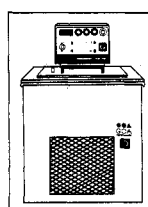


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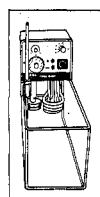
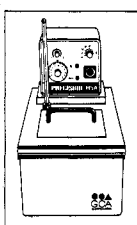
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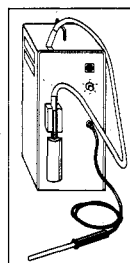
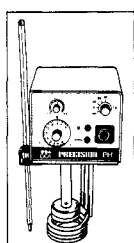
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## LETTERS

### Evolutionary Studies

In his interesting article about the creationist suit recently tried in California (News and Comment, 20 Mar., p. 1331), William J. Broad notes that this deliberately limited case could prove to be a mere prelude to a major series of legal battles over basic constitutional issues. As adumbrated by the creationist attorney Richard K. Turner, exposing the "religious" nature of evolutionary "beliefs" will be part of the fundamentalists' legal strategy.

Turner cites Popper's falsificationist theory of science, and the notorious deduction that the inability to make predictions denies scientific character to evolutionary theory. In 1980, Popper dissociated himself from this deduction which claims evolutionary studies to be "metaphysical" (1). In these circumstances, Popper's exact words should be quoted: "It appears as if some people would think that the historical sciences are untestable because they describe unique events. However, the description of unique events can very often be tested by deriving from them testable predictions or retrodictions." In short, Popper has now defended the scientific character of the theory of evolution and of paleontology.

Popper's own statement, made after critical reexamination of his views on the methodology of science, proves much broader than those of many experimentalists who claim his views as the basis of their scientific operations. A similarly narrowed view of Darwinism has dominated adaptational research with theories based on current and immediate optimality of all structures and processes. This restrictive research program has been criticized recently by Gould and Lewontin (2), who have set out a number of alternatives in an elegantly presented essay which supports Darwin's own pluralistic approach to evolutionary studies. Credible and successful scientific defense in future creationist trials could require that scientists avoid making narrowly restrictive and unnecessarily dogmatic statements about their scientific methodology.

W. D. RUSSELL-HUNTER  
Department of Biology,  
Syracuse University,  
Syracuse, New York 13210

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1. K. Popper, *New Sci.* 87, 611 (1980).
2. S. J. Gould and R. C. Lewontin, *Proc. R. Soc. London Ser. B* 205, 581 (1979).

### Population Growth and Energy Use

In his editorial "It is people who use energy" (30 Jan., p. 439), Kingsley Davis proposes population growth as a major cause of the energy problem.

In the United States, even if population had remained constant from 1955 to 1978, total energy consumption would have increased by 51 percent. To compensate for the increase in per capita energy consumption, the 1955 population would have had to fall by 56.2 million people or 34 percent by 1978.

Davis says worldwide consumption of energy has been growing at a rate of 3.5 percent per year. By contrast, population has been growing at a rate of between 1.7 and 1.8 percent. Thus, while population growth may be a major cause of rising energy consumption, one cannot disregard per capita consumption.

Per capita energy consumption in industrialized countries in 1978 was about 44 times higher than in low-income countries. The estimated annual population growth rates for these two groups of countries were 0.7 percent and 2.2 percent, respectively. While low-income countries accounted for 30.5 percent of the 1978 world population, they consumed only about 2.4 percent of the energy resources. In comparison, industrialized countries accounted for only 15.7 percent of the world population but consumed about 54.4 percent of the energy resources (1). A decrease in worldwide population growth rates, without a decrease in per capita energy consumption in industrialized countries, cannot solve the global energy problem.

ANRUDH K. JAIN

International Programs,  
Population Council,  
One Dag Hammarskjöld Plaza,  
New York 10017

#### References and Notes

1. Based on data included in tables 1, 7, and 17 of *World Development Report, 1980* (World Bank, Washington, D.C., 1980). This report classifies 125 countries in six groups: low-income, middle-income, industrialized, capital-surplus oil exporters, and centrally planned economies. Countries in these six groups accounted for 30.5, 20.6, 15.7, 1.4, and 31.8 percent of the 1978 world population but consumed about 2.4, 9.1, 54.4, 1.1, and 33.0 percent of the energy resources in 1978.

Davis infers that part of the energy problem in the United States is that we are letting in too many refugees. People use energy, true. However, I doubt that immigrants are the ones who are surrounded by electrical gadgets at every turn, keep comfortably warm or cool despite the weather, and drive their own cars (plural per family) rather than sup-