Letters

The Value of Animal Research

I was displeased to find my arguments that interpretation of experiments of nature has played a crucial role in the scientific revolution in medicine used in support of the position of animal rights activists (Letters, 11 Aug., p. 583).

It is true that the impact of natural experiments reflected in children born with X-linked agammaglobulinemia, severe combined immunodeficiency disease, DiGeorge syndrome, and numerous other immunodeficiency diseases has been vital to an understanding of human immunobiology. However, the interpretation of such experiments regularly requires that the questions raised by studying patients at the bedside and in the clinical laboratory be taken to the basic laboratories, often to basic animal laboratories. There answers are obtained that can be returned to the clinic in a form helpful in the treatment of patients and generally useful to clinical medicine. It is the to-and-fro interaction of clinic and basic laboratory, including the animal laboratory, that represents a most incisive and productive approach to medical science. Neither clinical investigation nor basic investigations with animals should stand alone. Both must be developed further, and both must continue to be employed as crucial components of the scientific revolution in medicine.

The major discoveries and insights of modern immunology would have been impossible without animal research. Elucidation of the functions of the bursa of Fabricius in the chicken and the biological role of the thymus in the mouse represent cornerstones of knowledge that have enabled us and many others to save the lives of babies suffering from immunodeficiencies. I regularly have instructed and continue to instruct my students that among the greatest contributors to medical science in general and immunology in particular have been laboratory mice.

My life's work and that of colleagues in pediatrics, immunology, and other fields have been guided by the desire to help sick human beings. We deeply respect animal life and are scrupulously humane in the treatment of our animals. We must, however, continue to be able to proceed with analysis of the mechanisms of disease and development of new treatments without limitation by animal rights activists, "antiresearchists," or others as we search for answers to the many questions that remain: questions posed by illnesses that we cannot yet cure. Our search would be disastrously slowed, if not stopped altogether, if we could not study animals as well as human beings.

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Federal Housing and Poverty

In his letter of 23 February (p. 905), Stephen Dewhurst is in error when he argues that federal housing assistance for the poor has been slashed precipitously. He states, "in 1980, the Department of Housing and Urban Development [HUD] was funded at $32 billion, today that figure stands at just over $7 billion."

The figures Dewhurst cites are for budget authority, not actual spending outlays. Actual federal spending for low-income housing assistance in fact rose sharply during the 1980s. HUD spending increased from $12.5 billion in 1980 to $22.8 billion in the current fiscal year (*1, 2*). Federal spending on housing assistance for the poor increased from $5.6 billion in 1980 to $13.9 billion in 1988, a real increase of 65%, and has grown

to $16.2 billion in the current fiscal year (*2*, p. A-296, table 3.3). The number of families served by HUD low-income housing programs increased from 3.1 million in 1980 (*4*) to 4.2 million in 1988 and has climbed to 4.4 million today (*5*).

The budget authority figures have fallen because the federal government has shifted since 1980 from subsidizing new construction of low-income housing, where spending is authorized in advance for the life of the housing, to assisting the poor through rental subsidy certificates and vouchers, where spending is authorized one year at a time.

With federal, state, and local governments spending about $200 billion per year to help the poor, Dewhurst's suggestion that poverty in America is due to government apathy is hard to maintain. What he does not consider is that the poverty programs he touts are part of the problem, rather than part of the solution.

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1. Office of Management and Budget, *The United States Budget in Brief, Fiscal Year 1982* (Government Printing Office, Washington, DC, 1981), p. 86, table 5.
2. Office of Management and Budget, *Budget of the United States Government, Fiscal Year 1991* (Government Printing Office, Washington, DC, 1990), p. A-298, table 4.1.
3. Office of Management and Budget, *Budget of the United States Government, Fiscal Year 1990* (Government Printing Office, Washington, DC, 1989), p. 10–33, table 16.
4. W. Tucker, *The Source of America's Housing Problem: Look in Your Own Backyard* (Policy Analysis 127, Cato Institute, Washington, DC, 1990), pp. 3–4.
5. *HUD Fiscal Year 1991 Budget Summary* (Department of Housing and Urban Development, Washington, DC, 29 January 1990), p. H-36.

Racemization Dating

The dismal appraisal of amino acid racemization (AAR) dating of fossil bones by Eliot Marshall (News & Comment, 16 Feb., p. 799) implies that this research has not yielded meaningful results. This one-sided assessment is championed by P. E. Hare and is apparently based on the controversy associated with the AAR dating of some paleo-Indian skeletons from California first published in *Science* in 1974 (*1*). It is important to put the California results in their true perspective.

AAR analyses of a fossil yield D to L amino acid ratios that can only be converted to age estimates if the rate of racemization (the rate of interconversion of the enantiomers) can be evaluated. This is best accomplished by measuring the extent of racemization in a reference specimen whose age is known from some other independent dating method (*2*). This "calibration" permits the calculation of the in situ rate of racemization, which can then be used, with certain well-defined limitations, to date other similar type fossil specimens from the area. Some fossil types appear to be better suited for AAR dating than others, although each has its own unique problems. The AAR dating of bones can be problematical, but no more so than their radiocarbon dating, because both methods are similarly dependent on the extent of bone protein preservation and the absence of contaminants.

In the case of the controversial California ages (*1*), the racemization rate in bone from coastal Southern California was calibrated with the Laguna skeleton, which had been dated at 17,150 ± 1,470 years when the conventional radiocarbon (β-counting) collagen-based method was used (*3*). The calibration constant thus determined appeared reliable because the AAR age of 26,000 years calculated for the Los Angeles skeleton was consistent with its radiocarbon age of >23,600 years (*3*). With the calibration constant derived from the Laguna skeleton, AAR ages of 40,000 to 50,000 years were calculated for other coastal Southern California paleo-Indian bone, such as the Del