Letters

Scientists and Laymen

In his 20 March editorial "Nature, nurture, and behavior" (p. 1445), Daniel E. Koshland, Jr., points to recent reports on the genetic basis of Alzheimer's disease and manic depression and their contribution to the increasingly complex nature-nurture debate. Certainly his conclusion about genetics and environment is correct—few knowledgeable in the field would argue that behavior is entirely one or the other. Instead, modern research points to a complex combination of hereditary and environmental factors, although each apparently contributes to a different degree, depending on the trait.

Implicit in Koshland's discussion, however, is the belief that while scientists are able to (and presumably do) understand the complementary roles of nature and nurture, laymen tend to grasp the polarities—either nature or nurture is significant for a given trait but not both. The complex interdependence of environment and heredity in behavior "may seem obvious to a scientist, but our judges, journalists, legislators, and philosophers have been slow to learn this lesson." May I point out that historically many of the egregious uses of science in the nature-nurture debate, especially with regard to human intelligence, have been perpetrated by scientists themselves, not those Koshland cites as "slow to learn."

Nonetheless, the answer to the layman's confusion about the genetic basis of behavior must extend beyond the criticism typified in Koshland's editorial. How does he expect to resolve the conflict between the apparent need for scientific training for an understanding of the issues and the fact that most policy-makers do not have such training? After all, most would agree that prudent policy must be based on all the facts, even if they are initially incomprehensible to policy-makers. Surely criticism is, at most, only a small step toward that goal.

The solution is for those who are knowledgeable in the field to write articles and give talks to those judges, journalists, legislators, and philosophers Koshland unjustly criticizes. More than ever before, the complexity of the nature-nurture debate requires direct input from responsible individuals at the forefront of scientific research. And while the accurate diffusion of scientific knowledge to the public happens to some extent, there is substantial room for improvement. It is not enough for a scientist to be content with his own understanding of what happens on chromosome 21 when the social ramifications (and potential abuses) of such information are so enormous.

Imagine, for example, what would happen if lawyers, content with their knowledge of the legal system, refused to advise and guide their inherently less knowledgeable clients. Legal journals might be filled with criticism of laymen foundering in the courts, but that would not solve any problems. Is the example of lawyers avoiding social responsibility much different from that of scientists?

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Economic Conversion

In Mark Crawford's article, "Soviets interested in study on economic conversion" (News & Comment, 6 Mar., p. 1133), Seymour Melman is quoted as saying that the Executive Branch of the U.S. government has "shown no interest in the economic conversion perspective." Crawford appears to concur, adding that "the idea would appear to run counter to the Reagan Administration's strong defense posture." Both of these comments are misleading and oversimplify a complex issue.

A comprehensive report entitled "Economic adjustment/conversion" (*1*) was prepared by the Pentagon's Office of Economic Adjustment and submitted to Congress in July 1985. It is true that this study was conducted in response to a congressional initiative. However, every effort was made to ensure that the study was complete and objective. My own experience as author of one of the chapters certainly supports this observation.

Additional examples may be cited of research on economic conversion conducted with the support of other government agencies. The National Science Foundation supported my study (*2*) of this topic in the mid-1970s, which was itself an outgrowth of an earlier effort financed by the U.S. Arms Control and Disarmament Agency (*3*). This last volume contains the work of distinguished scholars of diverse political views, including Lawrence R. Klein of the University of Pennsylvania; Kenneth E. Boulding of the University of Colorado; Murray Weidenbaum of Washington University, ex-chairman of the Council of Economic Advisors; and Graham T. Allison, dean of Harvard's Kennedy School of Government. These items just scratch the surface of a mountain of useful work financed by government agencies.

Crawford concludes by quoting Melman to the effect that "every President since John F. Kennedy has 'followed the lead of the Pentagon in opposing such [conversion] legislation.' " Fine tuning the economy by legislation is an idea now viewed skeptically by many economists of various political persuasions, independent of the "lead of the Pentagon." It should be obvious that a command economy and a market economy approach the issue of aiding the adjustment to reduced (or more likely redirected) military spending differently. An East-West symposium to discuss such differences and related issues could be interesting and possibly useful, provided that participants bring some degree of economic sophistication and a sense of realism with them.

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Carcinogenicity of *p*-Dichlorobenzene

In an approach to setting priorities for cancer prevention, it was suggested that clinical trials of putative anticarcinogens may be more cost-effective than the animal carcinogenicity studies of high-volume chemicals such as *p*-dichlorobenzene (*1*). In 1986, the National Toxicology Program (NTP) completed carcinogenesis and toxicology studies of *p*-dichlorobenzene in rats and mice by the gavage route. The studies were peer-reviewed by the Technical Reports Review Subcommittee of the NTP Board of Scientific Counselors. This panel of nongovernmental scientists concluded that, under the conditions of the studies, *p*-dichlorobenzene–induced adenocarcinomas of the kidney in male rats caused carcinomas and adenomas of the liver in both male and female mice and did not induce neoplasia in female rats (*2*).

The International Agency for Research on Cancer (IARC) reviewed these data in March 1987 and concluded that there was sufficient evidence of carcinogenicity in experimental animals. There were no data in humans, but the IARC Working Group placed 1,4-dichlorobenzene into Group

2B—"The agent is possibly carcinogenic to humans" (*3*).

p-Dichlorobenzene is used primarily as a space deodorant and for moth control. The solid form is commonly used to mask odors in toilets. Domestic production of 73.5 million pounds was reported for 1984 (*4*). It has been estimated that more than 9000 workers were exposed to the chemical occupationally in 1980 (*5*). Significant numbers of consumers are also exposed from the use of products containing *p*-dichlorobenzene. The concentration of *p*-dichlorobenzene in personal air samples from individuals at sites in five states ranged from below 0.02 to 1550 micrograms per cubic meter in nighttime air and from below 0.02 to 2600 micrograms per cubic meter in daytime air (*6*).

As a result of the findings of the NTP carcinogenesis studies, the Consumer Product Safety Commission and the Office of Toxic Substances of the Environmental Protection Agency are conducting risk assessments of *p*-dichlorobenzene to aid them in making risk management decisions.

The findings from the NTP carcinogenesis studies reinforce the need for caution in making analyses as to cost-effectiveness of differing research approaches to the prevention of cancer.

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EDB: Persistence in Soil

Recent studies (*1*) have revealed a neglected aspect of the behavior of organic compounds in soil or sediment that we believe has important implications. Compounds added to soil can, with time, diffuse to remote sites in the soil matrix, where they are inaccessible to microbial degraders and from which they can slowly leach to water supplies over exceedingly long periods.

We have found that the soil fumigant 1,2-dibromoethane (EDB) persists in topsoil at nanogram-per-gram concentrations for at least 20 years despite its predicted lability in the environment (that is, high volatility, high water solubility, and low soil-water partition coefficient). In these soils, a spike of ^{14}C-labeled EDB was rapidly mineralized, whereas the "residual" EDB remained unchanged.

Experiments further showed that this "residual" EDB is strongly bound. It can only be extracted from soil with polar solvents at elevated temperatures. Surfactants show no enhanced extraction ability. Thermal desorption up to 200°C into a stream of N_2 resulted in more decomposition than desorption, while a fresh spike of ^{14}C-labeled EDB was recovered quantitatively. Diffusion of "residual" EDB from soil into water is very slow at 25°C and is highly temperature dependent. The rates yield an upper limit of the apparent diffusion coefficient within particles on the order of 1×10^{-16} square centimeters per second, or 11 orders of magnitude smaller than that expected in water. The diffusion rates correspond to half-equilibration times of two to three decades in a 1:2 soil to water suspension, qualitatively consistent with the observed persistence in the field.

Soils fumigated in our laboratory result in a mix of labile and "residual" EDB. "Residual" EDB is readily liberated by pulverization of the soil in a ball mill, leading us to conclude that it is entrapped in micropores in soil aggregates rather than sorbed by physical or chemical interactions alone.

Karickhoff (*2*) has shown that sediments continue to sorb hydrophobic compounds indefinitely from water at a slow rate after the initial rapid uptake. We believe these results have important implications for the fate of other organic compounds in soil. First, misleading results can be obtained when studies of microbial degradation, sorption, desorption, and analytical recovery are conducted with freshly spiked soils or sediments. Consequently, mathematical fate models that assume rapid and reversible sorption equilibrium may be invalid. Of greater importance, compounds thought to be labile that become physically entrapped in soil can leach gradually to water supplies over decades. We have observed this phenomenon in Connecticut where EDB is present throughout the soil column beneath a tobacco field last fumigated in 1967, including the saturated zone where ground water flow is rapid (*3*). Also, unexpected retardation of contaminant plumes in aquifers may occur, as observed in recent field experiments with an injection of organics of low molecular weight which showed increased retardation with time (*4*). Finally, present efforts to devise microbial or extractive techniques for remediation of contaminated soils may fail if the organic contaminants have become physically entrapped in soils.

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Data on Immigrants' Taxes

I would like to add a point of information to "The economic consequences of immigration," by George J. Borjas and Marta Tienda (6 Feb., p. 645). The article indicates that, in general, no data are available on taxes paid by immigrants. One notable exception is the data series on federal income taxes paid by the Southeast Asian refugees who arrived from 1975 through 1979. Updated yearly in the "Report to Congress" published by the refugee resettlement program of the Department of Health and Human Services, this series shows that in 1984 these former refugees reported more than $1.5 billion in income and paid $138.5 million in federal income taxes.

As Borjas and Tienda note, such economic contributions must be balanced against immigrants' impact on social expenditures. To ignore them would be like discussing immigration without recognizing the existence of return migration.

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Erratum: In Eliot Marshall's article "Academy rejects Huntington nomination" (News & Comment, 8 May, p. 661), the affiliation of Herbert Simon should have been given as Carnegie-Mellon University of Pittsburgh, not the University of Pittsburgh.