster; and the brains figured by Vogt in his "Microcephaly," of idiots who were unquestionably human beings, were simply as much smaller than those of their parents as the first man's brain may have exceeded in size those of his "ape-like progenitors."

KING AND HAGUE'S MINING INDUSTRY.*

THE book before us is the third in number (though the first issued) of five volumes, describing the "Systematic" and "Descriptive Geology," "Mining Industry," "Zoölogy and Palæontology," and "Botany" of the country adjacent to the 40th parallel of latitude, between the eastern boundary of California and the eastern base of the Rocky Mountains. The geological and topographical survey of which this report is the first-fruit was authorized by Congress, and, although placed under the direction of the engineer department of the U. S. army, the execution of the work was confided to a civilian, assisted by civilians. The volume now issued, which is devoted to the mining industry, is a large quarto of 624 pages, printed in large and clear type, on heavy, slightly tinted paper, and followed by a good though not wholly satisfactory index. It contains thirty-seven plates, illustrating the mining and metallurgical processes and vein-phenomena of Nevada and Colorado, and is accompanied by a folio atlas of fourteen maps, depicting, on a large scale, and correlating the underground works and geological structure of the various parts of the Comstock lode, and the geology of the Toyabe mountains and of the White Pine district.

The ten chapters composing the volume are separately written by Clarence King, geologist in charge, and the members of his corps, J. D. Hague, S. F. Emmons, and Arnold Hague. In the chapter on the Comstock lode, Mr. King gives, first, a description of the geology of the Washoe district, with a careful and valuable study of the lithology, and then proceeds to an elaborate analysis of the structural and mineralogical characteristics and the vein-phenomena of the famous vein which in one decade has contributed over \$100,000,000 of bullion. In the next two chapters, Mr. Hague treats of the mines on the Comstock lode from the standpoint of a mining engineer. In a style of description which is remarkable for its clearness and conciseness, as well as for its adaptation to the comprehension of the general reader, the methods and difficulties of mining in Washoe, and the machinery and metallurgical processes used, are explained and illustrated by engravings. Mr. Hague furnishes information of the first importance to all interested in mining, in a series of well-discussed, analytical, statistical tables, showing in minute detail the experience of these mines in regard to production, cost, and profit. As for the future prospects of the Comstock lode, we gather from Mr. Hague that, to say the least, they are not brilliant. The great wedge-mass lying above the line of intersection of the two walls of the vein has been quite thoroughly explored, except in a few points where it extends below the workings, and even there its limit may be foretold from the convergence of its sides. All the economically important features of the lode appear to be intimately dependent upon the exceptional conditions existing in this portion of the vein—conditions which, in their turn, appear to have been rendered possible only by comparative proximity to the surface. That part of the vein which lies below the wedge has not thus far given promise; it is shrouded in the uncertainty that envelops an entirely unexplored deposit. But although the great wedge-mass has yielded up the greater part of the rich, concentrated bodies of ore, Mr. Hague holds out hopes of a continued product from the poorer portions of the same part of the vein:

"Whatever good or ill fortune may attend the explorations of the lode in depth, there is still much hope for a long-continued bullion production and remunerative mining industry in the existence of large bodies of ore near the surface, that, until now, have remained undeveloped by reason of their low value, being too poor to pay for mining and milling, at prices hitherto existing, but offering a margin of profit under conditions that seem possible for the future."

These conditions are in part already promised in the decrease of the cost of labor and materials by the construction of railroads.

* "United States Geological Exploration of the Fortieth Parallel. Clarence King, Geologist in Charge. Vol. III. Mining Industry, by James D. Hague. With Geological Contributions by Clarence King."

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"The sexual struggle is of two kinds; in the one, it is between the individuals of the same sex, generally the male sex, in order to drive away or kill their rivals, the females remaining passive; while in the other, the struggle is likewise between the individuals of the same sex, in order to excite or charm those of the opposite sex, generally the females, who no longer remain passive, but select the more agreeable partners" (p. 280).

The result is summed up as follows (p. 284):

"Courage, pugnacity, perseverance, strength, and size of body, weapons of all kinds, mental organs—both vocal and instrumental—bright colors, stripes and marks, and ornamental appendages, have all been indirectly gained by the one sex or the other through the influence of love and jealousy, through the appreciation of the beautiful in sound, color, or form, and through the exertion of a choice."

It would appear, then, that selection is through love or through war, but that in either case the successful competitor is the more likely to perpetuate whatever individual peculiarities he may possess as to strength, weapons, or ornament, and thus originate a new variety which, by wider and wider divergence, will, in course of time, be entitled to rank as a new species, and may finally differ generally as to family, ordinal, class, and branch characters from the parent stock. Supposing this to be true, Darwin is right in denying the existence of anything like species, genera, etc., excepting as more or less different varieties ("Origin of Species," §§ 155, 432, and 483); and this is totally incompatible with the view so forcibly stated by Agassiz: "Individuals alone have a material existence; species, genera, and all higher groups exist only as categories of thought in the supreme intelligence; but as such have as truly an independent existence, and are as unvarying as thought itself after it has been once expressed."

Let us glance, however, at some special difficulties of the theory of "selection in relation to sex." The male salmon fight with each other for the females, and the larger may naturally be supposed to have the advantage, yet the males are smaller than the females (vol. ii. p. 7), as is generally the case with fawns, and Darwin admits that this fact is surprising. In some cases, even, there is antagonism between natural and sexual selection; for instance, "stags are loaded with an additional weight of many pounds, and will be greatly retarded in their flight from wild beasts."

"Male birds have sometimes acquired ornamental plumage at the cost of retarded flight, and at the cost of some loss of power in their battles with rival males" (p. 248); and although our author would account for these and other cases by assuming that these spreading antlers enabled the stags best provided with them to overcome their rivals, and that this was of more consequence than the ability to escape their pursuers, yet he admitted and inexplicable facts of capture on the part of the females of many species (p. 256), causing them to prefer some other than the conqueror, make the explanation less satisfactory. A still more difficult case is that of the "spike-horn bucks" which seem to be increasing in number among the *Adiashockas*. "The spike-horn is a more effective weapon than the antler in combat of all kinds, and far less likely to hinder escape from beasts of prey. Undoubtedly the first specimen was merely an accidental freak of nature." But his spike-horns gave him an advantage, and enabled him to propagate his peculiarity" (vol. ii. p. 245). Now, when the remote ancestors of these deer first began to acquire horns, it is more likely, upon any kind of hypothesis, that the horns were spiked or simple than branching. If they are more useful now, why were they not then? and how did antlers originate and become the rule? Again, if the other kind of sexual selection be applied to, we must assume that the females had an inherent admiration for antlers, and

selected such individuals as had them. But aside from the difficulty of accounting by natural selection for any such limited why is it not equally operative at the present day? In fact acknowledge the difficulty in these cases, and we resume study of the explanation given for the long and back-winded of the crya leucocrya (on page 141 of vol. II), as an instance of factory nature of all reasoning from natural selection when particular cases. Everywhere some other condition is required as sufficient cause is assigned.

Darwin not only ascribed to selection the power of producing from monkeys, but also of originating all the many shades of color, length, and distribution of hairy covering, form of head and skull, which distinguish the human races—differences regarded as specific in their character. But he seems to me that is necessary for us to agree with him, by holding that all distinctions have arisen since the birth of the first human being, more time would have been allowed by supposing that several "progenitors," in different parts of the world, produced as many races. We are led to say this because Mivart is inclined to devote even the millions of years which geology allows would be in the production of the human race by the slow process of selection.

As to color, if we suppose black to have been gained by selection (p. 333), what was the original color? and if, "with a savage, the people of each tribe select their own characteristic" (p. 337), how can we account for any divergence from the color of the skin as we to form races? The same inconsistency in the above general law and the existing facts is found in respect to characters that distinguish the races of man, for since these characters are confessedly of no value in respect to ordinary selection, we can only account for the preservation and perpetuation of color, length of hair, etc., by assuming an inherent purpose outside of the women for things which had not previously acted direct contravention of the rule above given.

We will not discuss in detail the difficulties which Wallace, in the way of the production of human beings through the action of selection, but refer the reader to his most instructive and wise allusion to these objections, and attempts to refute them, in do not think he is successful; on the contrary, we are more inclined to believe that selection is insufficient yet surely for all other agencies, and would not diminish the following conclusions of our author:

"Variability is the necessary basis for the action of selection, wholly independent of it (p. 333). With respect to the variability, we are in all cases very ignorant (p. 337). The laws that determine the manner of transmission of several characters (p. 338), laws, from unknown causes, are very liable to change (p. 340). As to the action of some unknown cause (p. 341), as a resistance of change, perhaps a large one, must be left to the uniform action of these unknown agencies which constitute strongly marked and abrupt deviations of structure in our domestications (p. 343, and p. 345). In the greater number of cases, we may say that the cause of such slight variation and of such more marked more in the nature or constitution of the organism, the nature of the surrounding conditions, through new and changed conditions play an important part in making organic changes of it (p. 371).

Here is almost all that is required by Mivart, and it is, in our view, him of adaptations in the later edition of the "Origin of Species," tantamount to a change of front in the face of the enemy," and as these adaptations occur in connection with the attempt to apply trials of selection to a single species, and that the highest, it may without intending a pun, that the theory is disproved by the "a case of loneliness." Surely, if Darwin is obliged to fall back on known agencies, and upon such vague hypotheses as propounded with the means of originating species by natural selection, why do not, like Mivart, ascribe to them the sole power of producing species? selection to the preservation of favorable individual within the species?

It is objected to the view of Mivart that it is merely giving us a hypothetical principle, and means no more than to say that "a particular because of its specific quality." Why not? There are things of which we merely know that they are such and such, and as! as. The progress of science simply increases their number, it never do more than reduce them to one, the inevitable First Cause.

* "Contributions to the Theory of Natural Selection."

Alfred R. C. (p. 300 at Lake Arrow - 1st ed.)