ISSUED BY DEFENSE COULSEL, STATE OF TENN. vs. JOHN T. SCOPES

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STATEMENT BY DR. FAY-COOPER COLE, Anthropologist, University of Chicago.

(Biography.--- Dr. Fay-Cooper Cole received the degree Bacholor of Science at Northwestern University. After work as a graduate student at Rush Medical College and the University of Berlin, he took the degree Doctor of Philosophy at Columbia University. He is now Anthropologist at the University of Chicago. Before that he was connected with the Field Museum of Natural History at Chicago, one of the three chief museums in America, for nineteen years, for the greater part of that period he was in charge of the Museum's work in physical anthropology and Malayan ethnology. He conducted three expeditions covering a period of five and one-half years in the Philippine Islands, Borneo, Java, Madura, Nias, Sumatra and the Malay peninsula, making a particular study of the origin and the migration of the pygmies and Malays, and of their social organizations. He was a member of various expeditions to the American Southwest, escavating the ruined cities of the Cliff Dwellers in the southwest and carried on investigations among the Pueblo and Navajo Indians. From 1907 to 1912 he was special investigator for the Philippine Bureau of Science, codifying the laws and making a study of the social, economic and mental life of the uncivilized tribesmen. During the last three years of connection with the Field Museum he was also lecturer in anthropology at Northwestern University. He is a fellow of the American Association for the Advancement of Science, fellow of the American Geographical Society, member of the Council of this association and now one of the vice-presidents of the American Anthropological Association, and member of the Social Research Council of this association. He is author of four monographs and various scientific papers dealing with the folk lore, physical types, social, religious and economic life of the primitive tribes of the Philippine Islands.)

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Anthropologists accept evolution as the most satisfactory explanation of the observed facts relating to the universe, to our world and all life on it. They hold that the evidence abundantly justifies us in believing that development

has been from the simple to the complex and that present forms of life, including man, have been produced from earlier existing forms, but through immense periods of time.

The field of the anthropologist is man, man's body, and man's society, and in this study he finds himself working side by side with the biologist and the geologist. For the study of man's body he has worked out a set of instruments and has selected a series of points for observation, by means of which he can accurately describe each individual of a group, the length, breadth and height of head, the facial proportions, the length of limbs and so on.

In this way the anthropologist determines the average of a group or tribe or race, and to determine its normal variation. Anything strikingly beyond the normal at once becomes the subject of inquiry to determine its cause. In addition to the mathematical description there are added observations - color of skin, shape of teeth, the form of the hair, and many others.

On man's skeleton these observations are even more exact and are so definite that given a single skull or skeleton it is possible to tell with considerable certainty the age, sex, and race of the individual, while for a series of skeletons the results are definite. The skeletons tell much of man's history, for the articulation of the bones and the lines of attachment of the muscles reveal how he walked, how he held his head and many other details of his life. It also reveals the fact that man presents many variations difficult to explain without referring to similar conditions found in the animal world. To gain further light on these variations the anthropologist works with the anatomist and comparative anatomist and he quickly finds that every human being of to-day possesses many muscles

for which there is no apparent use, such muscles as those behind the ears, those going to the tail, the platysma, - a muscle going from the chin to the clavicle. These are but a few among many which to-day are functionless in man, but are still in use by certain animals. Going to the human embroy we find these vestiges of an earlier condition much more developed while others appear for a time and then vanish before birth. Such a case is the free tail possessed by every human embryo, a few weeks before its birth.

It is difficult to explain the presence of these useless organs in man unless we believe that sometime in his development they were in use.

This study also reveals the fact that man closely resembles certain members of the animal world in every bone and organ of his body. There are differences, but they are differences of degree rather than of kind. Those animals most closely resembling man are the anthropoid apes. A careful study shows that they have specialized in their way quite as much as man has in his, so that while they are very similar, yet it is evidence that man's line of descent is not through any of these anthropoids. It does appear, however, that both man and the other primates have a common precurser, but that the anthropoids must have branched off from the common stock in very remote times. If this is true, then we might hope to find in ancient strata of the rocks some evidences of earlier forms of men, who might perhaps more closely approach the common ancestor. This is exactly the case. The geologists have established the relative age of the strata of the rocks, while the palaeontologists have made plain the forms of life which lived in the epochs when these strata were deposited.

In the strata laid down at the end of the Pliocene period at least 500,000 years ago, there has been found the bones of a being which appears to be an attempt of nature toward man. In the year 1891 on the island of Java, there was found the bones of an animal which in many ways seems to be intermediate between man and the anthropoids. These bones were found in undisturbed strata forty feet below the surface, at a point where a river had cut through the mountain side. There can be no doubt that these bones were laid down at the time that the stratum was deposited and by studying the associated fauna, consisting of many extinct animals, the age of these rocks is established. These bones were not lying together, but had been scattered over a distance of about forty-five feet by the action of the ancient river which deposited them.

These semi-human bones consisted of a skull cap, a femur, and two molar teeth. The skull was low with narrow receeding forehead and heavy ridges of bone above the eye-sockets, while a bony ridge extended from between the eye-brows to the top of the head approaching a condition found in the cranium of the anthropoids. The brain capacity of this individual was between 850 and 900 cubic centemeters, or a little more than half of that of modern man. On the other hand it is half as much again as that of an adult gorilla, and the special development has taken place in those regions whose high developement is typical of the brain of man. Hence in this respect this being seems to stand midway between man and the highest anthropoids. The teeth approach the human type and indicate the peculiar rotary mode of mastication of the human which is impossible in animals having interlocking canine teeth. The thigh bone is straight, indicating an upright posture and ability to run and walk, as in man.

And the muscle attachments show he was a terrestial and not an aboreal form. If, as seems probable, these four bones belonged to the same individual, he must have been more man-like than any living ape and at the same time, more ape-like than any human known to us. He is known as Pithecanthropus erectus or the erect ape man.

Another find of somewhat similar nature was made only a few months ago in Bechuanaland of South Africa by Professor Dart of the University at Johannesburg. This find consisted of the skull of an animal well developed beyond modern anthropoids in just these characters, facial and cerebral which are to be expected in a form intermediate between man and the anthropoids. Neither of these two beings are, of certainty, directly ancestral to man, but they do seem to indicate that nature at a very early period was making experiments toward man.

Two other fossil beings, found in the early strata of the rocks, also seem to indicate a development toward man. In the strata of the second interglacial period, probably at least 250,000 years ago, there lived a being with a massive jaw, a jaw human in every respect, except that it had no chin and the ramus or upright portion toward the socket was very broad, as in the anthropoids. This jaw is so narrow behind that it is thought the tongue could not have sufficient play to allow of articulate speech. The teeth although very large are essentially human with even tops, as in man, while the canines lacked the tusk-like character which they still retain in the apes. This jaw was found ih the year 1907 in a sand-pit working near Heidelberg Germany. It was discovered in place at a depth of nearly eighty feet and lay in association with fossil remains of extinct animals which make possible its dating in geologic time.

It is difficult to picture a man from the jaw alone, but much we can say, the mouth must have projected more than in modern man but less than in the chimpanzee or gorilla. He had a heavy protruding face, hige muscles of mastication, essentially human teeth, and he was already far removed from his primate ancestors with large canines; He was nearer to man than to the apes; he was further along the line of evolutionary development than Pithecanthropus erectus, the Java Ape-man, and he lived at a much later period. This being is known as the Heidelberg man.

The second of these two finds which we have mentioned occurred near Piltdown in Sussex, England. This consisted of the crushed skull of a woman and a jaw which can scarcely be distinguished from that of a chimpanzee. For a time there was much question if the two could possibly belong together, but a more recent find, which ocurred about three miles distant from the first, again showed portions of the same type of skull and jaw. The skull is exceedingly thick and its capacity much less than that of modern man, but it is distinctly human, while, as indicated, the jaw approaches that of an anthropoid. Here again we seem to have an approach toward man in very ancient strata.

Toward the end of the second inter-glacial period in Europe we begin to find stone implements which give indication of having been intentionally formed and used by intelligent beings.

By the third inter-glacial period, more than one hundred and

fifty years ago these utensils have taken on definite form and we find thousands of stone axes of crude type scattered over a large portion of central and southern Europe. We have no fossil remains of man during this third inter-glacial period, for he then lived in the open and it would not only be by the merest chance that his skeletons might be preserved to us. But when the fourth glacial epoch spread over Europe these men were compelled to make their homes in the shelters and caves of the rocks, and here in the debris around their ancient hearths we can read the record of their home life, and from this period on for a period of at least 50,000 years, we can read the record of man's occupancy of Europe as clearly as though we were reading from the pages of a book. Fortunately for the scientists, these people buried their dead and we have preserved for us a considerable number, ranging from children to adult men and women, so there is no guessing as to the sort of man who occupied Europe at this time.

They were massively built, with long arms and short legs, in heighth they averaged about five foot three for the men and four feet ten for the women, or about the same as the modern Japanese. The head was long and narrow, above the eyes was a heavy bony ridge, back of which the forehead retreated abruptly, indicating rather little development of the fore-brain. The nose was low and broad, the upper lip projecting, but the jaw was weak and retreating. The head hung forward on a massive chest, this we know because the foramen magnum, the opening by which the spinal cord enters the cranium, was situated further back than is the case in modern man, and the points of articulation with the bones of the neck also show conclusively that the head hung habitually forward. In all cases we find the thigh bone to be curved and this, together with the points of articulation show

that the knee was habitually bent and that this man walked in a semi-erect position. These people known as the Neanderthal race spread out over the western half of Europe and we now know and have excavated very large numbers of the stations in which they lived. They were men, - they were human - but they were much more like the anthropoids in many respects than is modern man. They lived in Europe for a period of at least 25,000 years probably much longer, when they were displaced by new-comers who pushed in from around the eastern end of the Mediterranian and from Asia. The new-comers known as Cro-magnon, are a much finer physical type but so closely related to modern man that it is not necessary to describe their physical type; but it is of interest that we can study his home life, his art, and his life among certain animals now extinct for a period beginning about 20,000 years ago, and extending down to the coming of the modern races.

Only a few points relating to man and his history have been reviewed, but enough has been said to indicate that the testimony of man's body, of his embryological life, of his fossil remains strongly points to the fact that he is closely related to the other members of the animal world, and that his development to his present form has taken place through immense periods of time.

From the above it seems conclusive that it is impossible to teach anthropology or the pre-history of man without teaching evolution.

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