Letters

SDI Survey

R. Gange, in his recent letter (16 Jan., p. 268), writes that the negative response to the Strategic Defense Initiative found in the Cornell survey of National Academy of Sciences members resulted because the scientists "were polled on a system dissimilar to the one needed to satisfy the goals of SDI." According to Gange, the survey "stated" that the purpose of SDI is to defend the U.S. civilian population, whereas the true purpose, he informs us, is "to preserve a U.S. capability to retaliate in the event of a Soviet nuclear first strike." Gange misrepresents both the survey and the SDI program.

The ten questions in the survey dealt with a wide range of issues, such as the testing of an SDI system (87% said it probably could not adequately be tested), and the prospects that an SDI system could meet the Administration's performance criteria of survivability and cost-effectiveness (80% said the prospects were "poor" or "extremely poor," while 4% said the opposite). The issue of population defense was strictly confined to Question 6, which asked how many attacking Soviet warheads an SDI system would have to destroy to provide such defense (74% of the respondents said that more than 99% of the warheads would have to be destroyed). The survey contained no comment regarding whether or not the purpose of SDI is population defense.

However, the most authoritative Administration officials have been quite explicit about it. President Reagan said that SDI "is not and should never be misconstrued as just another method of protecting missile silos" (*1*). According to a declassified version of National Security Decision Directive No. 172, authorized by the President in May 1985, "The purpose of the defensive options we seek is clear—to find a means to destroy attacking ballistic missiles before they can reach any of their potential targets. . . . Thus, the goal of our research is not, and cannot be, simply to protect our retaliatory forces from attack" (*2*). Defense Secretary Weinberger said that SDI "will not be intended to defend our strategic weapons systems" (*3*); "it is not our missiles we seek to protect but our people, and we must never lose sight of that goal" (*4*). This is how the Administration represents the program to Congress and the public, despite Gange's contrary opinion of the goal of SDI.

The sharply negative reaction to SDI among members of the National Academy of Sciences was not created by the survey, but merely quantified by it. Judging from the results, it appears that a very large majority of Academy members in the physical and mathematical sciences regard SDI as technically unsound. The final report on the survey results is available from me on request.

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2. *Special Report No. 129* (Department of State, Washington, DC, June 1985).
3. C. W. Weinberger, *Annual Report to Congress*, 5 February 1986.
4. ———, Pentagon press conference, 1 July 1986.

Nuclear Winter Debate

My participation in current research and acquaintance with both the "TTAPS" and the National Center for Atmospheric Research groups prompts me to offer some perspective on the debate about climatic effects of nuclear war. Although it coined the provocative phrase "nuclear winter," the article by Turco, Toon, Ackerman, Pollack, and Sagan (*1*) merely concluded that land surface cooling of highly uncertain although possibly dramatic magnitude is a plausible consequence of a nuclear exchange—an assertion that none of the more accurate, three-dimensional computations performed since that time have refuted (*2*). Unfortunately, the TTAPS "baseline" result of 35°C cooling from a hemispheric mean annual average of 15°C—which TTAPS pointed out was exaggerated due to the model's neglect of ocean heat storage—was subsequently treated in much of the press as definitive truth (and also extended to the Southern Hemisphere on the assumption that the smoke would spread globally, but without considering the consequent reduction in smoke density). Hence the popular perception that "nuclear winter" equals global deep freeze. Meanwhile the three-dimensional simulations painted a far less apocalyptic picture even though they confirmed that massive smoke injections into the middle to upper troposphere could lead to dramatic surface cooling and some interhemispheric transport.

The TTAPS group is guilty at least of lack of energy in combating distorted reporting of their model's results, as well as a tendency—apparent in some of the remarks quoted by Eliot Marshall (News & Comment, 16 Jan., p. 271)—to imply that their original findings are as good as inscribed on stone tablets. In fact, the best guess ventured in (*1*) was, considering the moderating effects of ocean heat storage, the 35°C land surface temperature drop predicted by the model ought to be reduced by about 30% in continental interiors and 70% along coastlines, that is, by roughly a factor of 2. The latest generation of three-dimensional models (*3*) do indeed show land surface temperature drops in the general range of 10° to 20°C for Northern Hemisphere middle latitudes when smoke is injected into the atmosphere in the northern summer, but substantially smaller cooling is indicated for the tropics and the Southern Hemisphere, or when smoke appears in other seasons.

All this may be interesting from some abstract intellectual perspective, but from a more pragmatic standpoint it matters little whether the climatic damage of nuclear war would by itself serve to destroy civilization. There should be little doubt that other, better-known consequences of a nuclear exchange would be sufficient. I believe the most valuable result of the "nuclear winter" debate will be to force people to face that disturbing fact.

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REFERENCES AND NOTES

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2. For example, see C. Covey, S. H. Schneider, S. L. Thompson, *Nature (London)* **308**, 21 (1984); S. L. Thompson, *ibid.* **317**, 35 (1985); R. C. Malone, L. H. Auer, G. A. Glatzmaier, M. C. Wood, O. B. Toon, *Science* **230**, 317 (1985).
3. R. C. Malone, L. H. Auer, G. A. Glatzmaier, M. C. Wood, O. B. Toon, *J. Geophys. Res.* **91**, 1039 (1986); S. L. Thompson, V. Ramaswamy, C. Covey, in preparation.

It escapes me why we spend even a single dollar, much less $5.5 million, annually, to find out whether a nuclear holocaust will deep-freeze the earth, or whether it will not result in that and only pulverize Washington, Moscow, Leningrad, Boston—and cause the starvation of "hundreds of millions or even billions" of people elsewhere.

At issue is not a question of science. At issue is a military-political debate on whether or not a nuclear exchange can be risked. The answer is obvious. So why don't we instead invest $5.5 million more annually for something useful, like fostering cross-cultural understanding to reduce the suspicion that fuels the arms race?

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