Letters

What Ever Happened to Hairy Man?

Like Bentley Glass ("Evolution of hairlessness in man," Letters, 15 April), I object to the implication by Baker and Fentress (Letters, 25 Feb.) that attributing the reduction of biological structures to their loss of function has Lamarckian overtones. Glass has presented the theoretical basis for his views with admirable clarity. But, as an anthropologist, I must question his application.

Human hairlessness does demand an explanation, but from the evidence available it would seem that the development of clothing is probably not involved. Among the living human populations, those that are most dependent upon clothing are also those that have retained the greatest amount of body hair. And there is archeological evidence that a concern for the preparation of hides, and presumably clothing, was first developed by the ancestors of these populations. On the other hand, those populations that wear little or no clothing, and whose ancestors presumably did the same, are just those that retain a minimum of body hair. Since these inhabit the hotter parts of the world, it is quite possible that human body hair was eliminated by natural selection when the problem of dissipating metabolically generated heat became important to human survival. Man's hairless skin, richly endowed with sweat glands, is an admirable heat dissipator.

Throughout most of the last half million years, man subsisted by hunting and gathering. Among hunting mammals, man's heat-dissipating mechanism is unique, and one may suggest that it is a reflection of the fact that man alone has engaged in maximum hunting activities through the heat of a tropical day. South African bushmen have capitalized on this facet of their physiology in their hunting practices right up to the present day.

Correlating human hairlessness with tropical hunting behavior, one can guess that selection reduced the hairy coat at the time when regular and effective hunting techniques were developed. The fossil and archeological record shows that this occurred at the beginning of the Middle Pleistocene, more than half a million years ago. If we can infer it from the sudden proliferation of scrapers and leather working tools, the regular preparation of skins for clothing began with the onset of the last glacial advance about 100,000 years ago. This means that clothing was developed long after man's hairy coat had been lost. But 100,000 years is long enough to have some effect, and it is interesting to note that it is in just those populations whose ancestors first used clothing that skin pigmentation occurs in its most reduced form. Depigmentation, rather than hairlessness, may have been the result of the development of clothing for just the reasons Glass suggests. Reduction in visual acuity and baldness probably have occurred as he has stated. These and other facets of human physical characteristics are treated in greater detail in Brace and Montagu's recent text in physical anthropology (*Man's Evolution*, Macmillan, New York, 1965).

C. Loring Brace
Department of Anthropology, University of California, Santa Barbara

. . . Glass finds it "highly significant, as a support of [his] theory, that head hair, so clearly a protection from sun, wind, and rain, has been retained." Head hair does protect the crown, but it is far easier for man to guard his pate from exposure with his arms, a leaf, or any sort of cover than to protect the rest of his body with a garment or by warming it near a fire. If the Glass theory were true in this context, then man's head should have become bare first. In another context, nose, ears, and digits, being more exposed and sensitive to cold than the head, should be furred; instead, these organs are nearly or quite glabrous. The Glass theory is further confounded by man's retention of abundant tufts in the axillae and pubic regions, where exposure and need for cover are minimal. Even more perplexing in the light of the theory is the fact that the near-term fetus is furred from head to toe while sheltered in the womb but is born unclad into the inclement world.

Glass goes on "to propose seriously that baldness, like myopia, is largely a genetic trait that has only become widespread and common in human populations since man became relatively civilized and keen vision and a good head of hair were no longer important to survival." The species of mammals which have become quite or nearly bareheaded without awaiting civilization are too numerous to list. The pied marmoset, the uakari, and many individuals of chimpanzees are examples among the primates. Many mammals —whales, elephants, rhinoceroses, hippopotami, naked mole rats (*Heterocephalus glaber*), some species of armadillos, certain strains of laboratory mice —even combine nearsightedness with near-hairlessness. Man has no monopoly on alopecia. Any mammal, whether through age, disease, or mutation, can become bald or bare on the head or any other part of the body. Witness the baboon.

Man's long tresses and relatively thinly haired body and limbs are almost certainly the result of sexual selection, with the male selecting for these traits in the female. In all probability, man was exposed to a cold environment *after* losing most of his body hair; he survived the changing climate because he could adapt physiologically, apart from having the wit to use fire and clothing for greater comfort. Axillary and pubic hairs, which appear in the least exposed parts of the body, are secondary sexual characteristics peculiar to man.

Philip Hershkovitz
Field Museum of Natural History, Chicago, Illinois 20605

. . . Glass postulates a selectively neutral character (body hairiness), which disappears through swamping by mutation. Mayr considers it "exceedingly unlikely that any gene will remain selectively neutral for any length of time" (*1*), an opinion that has been expressed by other authorities (*2*). Even if we assume a long period in human evolution during which there is no differential selective pressure affecting hairiness, the latter portion of Glass's assertion is still difficult, for we must postulate a high mutation rate to account for the effective elimination of body hair. But many genetic loci with

high mutation probabilities have the high probabilities in both directions; that is, we ought frequently to see very hairy mutants in the present-day population.

An alternative explanation of the loss of inessential characters may be that every character requires metabolic energy to develop and maintain it, and elimination of a useless character diverts this energy to uses that promote survival, so that individuals without the character survive and reproduce at higher rates than individuals who have it.

Glass hypothesizes that baldness is a product of civilization (and hats), since "baldness is still limited almost entirely to males who have passed the age at which most males, in primitive times, would have died of various causes." The real criterion is whether baldness (and the selective disadvantage which it brings to the individual) occurs prior to *reproduction* (not death). Since baldness only rarely, even today, occurs prior to reproduction, there is no reason to suppose that primitive man lacked the baldness genes, unless complicating pleiotropic effects are postulated.

JACK P. HAILMAN
Institute of Animal Behavior, Newark College of Arts and Sciences, Rutgers University, Newark, New Jersey

References

1. E. Mayr, *Animal Species and Evolution* (Harvard Univ. Press, Cambridge, 1963), p. 207.
2. For example, R. A. Fisher, *Genetical Theory of Natural Selection* (Clarendon, Oxford, 1929); T. Dobzhansky, *Evolution, Genetics, and Man* (Wiley, New York, 1955), p. 152ff.

In arguing that by adopting clothing man "changed his environment sufficiently to make hairiness an inconsequential feature except on the more exposed parts of his anatomy," and further that "head hair, so clearly a protection from sun, wind, and rain has been retained," Glass states the conventional view of the role of hair in man. Evidence is accumulating that this is an unnecessarily limited view of the part hair plays in human and mammalian physiology, indeed that protection from the elements is probably a minor function. Work done in our laboratory and others indicates that hair, as an appendage of the integument, acts with the integument in the management of certain physiological processes, one of which is the highly selective excretion of trace elements. This appears to be true not only of hair in mammals but of feathers in birds and the cast skins of reptiles, amphibians, and arthropods.

Patterns of hairiness in man may follow evolutionary changes in diet or other factors. Baldness itself seems to be associated with increased hairiness over other parts of the body. Hairiness and feather dress is only poorly correlated with severity of climate; tropical mammals and birds have luxuriant hair and feathers. Hence it is reasonably clear that one must be cautious in assigning simple evolutionary roles to hair and similar integumentary derivatives.

GARTH S. KENNINGTON
Department of Zoology and Physiology, University of Wyoming, Laramie

. . . Hair was developed by our earliest mammalian ancestors, probably in the Triassic period, about 200 million years ago. It was part of the temperature regulating mechanism which differentiates mammals from cold-blooded animals and which also includes such components as sweat glands, vasoconstriction and vasodilation, hair erection, panting, shivering, and temperature sensors in various parts of the body. Loss of fur or body hair in man can only be interpreted as due to a mutation involving a defective gene, similar to that responsible for albinism, for example. Because all living men, of all races, now carry this defective gene, we are forced to assume that its introduction into our makeup occurred further back than the development of the genes which serve to distinguish the Caucasian, Negro, Mongoloid, and Pigmy races from each other. The introduction of the gene could hardly have taken place later than the first great dispersion of paleolithic man, which is assumed to have taken place during the great interglacial stage (Yarmouth or Riss-Mindel) about 200,000 years ago. The carriers of the defective gene could hardly have survived except in a highly favorable environment where exposure to cold, mosquitos, sunburn, and spiny vegetation was not too severe a handicap. It is likely, for example, that the Neanderthal race had a heavy coat of fur, because they lived in, and seemed to prefer, an arctic or subarctic environment, which would be fatal to modern man without specialized clothing.

Unless there were some compelling advantage in not having body hair, it would be very unlikely for the defective gene to propagate rapidly throughout a population. The fact that it did, and that all nonbearers of the gene were eliminated completely, requires an explanation. One such possibility will occur to those who have read *Rats, Lice, and History* by Hans Zinsser. Body hair offers exceptional shelter for such insects as ticks and body lice, which have evolved in company with man and other mammals. The nonhairy members of the population probably took great pains to rid themselves of these unwelcome guests, as they still do. Their furry cousins probably never could delouse or detick themselves (as anyone can appreciate who has tried to rid a long-haired dog of ticks). Thus an outbreak of typhus, spotted fever, Black Death, or any similar plague could have wiped out the entire fur-bearing segment of the human population. This could have occurred in a small, compact group of our ancestral humans, while nonancestral groups like the Neanderthalers remained unaffected.

Lack of body hair was unquestionably a compelling incentive for inventing clothing, building shelters, and using fire. The need to compensate for a defective gene may thus have been one of nature's most powerful stimulants for the advancement of mankind.

WALTER S. OLSON
4 Claremont Road, Scarsdale, New York

On Being Referred To

With the continuing growth of science, problems of communications are increasing greatly. At present there is no practical way to keep up to date with who is referring to one's work. A scientist should know immediately what applications are being made of his work and what interpretations and correlations with other work are being made by others. Timely knowledge of this sort would stimulate new ideas and research, open new channels of collaboration, avoid duplication of effort, and give one the opportunity to defend his work against unjust criticism. Cooperation among scientists, as proposed below, should do much to improve communications.

I propose the adoption of three professional courtesies by the scientific community. First, I suggest that, when preparing papers for publication, authors notify the senior author of each reference cited by postcard. Second, I recommend sending reprints to all authors cited. Third, whenever they send