

Letters to the Editor.

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Human and Other Tails.

IN NATURE of February 24 last, p. 845, there appears a report of Prof. Arthur Keith's remarks at the meeting of the Royal Anthropological Institute held on February 8. It may be that the Journal of the institute will contain a more detailed paper on the same subject, and that the fuller paper will somewhat modify the dicta put forward in the report as it appears in NATURE. But in the absence of any further details it seems worth while to note some of the points raised by Prof. Keith which appear open to criticism.

My right to criticise may perhaps be sustained by the reference on p. 846 to Tarsius and to my published views concerning its systematic position. Prof. Keith's rather far-reaching generalisations were called forth by the examination of one of those fleshy sacral appendages commonly known as human tails. It is obvious from every sentence in the article cited that Prof. Keith believes that the human tail was lost because man became an orthograde—that is, adopted a vertical instead of a horizontal poise for his body. No doubt that is a very well justified position to take up, and, in so far as a human orthograde poise implies a cessation of tail utility, I entirely agree with him. But when Prof. Keith says, "With the evolution of the upright posture the pelvic muscles which act on the tail had to bear the steady burden of the abdominal viscera—had to be in action as long as the orthograde posture was maintained. They could not serve in the support of the viscera and the movements of the tail at the same time," I dissent from him altogether. Indeed, to me it seems a remarkable thing that one who is in constant association with the museum of John Hunter could possibly believe that, if this dual duty of support of viscera and production of tail movements were thrust upon them, the muscles would fail in one respect or the other. We need, as a matter of fact, go no further afield than the kangaroo to see how an animal which is typically orthograde may support its abdominal viscera in the upright posture, and yet possess a tail which is one of the most wonderful of muscularly controlled caudal appendages met with among the mammals.

Man has not lost his tail because the caudal musculature is incapable of undertaking the dual rôle of visceral support and caudal mobility. He has lost it because it has ceased to be of any use to him. For the same reason the gibbon, the orang, the chimpanzee, and the gorilla have lost theirs. For the same reason certain "pronograde apes" (which Prof. Keith appears to assume possess uniformly "basal or pelvic," as well as "free or terminal," portions of their tails) have lost theirs. *Cynopithecus* possesses no more than a button, the Barbary ape still less, and, indeed, the reduction of the tail is seen to the best advantage in the most typically pronograde group (the baboons) of the Primates. Because the tail has ceased to be of any functional use certain of the lemurs have also lost it, and so have a host of other mammalian forms belonging to other orders. Did it not appear flippant, one might ask if Prof. Keith imagines the guinea-pig lost its tail because its caudal musculature could not fulfil a dual rôle. Recession of the tail has been effected and prehensile tails have been

developed, over and over again in the mammalian phylum. But one may not argue phylogeny, or the limits of the possibilities of muscular adaptation, to account for these things. No argument which bases the loss of the tail on the grounds cited by Prof. Keith carries the least conviction or bears any interpretation which may be distorted into human phylogeny.

Prof. Keith further goes on to state that "in pronograde apes the pelvic visceral musculature is attached to the peculiar chevron-like bones (hæmal arches) placed beneath the pelvic vertebræ of the tail; the reappearance of the hæmal arches in the human embryo during the second and third months of development may be regarded as definite proof that man comes of a pronograde ancestry." This is a common type of argument, one that has been current far too long, and one against which I have been attempting to teach for some time past. Apart from the confusion that may be caused by identifying "hæmal arches" with definite "chevron bones" is the gross fallacy involved in the argument that because hæmal arches are present in pronograde apes and in man, therefore man is developed from a pronograde ape. Hæmal arches are a primitive vertebrate heritage, but they are no more; they have no more to do with the pronograde poise *per se* than have the neural arches or the gill bars. We all know that the pronograde habit is typical of lower vertebrates, and we need not quibble about a pronograde vertebrate ancestry for man. But to argue that the pronograde simian ancestry of man is evidenced in the "reappearance of the hæmal arches in the human embryo during the second and third months of development" is sheer nonsense. Hæmal arches are developed in birds, and one would have as good justification for saying that this proved that man descended from a volant ancestor as Prof. Keith has, by the parallel argument, for claiming man's descent from a simian pronograde ancestor. Both arguments are fallacious and stupid.

Whilst the whole trend of Prof. Keith's remarks appears to be directed towards a vindication of the pronograde simian ancestry of man, he seems, in the end, to disagree with the ancestral position of "*Tarsius spectrum*, for which Prof. Wood Jones claims a special human relationship." Yet of this animal he says: ". . . in its tail and tail-musculature *Tarsius* is a pure pronograde Primate." I should be sorry to destroy the last bridge by which Prof. Keith's views might be reconciled with my own; but I have no hesitation in saying that *Tarsius* is certainly not a pure pronograde, and that, moreover, no living animal the habits of which are open to observation should be judged as a pronograde by an examination of the musculature of its tail.

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TWENTY-FIVE years ago it was my privilege to teach Prof. Wood Jones; he now repays me with interest and with some degree of vigour. The matter wherein we differ has a very direct interest, not only for those who are seeking to unravel the history and relationships of man by means of anatomical evidence, but also for every zoologist who relies on structural details for arranging animals in a natural or evolutionary series. In man and in the four anthropoid apes—the gorilla, chimpanzee, orang, and gibbon—the tail has undergone a peculiar transformation—a sacralisation it may be named—for its vertebræ have become a mere submerged appendix of the sacrum. The depressor muscles of the tail have become spread out to form a muscular hammock on which the pelvic