

The Evolution of Man

By PROF. WILLIAM BOLSCHE

Serial No. VI.

[In number IV. of this series, it was shown, by the evidence of the blood test, that the gibbon monkey, a member of the group of anthropoid apes, was the nearest in blood relationship to man, in that no ill-effects resulted from the inoculation of the gibbon with the blood of the former.

In No. V. last issue, other evidence was advanced to supplement the above appearance of close relationship between man and the apes, and more especially the gibbon. This animal has the common faculties with man of being able to sing the music of the scale, and, when on the ground of walking habitually upright on his two legs. In other respects, however, other members of the anthropoid apes bear a closer resemblance to man than the gibbon, so that it seems feasible to conclude that they are all, including man, closely related to the archetype for which we are looking, though none of them representing the thorough-bred type. The probability of this relationship is reduced to almost a certainty by a consideration of the biogenetic law. This law is, that young animals frequently resemble the ancestors of their whole race more nearly than the adult animals. A great number of higher animals assume again in the egg, or in the mother's womb, certain forms which we meet on a much lower and more ancient plane. Thus the arms of the gibbon are immensely long in the adult, but in its mother's womb they are of the same proportions as those of the young of the human being. This, if the law is correct, would show that the ancestors of the gibbon, millions of years ago, did not possess its present long spider-like arms. It was also pointed out that the child of the human, when in the first stages in the womb, is completely covered with thick woolly hair, much as the monkey tribe is today.

Professor Bolsche continues the discussion this issue on the archetype of the anthropoids and man, who must have had, at least, a very close resemblance to the Pithecanthropus or monkey-man of Trilil, in the structure of his skull and legs.]

Now we come to a new question. What is the ancestor of that archetype? In what other disguise can we trace him further back? In the system, the four anthropoid apes are followed by the rest of the monkeys. This class again consists of at least three great groups which differ from one another. Some of them are the long-tailed monkeys of Asia and Africa, such as *Macacus*, baboons, etc., which make up the majority of the popular monkeys in our zoological gardens. The second group lives exclusively in America, and the bright Capuchin monkey may be mentioned as a type. The third, also restricted to America, comprises a small number of little monkeys, having claws instead of nails on most of their fingers and toes and resembling much more a squirrel than a genuine monkey. The marmoset is one of them. These three groups can no more be used in the construction of a consecutive line of development than the four anthropoid apes. But a purely anatomical comparison leaves the impression that somewhere near them the next lower stage of man must be found.

Even the very first experts who described the gibbon noticed that this same gibbon, aside from his strong resemblance to the other anthropoid apes and to man himself, also had certain other resemblances very plainly developed, and these pointed towards the *Macacus*-like long-tailed monkeys. These characters could be inherited only from the archetype, and this type again could only have inherited them from some still older type, which had a general and much greater resemblance to the majority of the other monkeys. That there was once upon a time a certain ancestor who had an externally visible long tail is still evidenced by man himself. Not only is man in the tailed stage to this day, though the tail vertebrae are no longer externally visible, but these are certainly still better developed in man than in the anthropoid apes. Furthermore, the human embryo in the mother's womb once more reveals the persistency of that mysterious biogenetic law. It has a plainly, visible external tail. In exceptional cases this "embryo tail" is also preserved in adults, and in some cases we have those abnormal "tail men," whose existence has often been doubted, but who nevertheless exist. There is no reason why we should not assume that certain *Macacus*-like types, preceding the human type, carried a genuine tail for a con-

stant characteristic. So far as we can judge, from fossil remains of bones, genuine long-tailed monkeys, similar to those in present Asia, were already in existence in the middle of the Tertiary period, in which both man and anthropoid apes were found. One species, *Mesopithecus*, lived in great numbers in Greece, where many bones of them have been found. This Grecian monkey had a very long tail. At the same time the form of its nose and the position of its eyes gave it a greater resemblance to the human being than any of the present long-tailed monkeys have. On the other hand, the light-hearted crowd of long-tailed monkeys has developed many characteristics which tend toward a direction leading away from man. There are, so to say, one-sidedly bestialized forms, an extreme exaggeration of which is the baboon family, for instance, the grotesque mandril. The conclusion is inevitable that once again, at this point, a line of descent originally close to man has gradually deviated into a bypath and produced many varieties of monkeys now living in Asia and Africa. Therefore we should once more have to assume the existence of an archetype out of which developed, on the one hand, the original ancestor of man and of the anthropoid apes, and, on the other, that Grecian *Mesopithecus* and the many side lines of African and Asian long-tailed monkeys. Of course, this archetype would have to be still a great deal more ancient than the preceding one. It might have existed as early as the first third of the Tertiary period. By its external characteristics, we should certainly have classed it among the genuine monkeys, and only a few slight anatomical marks would have betrayed to the expert that he was not dealing with a monkey of later descent, but with one in which, so to say, the third generation of coming man was still concealed.

Now, it is peculiar that we have actually found remains of monkey-like animals in the first third of the Tertiary period. They were discovered by the Spanish explorer Ameghino in Patagonia, the extreme end of South America, and were concealed in a layer of rock which must have been developed toward the end of that first third of the Tertiary period. We call this first third the "Eocene" period, or in English, the dawn of the more recent period. When Ameghino first analyzed one of these Patagonian monkey skulls, it conjured up to his imagination the ghost of a very small man, so that he called it "Homunculus," but it seems that after all this resemblance to man is not much greater than that of the American monkeys of the Capuchin type, and that group of Eocene monkeys evidently belonged to that class. It can not be denied that the present Capuchin monkey is in many respects, physically and mentally, man-like. It also has secret relations with the gibbon, and thus to the archetype of the Pithecanthropus kind. Thus, many things favor the more recent assumption that possibly these bright, gentle and highly intelligent American Capuchin monkeys are the closest of any of the present monkey forms to that genuine monkey type of man which belongs to the Eocene period.

On the other hand, the small and squirrel-like marmosets must be eliminated from our line of descent and regarded as a side line. Most likely they are a one-sided adaptation to special conditions in South America.

But now that we have gotten so far, there can be no doubt as to the next question. If man can be traced so far back in monkeydom, he can not but share all the vicissitudes of monkey life further back. Whatever may be the general descent of monkeys, that is at the same time the line of man's development. The prototype of monkeys is also that of man.

The conventional system of mammals proceeds along a great downward scale. First we have the prosimiae, bats, insectivora, such as the hedge-hog, then carnivora, rodents, the large and variegated group of ruminants, etc. But this scale is only apparently a historical one. Whoever were to imagine that man went through all these different stages in succession would not come to any definite result. For instance, if we compare the teeth of a rabbit with those of a monkey, we should have considerable difficulty in accepting the idea that the monkey could be descended from a rabbit.

It is the same when we compare two styles of architecture. The one is simple and noble and the other a sort of bizarre caricature of the

former. We do not take kindly to the idea that the simple style should have developed from the caricature. Just so, the rows of teeth of monkeys, including those of man, give the impression of a simple temple of noble style, in which everything is developed in conformity with a definite and uniform system. But the teeth of a rabbit, of a horse, and even those of a cat, appear to us like a caricatured variation of that simple style, going to excess here, falling short there.

Of course, the opposite idea that all these other groups of mammals should have developed from monkeys is equally improbable. The simplest historical premises oppose such an idea. Neither do the remains of bones of primitive animals teach us that there were at a certain period, first, let us say, ruminants, later on, perhaps rodents, then carnivora and finally monkeys. Nor do they show that there were at first no other higher mammals than monkeys, and then in successive periods ruminants, rodents, etc. We rather receive the impression that all of these groups appeared simultaneously at a certain period.

Now it is precisely the progress in our knowledge of extinct mammals which succeeded finally in leading us out of this labyrinth of contradictory assumptions.

All those groups of mammals still appeared in the first third of the Tertiary period, the so-called Eocene period, to which we have repeatedly referred. Monkeys, as we have seen, were among them. Hence, if we desire to learn more about the origin of these things, we must trace our steps further back, say to the beginning of this Eocene period.

Now we have found in two places far distant from one another—in France near Cernays in the vicinity of Reims, and in North America in New Mexico—the bones of certain extremely old mammals belonging to just this period, and these bones explain the mystery very fully. On the one hand, all of these bones have a very simple and fundamental structure. They show a remarkable row of teeth without extremes, or caricatured exaggerations, and the present monkey and human teeth are easily derived from them. Furthermore, these skeletons have four feet, or rather four hands, with five regular fingers, among them one very flexible thumb. This is another very good prototype of the monkey and human hand, which is so widely different from the claw of the lion, or from the shin and hoof of the horse. In place of nails, these five fingers had an indefinite sort of thing, half way between a claw and a hoof, which might easily have developed into anything, say, a horse's hoof, a carnivore's claw, or the nail of a Simian, or a human hand.

On the other side, these animals show the beginnings of certain divergences in the structure of their bones. Some of them have more of the rodent, others more of the carnivore, others of some dominating ruminant character. There is no doubt that these simultaneously represented a very ancient group of ancestors which was just then beginning to branch out into the various great side lines of mammals. And it is equally certain that one of these side lines was composed of monkeys. Of course, this original side line of monkeys must have resembled the original ancestor in the structure of teeth and hands and must have been a straight continuation of its evolution in the best sense of the word. This explains why man and monkey, who to this day possess the simple normal teeth and the primitive hand, give the impression, now that the ancient group of ancestors has long become extinct, that carnivore, ruminants, etc., are nothing but very extreme caricatures of the archetype.

Furthermore, the claim that the monkeys were really a side line of that very primitive ancestor, and the most direct side line at that, is substantiated by a study of those ancient bones of Cernays and New Mexico. Just as we still observe in those bones certain variations in the direction of carnivora, of rodents, of ruminants, so we also find a little group of animals which gradually, but very decidedly, move in the direction of our monkeys.

True, they are not yet genuine monkeys, but they certainly show an unmistakable resemblance to a certain group of mammals which have always followed in the system directly after the monkeys, and which were often considered as some peculiar variety of genuine monkeys, the so-called prosimiae.

(To Be Continued.)