However, coal mining in the Donetz basin is infamous, and 40% of all rail transport in the U.S.S.R. is moving coal. Most observers would agree that the Russians are less careful about accident prevention and pollution control than we are in the West, and emissions from generating plants are less carefully controlled. These emissions were reported in general to the Organization for Economic Cooperation and Development for a 1977 study (*6*). From this it became clear that coal burning in the U.S.S.R. contributes to Western European air pollution and is thereby as serious internationally as the long range transport of the radioactive iodine and cesium from Chernobyl.

From these considerations I estimate that, although the Soviets burn less coal than we do in the United States, the average effects on public health are similar. The death toll from coal burning in the U.S.S.R. on this basis is then between 5,000 and 50,000 individuals per year. A Department of Energy report (*7*) calculates that 20,000 cancer cases worldwide may be caused by Chernobyl. Only 200 of these will be among people exposed to radiation levels where there are data. The calculation depends on an extrapolation of the dose-response relation to very low doses and dose rates. The authors of the report remind the readers that the number could be zero. This uncertainty is similar to, although not identical to, the uncertainties of the air pollution estimates. That 20,000 lies between 5,000 and 50,000 is the basis for my statement that the average public health effects are similar.

Society has always treated accidents in which a number of people are killed or injured in one incident differently from the way they treat the continuous death toll of day-to-day operations (*8*). A coal mining accident killing 100 miners is news; the yearly death toll of more than 100 miners by accident is not. To equate the average effect on public health of accidents and the effect of continuous operation would therefore not correspond to public perception and would be what I called "too narrow an application of risk-benefit analysis." I would definitely recommend *against* any nuclear power program that involves a Chernobyl-size accident once a year, even if it were to replace a similar number of deaths from coal burning. However, it is up to the public, when presented with these comparisons, to decide whether or how often such large accidents may be permitted, or whether to revert to older technologies that are more hazardous on average.

Lawless mentions a number of other issues related to the Chernobyl accident that must be included in an overall summation of health effects. One is negligible, as implied in my article; Kiev never had to turn to alternative sources of drinking water, so the health effects of doing so were small or nonexistent. No accidents or illnesses were reported during the evacuation, and it is unlikely that more than ten or so would go unreported. Another effect is clear: the Soviet authorities take the accident very seriously, so those evacuated have, and will have, much better medical care than the average in the Soviet Union.

There was some trauma in the Western world (not mentioned by Lawless), but we must depend on Soviet sources for details of most of the effects he lists. In a video link to the United States in early September 1986, the chief pediatrician of the Ukraine stated that 400 normal children had been born to mothers who were among the 115,000 persons evacuated. She made a plea to the Western world not to exaggerate the health effects of the accident and produce unreasonable fear among the children. The point is clear; some of the adverse effects that Lawless describes depend critically on public reaction to the accident. For most of the evacuees, the process was orderly and relatively painless.

If, therefore, I make estimates of what I think the effects of the evacuation are on health, I find figures much lower than the 20,000 hypothetical cancers listed by the Department of Energy (*7*). However, these effects are even more uncertain than the effects of radiation or of air pollution at low levels and are strongly influenced by the societal response to accidents. I believe the Soviet response to the Chernobyl accident was remarkably good. I hope the response of America to such an accident, in any industry, would be as good as it was in the Ukraine. However, such optimism may be modified by a comparison of public behavior during the New York blackouts of 1963 and 1977. Technically, the former was more serious, whereas the bad public behavior in the second was expensive.

A good response depends on understanding, to some extent on prior training, but primarily on a general refusal of society to panic and a willingness of those controlling the accident to do their jobs without hesitation, as the firemen did so bravely at Chernobyl.

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5. For example, E. E. Shpilrain of the Academy of Sciences of the U.S.S.R. repeated without comment data from (*1*) at a seminar on cooperation in nuclear power in Rome in 1986. He also stated that he knew of no comparable statistics in the U.S.S.R.
6. *The Organization for Economic Cooperation and Development Programme on Long Range Transport of Air Pollution: Measurement and Findings* (Organization for Economic Cooperation and Development, Paris, 1977).
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8. R. Wilson and W. Jones, *Energy, Ecology and the Environment* (Academic Press, New York, 1974).

Arresting Vocabulary

As a technical editor, I found the first two sentences of the report by J. William Schopf and Bonnie M. Parker (3 July, p. 70) arresting—literally, as I have been unable to read further into the report. I'm (temporarily, I'm sure) spellbound by the nuggets of invective lying there in plain view. I can now address my putative father as "you dubiofossil!" and some unsuspecting opponent in group debate as "You contaminant!" Doubtless the term "pseudofossil" also may have rich application outside its paleontological home, perhaps as a categorization for Machiavellian young professors who unleash their high spirits only when off duty.

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Erratum: In table 2 of the report "Free energy calculations by computer simulation" by P. A. Bash *et al.* (1 May, p. 564), two minus signs were omitted. The $\Delta(\Delta\delta)$ for the transformation of thymine to cytosine and that for adenine to guanine should have been -5.24 ± 0.33 kcal/mol and -6.95 ± 0.54 kcal/mol, respectively. In the caption for figure 2, the structure designations for the "additive" model and the real model of *p*-nitrophenol were reversed. The first two sentences of the caption should have read, "Partial charges determined with the methods described in (*19*) with the use of a 6-31G* basis set for phenol (**1**), nitrobenzene (**2**), benzene (**3**), and *p*-nitrophenol (**5**). The partial charges for the additive model of *p*-nitrophenol (**4**) were determined as follows. . . ."

Erratum: In Leslie Roberts' Research News article "Agencies vie over human genome project" (31 July, p. 486), the new executive office subcommittee on the human genome was incorrectly identified as part of the Biotechnology Science Coordinating Committee. It is actually a subcommittee of the Domestic Policy Council Working Group on Biotechnology.

Erratum: The caption for the photograph on page 1405 in Leslie Roberts' article "Federal report on acid rain draws criticism" (News & Comment, 18 Sept., p. 1404) incorrectly implies that acid rain has damaged spruce trees on Whiteface Mountain. The cause of the spruce decline is not yet known, although air pollution is generally believed to have contributed.