Letters

Technology Incentive Programs

The briefing on civilian R & D (News and Comment, 1 Aug., p. 360) refers to a report (*1*) prepared for the Joint Economic Committee of Congress by Robert Gilpin of Princeton University. According to the briefing, "The best way to encourage innovation is by 'demand-pull,' not 'technology-push': in other words by creating the market conditions that stimulate innovation rather than by creating new technology and hoping that a market will materialize for it. Most of the technology incentive programs run by the National Science Foundation and other agencies have in fact followed the technology-push strategy, which may be why they have not yet fulfilled the expectations of their creators."

This news account does not refer to a discussion in the Gilpin report (*1*, pp. 67, 71) of the Experimental Technology Incentives Program (ETIP) at the National Bureau of Standards. First, ETIP is the only technology incentive program now operating. The National Science Foundation program has been defunct for over a year, and there were no others. Second, in his report, Gilpin, in fact, praises ETIP for its "demand-pull" approach to innovation policies.

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References

1. R. Gilpin, *Technology, Economic Growth, and International Competitiveness* (Government Printing Office, Washington, D.C., 1975).

Fluorocarbons

The use of the word "fluorocarbons" (News and Comment, 27 June, p. 1286) to include such chlorine-containing compounds as the Freons is misleading. To condemn the entire class of fluorocarbons as a danger to the environment may block one of the most promising means of solving the stratospheric ozone problem.

Fluorocarbons are compounds of carbon and fluorine only. The suspect compounds are fluorocarbon chlorides. Fluorocarbons cannot generate chlorine upon radiation. Chlorine-free fluorocarbons can replace the Freons and other chlorine-containing compounds in aerosols and refrigerants with only a moderate increase in cost and minor adjustments of equipment.

The loose use of the word fluorocarbon may not mislead professional chemists, but if lawyers and politicians include the term in laws and regulations, the replacement of the suspect chlorine-containing compounds by chlorine-free fluorocarbons may be prevented.

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Anthropocentrism and Evolution

As a biological anthropologist, I found W. H. Murdy's ideas on anthropocentrism (28 Mar., p. 1168) professionally relevant and personally stimulating. For the most part I concur with his views. His philosophical interpretation of anthropocentrism, grounded in evolutionary theory and ecological awareness, is basically the same rationale which I use to justify the pursuit of my own anthropocentric discipline—a rationale which I am probably more aware of than many anthropologists, since many of my data and conclusions derive from nonhuman populations. However, I find one fundamental part of his argument intellectually disturbing: his assertion that human survival is dependent on a belief in the human phenomenon within "a meaningful whole."

Murdy quotes Teilhard de Chardin (*1*) and Boulding (*2*) in support of the subjective idea "that we are essential elements of a meaningful whole and that our individual acts are vitally significant to the self-actualization of the process of human evolution itself and to the enhancement of value in the world." Perhaps Murdy is simply proposing the above as a critical item of faith, regardless of its verity—"critical" because he feels that such a belief "may be requisite to the future survival of the human species and its cultural values." However, Murdy seems to be propounding "the right thing [anthropocentrism] for the wrong reason" (*3*).

I, too, have an anthropocentric bias toward (but not necessarily "belief" in) the "value, meaningfulness, and creative potential of the human phenomenon," but my feelings can be explained in bioscientific terms without relying on the biomystical teleology of Teilhard de Chardin or others. In addition, I do not need to believe that the world or the universe has any ultimate meaning, at least in terms which I can ever comprehend (*4*) to understand why I am anthropocentric.

In the first place, it simply is not true, as Murdy states, that the "modus operandi of biological evolution" is "unbridled self-indulgence on the part of one generation without regard to future ones"—at least if this means that members of one generation do not invest time, effort, and, occasionally, their lives in enhancing the chances for survival (and, eventually, reproduction) of their offspring. Such parental investment is a basic form of kin selection, and even nonparental altruism may be explained in terms of natural selection (*5*). Populations which do not display some altruistic behavior (consciously or otherwise) toward at least some members of successive generations will probably become extinct.

Likewise, it is not really surprising that I am anthropocentric; both my culture and my genes (the products of very long periods of selection) have strongly predisposed me toward such an attitude. It is (or has been) a very adaptive attitude in most situations and, in evolutionary terms, that is what counts. However, it is not an attitude which necessarily reflects "meaningfulness" in the universe; nor must I accept a "belief" in such meaningfulness in order to accept my anthropocentrism. Beyond this, I am more than willing to accept the kind of anthropocentrism which Murdy advocates, even though our reasons for doing so may differ.

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References

1. P. Teilhard de Chardin, *The Future of Man* (Harper & Row, New York, 1964), p. 296.
2. K. E. Boulding, *The Meaning of the Twentieth Century* (Harper & Row, New York, 1965), p. 163.
3. N. R. Hanson, *Observation and Explanation: A Guide to Philosophy of Science* (Harper & Row, New York, 1971), p. ix.
4. G. S. Stent, *Science* **187**, 1052 (1975).
5. R. A. Fisher, *The Genetical Theory of Natural Selection* (Dover, New York, ed. 2, 1958); W. D. Hamilton, *J. Theor. Biol.* **7**, 1 (1964); *Nature (Lond.)* **228**, 1218 (1970); *Annu. Rev. Ecol. Syst.* **3**, 193 (1972); J. L. Brown, *Nature (Lond.)* **211**, 870 (1966); G. C. Williams, *Adaptation and Natural Selection* (Princeton Univ. Press, Princeton, N.J., 1966); R. L. Trivers, *Q. Rev. Biol.* **46**, 35 (1971); D. T. Campbell, *J. Soc. Issues* **28**, 21 (1972); P. J. Darlington, *Proc. Natl. Acad. Sci. U.S.A.* **69**, 293 (1972).

The only trouble with anthropocentrism, whether the old kind or Murdy's modern but indistinguishable version, is that it just isn't good enough. To dress the self-centeredness of the species in such lofty terms