THE PLATEAU HABITAT OF THE PRO-DAWN MAN

GROUNDS for the pro-Dawn Man theory[1] are directly derived in part from existing embryological, anatomical and zoological evidence, in part from certain principles of animal descent or phylogeny which were entirely unknown in the period when Charles Darwin published his classic work, "The Descent of Man" (1871), and the shortly succeeding period when Huxley wrote his famous essay, "Man's Place in Nature." Although following Lamarck, who early in the nineteenth century sketched the apes as human ancestors, Charles Darwin required great courage to draw in 1871 the following picture of our ancestors:

> The early progenitors of man must have been once covered with hair, both sexes having beards; their ears were probably pointed, and capable of movement; and their bodies were provided with a tail, having the proper muscles. Their limbs and bodies were also acted on by many muscles which now only occasionally reappear, but are normally present in the Quadrumana. At this or some earlier period, the great artery and nerve of the humerus ran through a supra-condyloid foramen. The intestines gave forth a much larger diverticulum or caecum than that now existing. The foot was then prehensile, judging from the condition of the great toe in the foetus; and *our progenitors, no doubt, were arboreal in their habits, and frequented some warm, forest-clad land.*

I take the liberty of italicizing the two most salient lines in this oft-quoted passage because they give the key to the thought of Darwin and of subsequent advocates of the ape-man theory down to the present time. Over against such a habitat which has framed the structure of all anthropoid apes may be placed the conclusion theoretically reached by the brilliant geologist, Joseph Barrell, in 1917, and independently reached by myself by direct observation during my journey of 1923 into the heart of the desert of Gobi. To my knowledge Barrell was the first to formulate what may be called a semi-arid plateau theory of the origin of man, as recently quoted by Charles Berkey in "Geology of Mongolia":[2]

> . . . Among the many suggestive thoughts offered by Joseph Barrell (1917) as guiding hypotheses for our explorations in central Asia, his idea about primitive man is especially ingenious. Man's strong padded foot, his relatively long leg and his erect posture, are all distinct departures from an adaptation to life in the trees, and tend, instead, to fit him for running and for tramping long distances; in short, for life on open plains where trees grow in patches along the stream courses, rather than for life in a dense forest. Granting that the more distant ancestors of men lived in trees and in jungles, it seems probable that they would have remained arboreal in an environment of jungle and forest. But in a region where forests were thinning, where open, treeless plains were beginning to appear, and where the climate was changing toward cooler and more arid conditions, it seems probable that arboreal types must adapt themselves to the plains, or become extinct.

I am not conscious of having seen or heard of Barrell's generalization prior to my own discovery of the same principle, which I enunciated before a gathering of geologists and natural philosophers in Peking:[3]

> Mongolia was probably not a densely forested country —this is indicated by the animal remains found there in the earlier deposits. An alert race can not develop in a forest—a forested country can never be a center of radiation for man. Nor can the higher type of man develop in a lowland river-bottom country with plentiful food and luxuriant vegetation. It is upon the plateaus and relatively level uplands that life is most exacting and response to stimulus most beneficial. Mongolia always has been an upland country, through the Age of Mammals and before. It was probably a region forested only in part, mainly open, with exhilarating climate and with conditions sufficiently difficult to require healthy exertion in obtaining food supply. . . .
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> In the uplands of Mongolia conditions of life were apparently ideal for the development of early man, and since all the evidence points to Asia as the place of origin of man, and to Mongolia and Tibet, the top of the world, as the most favorable geographic center in Asia for such an event, we may have hopes of finding the remote ancestors of man in this section of the country. However, this Mongolian idea must be treated only as an opinion; it is not yet a theory, but the opinion is sufficiently sound to warrant further extended investigation.

No pro-human habitat could present a wider contrast than does the central Asiatic plateau to Darwin's "warm, forest-clad land." All recent ethnologic and physiographic evidence points in the same way, namely, that intelligent progressive and self-adaptive types of mankind arise in elevated upland or semi-arid environments where the struggle for food is intense and where reliance is made on the invention and development of implements as well as

[1] Before the American Philosophical Society, April 20, 1928, the author renewed his attack upon the ape-man theory of human ancestry which he began at the bicentenary meeting of the society in April, 1927.

[2] Charles P. Berkey, Frederick K. Morris: "Geology of Mongolia. Natural History of Central Asia," Vol. 11. Published by the American Museum of Natural History, New York, 1927.

[3] H. F. Osborn: "Why Mongolia may be the Home of Primitive Man." *The Peking Leader*, October 10, 1923.

weapons. On the contrary, there is no premium on invention, intelligence, or self-adaptation in mammals of any kind living in warm forests.

Granting all the very strong *circumstantial* evidence in favor of the ape-man theory, which has been piled mountain high by investigators since the time of Darwin and has been recently revived and stimulated to new force by the attacks of the fundamentalists on the whole evolution theory, we must look for the direct evidence which can come only from geology and palæontology. The final solution of this problem of problems therefore rests with the fossil hunter and explorer, whose task is an extremely difficult one because fossil remains of Primates, always scarce, are becoming increasingly scarce as the Primates rise in the scale of intelligence. I do not know the exact figures, but I think it is safe to say that 50,000 to 1 is about the ratio of probability of discovery of fossil remains of lower orders to fossil remains of Primates in Tertiary time.

Meanwhile, the circumstantial evidence of geology and of geography is all in favor of the theory that the pro-man stock was well established in Oligocene time, now conservatively estimated at sixteen million years ago. At this time occurred the first *modernization* of the entire mammalian kingdom. So far as we can observe geologically, this modernization was due to the first great wave of aridity concurrent with the complete elevation of great continental plateaus, especially in central Asia and in the western region of North America.

This wave of aridity and of elevation caused a profound cleavage in the mammalian world, the first great natural divorce between the warm forest-loving types developed during the preceding Eocene period and the temperate plains and plateau-loving types which apparently invaded the great Oligocene belt of the 40th parallel from the north. This cleavage profoundly affected the whole mammalian world of this region; not only the horses, rhinoceroses, tapirs, and even-toed animals like the progenitors of the deer, the cattle, and the camel families had to make their choice between forest regions and the plains, but the carnivorous enemies—wolves and foxes and the progenitors of the greater carnivores in the cat family—were compelled to go forest-ward or plains-ward. It is not at all probable that the Primates—lemurs, North and South American monkeys and the hypothetic division of pro-man—were exempt from this compelling and fateful decision. Why was it postponed by the progressive progenitors of man when adopted by all the progressive elements in the remaining mammalian world? Why theoretically postpone this fateful decision on the part of our primate ancestors to Miocene or Pliocene time, as is still done by many conservative writers who continue to adhere to the abandoned conceptions of the period of Charles Darwin's speculation partly because of loyalty to him and reverence for his classic contribution to anthropology?

This concludes the seventh address which I have devoted to this absorbing subject. In the succeeding or eighth address I shall continue the attack and try to demonstrate that while the anatomical and embryological evidence for the *kinship* of the apes to man is overwhelming, the same evidence, when closely analyzed and subjected to conditions of modern principles of phylogeny discovered since Darwin's time, compels us to replace the ape-man hypothesis by the new pro-Dawn Man theory.

HENRY FAIRFIELD OSBORN

THE USE OF CHARTS IN THE NATURAL SCIENCES

OLD teachers of natural science subjects will remember the time when charts were used extensively in classroom and laboratory instruction. That was before the general introduction and universal use of the lantern, now the principal means of classroom demonstration. The lantern slide has almost completely driven out the chart, and many university departments of zoology, anatomy, physiology, bacteriology and botany have practically no charts at all, or whatever they have is antiquated material or homemade, crude and unattractive.

A recent inspection of new German charts suggested the question whether we have not gone too far in our abandonment of the use of the chart and have deprived ourselves of a help, which the lantern-slide can not and will not render. In Germany it was undoubtedly the reason of economy which prompted the continuous use of charts instead of slides. Under present circumstances no German university institute could afford to equip each classroom with a lantern or to have enough portable lanterns on hand to put one at the disposal of each lecturer or laboratory instructor. Of course there are some lanterns in German universities, but they are few and far between. The same is true to a still higher degree of French educational institutions. Also, the high perfection in graphic arts in Germany and the comparatively low cost of publishing charts of a high artistic value have contributed in a large degree to the universal demand for charts in German classrooms.

Sometimes the lantern-slide is superior to the chart. It allows a much greater variety of illustrations. It is handy to use and every biological laboratory has the equipment to make lantern-slides from