the national goal of winning the war was clear and persistent, "[scientific] accomplishments during the war were unprecedented, and they have not been matched since, in rate or quality." I wonder if they are not matched by—for example—the intercontinental ballistic missile, DNA, polio vaccine, the Rangers, Mariner IV, Early Bird, the jet transport, and all the other achievements our colleagues could add to the list.

ROBERT K. WEAD
22361 Kittridge Street,
Canoga Park, California 91304

Evolution of Hairlessness in Man

Most of the remarks made by Baker, Kraft, and Fentress (Letters, 25 Feb., p. 935) seem to me to be interesting extensions of various lines of thought suggested by my essay on "The ethical basis of science" (3 Dec., p. 1254). The unabridged essay contained in the book from which the article derived may offer other extensions and possibly clarification of some moot points.

I must take exception, however, to Baker's comment on my "rather Lamarckian statement connecting the 'loss of certain unnecessary structures, such as bodily hair, once clothing was invented.' " There is nothing whatever Lamarckian about the statement. It would be "Lamarckian" only if I had said or implied that the needs or desires of the human being had led to the inheritance of a trait. Natural selection is required to maintain every functioning, necessary feature at a functioning level. Whenever, by change of environment, a once useful structure becomes useless, the prevalent nature of mutation will lead progressively to its reduction or deterioration. That is to say, it is by *mutation in the absence of natural selection* that functionless structures become reduced, then vestigial, and finally disappear altogether. No geneticist or evolutionist to my knowledge would propose any Lamarckian explanation for the disappearance of useless structures. The wings of all the now wingless insects of Kerguelen have presumably been lost solely by natural selection in an environment where wings were not only useless but a positive handicap. Eyes in cave fish and salamanders are presumably no detriment, but they have lost significance and the animals have evolved to a blind or even eyeless condition.

The situation is similar with respect to human hair. All other primate species, whether living in the tropics or in temperate regions, whether arboreal or ground-dwelling, are hairy. Man, too, still possesses all his hair follicles, but the hair itself, over most of the body, is reduced and vestigial. In this respect he is comparable to the elephants or the cetaceans. Evolutionists suppose that the relative hairlessness of these mammals arose from a change in selection pressure, and it is reasonable to suppose the same is true of the human species. What was this change in selection pressure? One may postulate a positive advantage in being hairless, a disadvantage in hairiness; or one may postulate that hairiness simply became inconsequential to man. The first hypothesis does not seem very probable, because the human species, evolving in East Africa or wherever else, was in the company of other primates who did not become hairless, to judge from their modern descendants. Although the matter must of course remain without conclusive proof, it seems far more reasonable to suppose that man very early in his separate existence as a species (or genus) began wearing clothing (in the form of skins) and later using fire to warm himself. Thus he changed his environment sufficiently to make hairiness an inconsequential feature, except on the more exposed parts of his anatomy.

It is highly significant, as a support of this theory, that head hair, so clearly a protection from sun, wind, and rain, has been retained. Mutations eliminating only body hair have not been removed from the population by natural selection, while those that eliminate head hair have been extinguished. I would go so far as 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 so important to survival. In fact, 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. Thus the apparent extension of baldness as a common human trait is largely a matter of the extension of the life span. That cannot be the case for general body hairlessness.

BENTLEY GLASS
State University of New York,
Stony Brook 11790