

## **A problem in human evolution.**

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## A PROBLEM IN HUMAN EVOLUTION.

"HARDLY any view advanced in this work," says the illustrious author of the *Descent of Man*, "has met with so much disfavour as the explanation of the loss of hair in mankind through sexual selection." Indeed the friends and foes of Mr. Darwin's great theories have been equally ready, the one party to disclaim and the other party to ridicule the account which the founder of modern philosophic biology has given of the process whereby man, as he supposes, gradually lost the common hairy covering of other mammalia. Mr. Wallace, with all his ability and ingenuity, finds it necessary to call in the aid of a *deus ex machina* to explain the absence of so useful and desirable an adjunct; for he believes that natural selection could never have produced this result, and he therefore feels compelled to put it off upon "some intelligent power," since he denies altogether the existence of sexual selection as a *vera causa*. Mr. J. J. Murphy in his recently published revision of *Habit and Intelligence* has taken up the same ground with a more directly hostile intent; and Spengel has also forcibly given expression to his dissent on the plea of inadequate evidence for the supposed preference. It seems highly desirable, therefore, to prop up Mr. Darwin's theory by any external supports which observation or analogy may suggest, and if possible to show some original groundwork in the shape of a natural tendency to hairlessness, upon which sexual selection might afterwards exert itself so as to increase and accelerate the depilatory process when once set up.

The curious facts for which we have to account are something more than the mere general hairlessness of the human species. In man alone, as Mr. Wallace clearly puts the case, "the hairy covering of the body has almost totally disappeared; and, what is very remarkable, it has disappeared more completely from the back than from any other part of the body. Bearded and beardless races alike have the back smooth, and even when a considerable quantity of hair appears on the limbs and breast, the back, and especially the spinal region, is absolutely free, thus completely reversing the characteristics of all other mammalia." When we consider the comparatively helpless condition to which man has been thus reduced, as well as the almost universal human practice of substituting artificial clothing, derived from the skins or wool of other animals, for the natural apparel which the species has so unaccountably lost, it does not seem surprising that even Mr. Wallace should be staggered by the difficulty, and should fall back upon an essentially supernatural explanation.

of legal Right and legal Duty. They considered the parties as bound together by a *vinculum juris*, a bond or chain of law, and "Obligation," which is the name for this chain, signified rights as well as duties; the right, for example, to have a debt paid as well as the duty of paying it. As I have said elsewhere, "the Romans kept, in fact, the entire picture of the 'legal chain' before their eyes, and regarded one end of it no more and no less than the other." But it was the Court of Justice which had welded this chain, and the explanation of this and other blended ideas which we can detect in Roman legal phraseology is, I presume, that the dominancy of the Court of Justice over all legal notions still continued to influence the Roman view of law. Although, however, the authors of the Roman Institutional manuals did not invent, and could not have invented, arrangements of law based on classifications of Rights, they did, as we have seen, attain to the conception of law as something distinct from Procedure, and they did conceive it as distributable into the Law of Persons and the Law of Things. The exact relation of these two departments to one another has been keenly disputed by modern writers, and it cannot be conveniently considered here; but anybody who can bring home to himself the ancient ideas of law on which I have sought to throw light may, perhaps, convince himself that the conception of a Law of Things, at all events, was a great achievement in mental abstraction; and that it must have been a man of legal genius who first discerned that Law might be thought of and set forth apart from the Courts of Justice which administered it on the one hand, and apart from the classes of persons to whom they administered it on the other.

H. S. MAINE.

The great key to the whole problem lies, it would seem, in the fact thus forced upon our attention, that the back of man forms the specially hairless region of his body. Hence we must conclude that it is in all probability the first part which became entirely denuded of hair. Is there any analogy elsewhere which will enable us to explain the original loss of covering in this the normally hairiest portion of the typical mammalian body? The erect position of man appears immediately to suggest the required analogy in the most hairless region of other mammals.

Almost all animals except man habitually lie upon the under surface of the body. Hence arises a conspicuous difference between the back and the lower side. This difference is seen even in lizards, crocodiles, and other reptiles, amongst which, as a rule, the tegumentary modifications of the under surface are much less extended and less highly differentiated than those of the upper. It is seen amongst birds, which usually have the plumage far less copious on the breast than on the back. But it is most especially noticeable in mammals, which have frequently the under side almost entirely bare of hair, while the back is covered with a copious crop. Now, it would seem as though this scantiness of natural clothing on the under side were due to long-continued pressure against the ground, causing the hair to be worn away, and being hereditarily transmitted in its effects to descendants. We are, therefore, led to inquire whether all parts of the mammalian body which come into frequent contact with other objects are specially liable to lose their hair.

The answer seems to be an easy one. The soles of the feet in all mammals are quite hairless where they touch the ground. The palms of the hands in the quadrumana present the same phenomenon. The knees of those species which frequently kneel, such as camels and other ruminants, are apt to become bare and hard-skinned. The callosities of the old-world monkeys, which sit upon their haunches, are other cases in point; but they do not occur among the more strictly arboreal quadrumana of the American continent, nor among the lemurs, for the habits of these two classes in this respect are more similar to those of ordinary mammals. On the other hand, the new-world monkeys possess a prehensile tail, with which they frequently swing from bough to bough or lower themselves to the ground, and in these creatures, says Cuvier, "la partie prenante de la queue est nue en dessous." Wherever we find a similar organ, no matter how widely different may be the structure and genealogy of the animals which possess it, we always find the prehensile portion free from hair. This is the case with the marsupial *tarsipes*, with many rodents, and above all with the opossum, which uses its tail quite as much as any monkey uses its hands. Accordingly its surface is quite bare from end to end, and in some

species scaly—a fact which is rendered more comprehensible when we remember that the young opossums are carried on their mother's back, and hold themselves in that position by curling their tails around hers.

A few more special facts help to bear out the same generalisation. In the gorilla, according to Du Chaillu, "the skin on the back of the fingers, near the middle phalanx, is callous and very thick, which shows that the most usual mode of progression of the animal is on all fours and resting on the knuckles." The ornithorhynchus has a flat tail, on which it leans for support, and this, says Mr. Waterhouse, "is short, depressed, and very broad, and covered with coarse hairs; these, however, are generally worn off on the under side of the tail in adult or aged individuals, probably by the friction of the ground." The toes of the very large forefeet, used in burrowing, are also naked, as are the similar organs in the mole and many other creatures of like habit. The beaver likewise uses his tail as a support, flaps it much in the water, and is said, perhaps not quite erroneously, to employ it as a trowel in constructing his dams; and this tail is entirely devoid of hair, being covered instead with a coat of scales. We can hardly avoid being struck in this instance, as in that of some seals' and sea-lions' flappers, with the analogy of the penguin's wings, which are employed like fins in diving, and have undergone a similar transformation of their feathers into a scale-like form. In the ground-kangaroos, which use the tail as a support trailing behind them on the ground, that organ is again only slightly covered with coarse hairs, almost entirely wanting on the extremity of the under surface; but in the tree-kangaroos, which carry the tail partly erect, it assumes a bushy and ornamental appearance. Like differences occur between the rats and mice on the one hand and the squirrels on the other. In those monkeys which, like *Macacus brunneus*, sit upon their tails, that organ is also bare. To multiply further instances would only prove tedious.

Again, when we look at the only mammals besides man which have denuded themselves of their hairy covering, we find that a great majority of them are water-frequenters. The most completely aquatic mammals, like the whales, porpoises, dugongs, and manatees, though differing widely in structure, are alike in the almost total absence of hair, while the hippopotamus is likewise a smooth-skinned animal. Now, the friction of water is of course far stronger than that of air, and it would seem to have resulted in the total depilation of these very aquatic species. Other less confirmed water-haunters, such as seals and otters, have very close fur, which scarcely at all retards them in their movements when swimming. The elephant and rhinoceros are, indeed, difficult cases to explain; but of course it is not necessary to suppose that no other cause save

that which we are considering can ever produce hairlessness. It will be enough if we can show that the cause actually under examination does with reasonable certainty bring about such an effect.

If, then, the portion of animals which generally comes in contact with the ground or other external bodies acquires in this manner a hairless condition—shown alike in hands, feet, tail, and belly—what will be the result upon animals which are gradually acquiring the erect position? Of this we can obtain an almost complete series by looking first at the beaver, which rests upon its scaly tail alone; then at the baboons, which rest upon the naked callosities on their haunches; thirdly, at the gorilla; and, last of all, at mankind.

The gorilla, according to Professor Gervais, is the only mammal which agrees with man in having the hair thinner on the back, where it is partly rubbed off, than on the lower surface. This is a most important approach to a marked human peculiarity, and is well worthy of investigation. "I have myself come upon fresh traces of a gorilla's bed on several occasions," says Du Chaillu, "and could see that the male had seated himself with his back against a tree-trunk. In fact, on the back of the male gorilla there is generally a patch on which the hair is worn thin from this position, while the nest-building *Troglodytes calvus*, or bald-headed *nshiego*, which constantly sleeps under its leafy shelter on a tree-branch, has this bare place on its side, and in quite a different way." "When I surprised a pair of gorillas," he observes elsewhere, "the male was generally sitting down on a rock or against a tree." Once more, in a third passage he writes, "In both male and female the hair is found worn off the back; but this is only found in very old females. This is occasioned, I suppose, by their resting at night against trees, at whose base they sleep." And when we inquire into the difference between the sexes thus disclosed, we learn that the female and young generally sleep in trees, while the male places himself in the position above described against the trunk.

The gorilla has only very partially acquired the erect position, and probably sits but little in the attitudes common to man. But if a developing anthropoid ape were to grow more and more upright in his carriage, and to lie more and more upon his back and sides, we might naturally expect that the hair upon those portions of his body would grow thinner and thinner, and that the usual characteristics of the mammalia as to dorsal and sternal pilosity would be completely reversed. This is just what has probably happened in the case of man. In proportion as he grew more erect, he must have lain less and less upon his stomach, and more and more upon his back or sides. For fully developed man, with the peculiar set of his neck, face, and limbs, it is almost impossible to rest upon his stomach. On the other hand, all savage races lie far more upon their backs

than even Europeans with their sofas, couches, and easy-chairs; for the natural position of savage man during his lazy hours is to stretch himself on the ground in the sun, with his eyes closed, and with his back propped, where possible, by a slight mound or the wall of his hut. Any person who has lived much amongst negroes or South Sea Islanders must have noticed how constant is this attitude with men, women, and children, at every stray idle moment.

Nor must we forget the peculiar manner in which human mothers must necessarily have carried their infants from a very early period in the development of our race. During the first eighteen months of life the human infant must always be held, or laid, more or less upon its back; and this position will probably tend to check the development of hair upon the dorsal and lateral regions.

Next, let us ask what is the actual distribution of hair upon the body of man. Omitting those portions where the ornamental use of hair has specially preserved it, the most hairy region is generally, so far as my observations go, the fore part of the leg or shin. Obviously this is a region very little likely to come in contact with external objects. On the other hand, the most absolutely hairless places are the palms of the hands and the soles of the feet, afterwards the elbows, and at a long interval the knees and knuckles. The back is very hairless, and so are the haunches. But the legs are more hairy than the body, both in front and behind, though less hairy on the calf than on the shin. Now it will be obvious that both by day and night we rest more upon our backs and haunches than upon our legs, the latter being free when we sit down on a chair or bench, doubled in front of us when we squat on the ground (the normal position of savages), and thrown about loosely when we lie down. Especially might we conclude that this would be the case with early races, unembarrassed by the weight of bed-clothes. As for the arms, it is noticeable that they still retain the ordinary mammalian habit in being hairier on the back than on the front; and this also is quite in accordance with our present suggestion, because the same differentiating causes have not worked upon the arm as they work upon the back and legs. The peculiar position of the anterior extremities in man, together with the erect posture, makes the arms come much more frequently into frictional contact with the body or clothing on their inner than on their outer surface. Hair grows most abundantly where there is normally least friction, and *vice versa*. As for the hair which frequently appears upon the chest of robust Europeans and others, I shall return to that point at a later stage. It may be noted, however, that while the first joint of the fingers is hairy, the second joint, answering to the callosity of the gorilla, is generally bare.

As man, then, gradually assumed the erect attitude and the re-

versed habits of sitting and lying down which it necessarily involves, seems to me that he must have begun to lose the hair upon his back. But such a partial loss will not fully account for his present very hairless condition over the whole body (with trifling exceptions) on the average of all sexes, races, and ages. For this further and complete denudation I think we must agree with Mr. Darwin in invoking the aid of sexual selection, especially when we take into consideration the ornamental and regular character of the hairy adjuncts which man still retains.

In the first place, we have external reasons for believing that sexual selection has produced similar results elsewhere, acting upon a like basis of natural denudation. For among the mandrills and some other monkeys the naked callosities, originally produced, as is here suggested, by physical friction, have been utilised for the display of beautiful pigments; and Mr. Bartlett informed Mr. Darwin that as the animals reach maturity the naked surfaces grow larger in comparison with the size of the body. When we look at the great definiteness and strange colouring of these bare patches we can hardly doubt that they have been subjected to some such selective process.

But if man once began to lose the hair over the whole of his back, shoulders, and haunches, as well as more partially upon his sides, legs, and arms, he would soon present an intermediate half-hairy appearance which is certainly very ludicrous and shabby-looking. Why this middle stage should displease us, it might be rash to guess; yet one may remember that as a rule throughout the mammalia a partially hairless body would be associated with manginess, disease, and deformity. At any rate, it seems to be the fact that when animals once begin losing their hair, they go on to lose it altogether. One may well believe that among our evolving semi-human ancestors those individuals which had most completely divested themselves of hair, would be the most attractive to their mates; and these would also on the average be those which had most fully adopted the erect attitude with its accompanying alterations of habit. Thus natural selection would go hand in hand with sexual selection (as I believe it always does), those anthropoids which most nearly approached the yet unrealised standard of humanity being most likely to select one another as mates, and their offspring being most likely to survive in the struggle for life with their less anthropoid competitors.<sup>1</sup> It does not seem probable, to me at least, that a naturally hairy species would entirely divest itself of its hair through sexual selection, especially as the first steps of such a process could hardly fail to render it a mongrel-looking and miserable

(1) On the advantages which man or his half-developed ancestor derived from the erect or semi-erect position, see Darwin, *Descent of Man*, p. 53.



creature; but it seems natural enough that if the original impulse was given by a physical denudation, the influence of sexual selection would rapidly strengthen and complete the process. Indeed, if a hairy animal once began losing its hair, the only beauty which it could aim at would be that of a smooth and shiny naked black skin.

Woman is the sex most affected in mankind by sexual selection as has been often abundantly shown. Hence we should naturally expect the denudation to proceed further in her case than in that of man. Especially among savage and naked races we should conclude that hairlessness on the body would be esteemed a beauty; and we find as a matter of fact that most such races have absolutely smooth and glistening skins. But in Europe, men often develop hair about the chest and legs, though not upon the back and shoulders, while women seldom or never do so. Here we see that the hair reappears in the less differentiated male sex rather than in the more differentiated females, with whom sexual selection has produced greater effects; while it also reappears only on those parts where the original denudating causes do not exert any influence. Similarly, the smooth-bodied negroes, transported to America, and subjected at once to a change of conditions and to circumstances which would render sexual selection impossible as regards the hairlessness of the body, rapidly re-develop hair upon the chest. For we must remember that sexual selection can only act in this direction while a race remains wholly or mainly naked. Clothing, by concealing the greater part of the skin, necessarily confines the selective process to features, complexion, and figure.

As to the poll, beard, whiskers of certain races, we must believe that they are the result of selective preferences acting upon general tendencies derived from earlier ancestors, and, perhaps, aided in the first-mentioned instance by natural selection. The comparative definiteness of these hairy patches, as of the callosities in the monkeys, stamps them at once as of sexual origin. The poll is probably derived by us from some of our anthropoid ancestors, as crests of hair frequently appear upon the heads of the quadrumana. But as man gradually became more erect and less forestine, as he took to haunting open plains and living more in the sunlight, the existence of such a natural covering, as a protection from excessive heat and light upon the head, would doubtless prove of advantage to him; and it might, therefore, very possibly be preserved by natural selection. Certainly it is noticeable that this thick mat of hair occurs in the part of his body which the erect position most exposes to the sunlight, and is thus adaptively analogous to the ridge of hair which runs along the spine or top of the back in many quadrupeds, and which is not visible in any quadrumanous animal that I have examined. The beard also bears marks of

quadrumanous origin, as Mr. Darwin has shown; but its varying presence or absence in certain races affords us a good clue to the general course of evolution in this particular. For amongst the bearded races a fine and flowing beard is universally admired; while amongst the beardless races stray hairs are carefully eradicated, thus displaying the same aversion to the intermediate or half-hairy state, which, as I suppose, has been mainly instrumental in completely denuding the body of man. Certainly it is a fact that while we can admire a European with a full and handsome development of hair upon the chin and lip, and while we can admire an African or a North American Indian with a smooth and glossy cheek, we turn with dislike from thin and scanty hair either in a European, a negro, or an Asiatic. It seems to me that in every case the general æsthetic feeling of the whole human race is the same; but that in one tribe circumstances have made it easier to produce one type of beauty, while in another tribe other conditions have determined the production of another type. Thus, in a negro, a very black and lustrous skin, clear bright eyes, white teeth, and a general conformity to the normal or average negro features are decidedly pleasant even to Europeans when once the ordinary standard has become familiar;<sup>1</sup> while in a European the same eyes and teeth are admired, but a white skin, a rosy complexion, and a moderate conformity to the ideal Aryan type are demanded. Each is alike pretty after its own kind, though naturally the race to which we each ourselves belong, possesses in most cases the greatest attractiveness to each of us individually.

Of course, both in the beard of man, and in the general hairiness of his body, as compared with woman, allowance must be made for that universal tendency of the male to produce extended tegumentary modifications, which, as Mr. Wallace has abundantly shown, depends upon the superior vigour of that sex. Yet the period when the beard first shows itself, and the loss of colour in the hair of both sexes after the reproductive period is past, clearly stamp these modifications as sexual in origin.

It must be remembered also, in accounting for the general loss of hair on both back and front of the body, that the older ancestral heredity would tend to make the chest bare, and the newer acquired habits would tend to produce like results upon the back. "In the adult male of the gorilla," says Du Chaillu, "the chest is bare. In the young males which I kept in captivity it was thinly covered with hair. In the female the mammæ have but a slight development and the

(1) The mutilations of the face and other parts, which often make savages so ugly in our eyes, though not in their own, are due, as Mr. Herbert Spencer has shown, not to æsthetic intentions, but to originally subordinative practices, as marks of subjection to a conquering king or race.

breast is bare." All this helps us to see how the first steps in the sexually selective process might have taken place, and also why the trunk is on the whole more denuded than the legs. As for the exceptional fact that the arms are hairier on the back than in front besides the functional explanation already given, we must recollect that the anthropoid apes have long hair on the outer side of the arms which has probably left this slight memento of its former existence on the human subject. Eschricht has pointed out the curious fact that alike in man and the higher quadrumana this hair has a convergent direction towards the point of the elbow, both from above and from below.

Finally, it may be noted that the hairless condition of man, though apparently a disadvantage to him, has probably been indirectly instrumental in helping him to attain his present exalted position in the organic scale. For if, as is here suggested, it originally arose from the reactions of the erect attitude, it must have been associated from the first with the most humanlike amongst our ancestors. Again, if it was completed by sexual selection, it must also have been associated with the most æsthetic individuals among the evolving species. And if, as we have seen reason to believe, these two qualities would tend to accompany one another, then this slight relative disadvantage would be pretty constantly correlated with other and greater advantages, physical and intellectual, which enabled the young species to hold its own against other competing organisms. But, granting this, the disadvantage in question would naturally spur on the half-developed ancestors of man to seek such artificial aids in the way of clothing, shelter, and ornament, as would ultimately lead to many of our existing arts. We may class the hairlessness of man, therefore, with such other apparent disadvantages as the helpless infancy of his young, which, by necessitating greater care and affection, indirectly produces new faculties and stronger bonds of union, and ultimately brings about the existence of the family and the tribe or nation. And if we look back at the peculiarities which distinguish placental from im-placental mammals, the mammalia generally from birds, and birds from reptiles, we shall see that in every case exactly similar apparent disadvantages have been mainly instrumental in producing the higher faculties of each successive vertebrate development. Hence it would seem that the hairless condition of man, instead of requiring for its explanation a special intervention of some supernatural agent, is strictly in accordance with a universal principle, which has brought about all the best and highest features of the most advanced animal types through the unaided agency of natural selection.

GRANT ALLEN.