

There is a glaring omission among the recommendations. No role is assigned to science teachers. Are not the ecological principles underlying these problems those which receive major emphasis in school biology courses? A full appreciation of food chains, population balances, and biological evolution would certainly help the citizenry to act intelligently toward solving environmental pollution problems. Another recent report on the environment by a 30-member task force of the American Chemical Society made 69 recommendations (2). The closest any of these came to involving science teachers asked for an extensive educational program by government agencies to teach pesticide users the optimum methods of pest control.

Recently, Congress has been studying legislation to protect consumers from possible injury by household chemicals. Here again, science teachers, if properly encouraged to teach safety precautions, could make such legislation superfluous.

Dozens of local, state, and federal programs are being launched to help young people bypass the risks to health and character caused by using alcohol and drugs. The general practice of not involving science education with such programs is doubly soul-searching. The vital messages of these programs are diluted with many warnings on much less lethal matters, and the total effect is so diminished that science teachers must continue to face young minds and bodies who are flirting with total destruction. Preventive education is essential. Our environment has already undergone extensive damage. So have large segments of our disadvantaged population. And, most amazing, the logical thought processes of science are losing ground during this "Age of Aquarius" and there is a resurgence of faith in astrology, superstition, and all such hanky-panky.

Does science teaching deserve to be ignored? Maybe the thousands of men and women who teach elementary and secondary school science are suffering from a bad image. Certainly there have been few programs recently intended to improve that image. During the years after Sputnik, many voices proclaimed the shortcomings of the science teaching profession. Now is the opportunity to measure the capabilities of this profession when urgent problems need to be solved. The nation's science teachers are ready, willing, and able to work on these programs. Con-

gressmen, Cabinet officers, industrial leaders, and members of the communications media should be urged to utilize this great national resource—while there is still time.

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References

1. *Report of the Secretary's Commission on Pesticides and Their Relationship to Environmental Health*, Dept. of Health, Education, and Welfare (Government Printing Office, Washington, D.C., 1969).
2. *Cleaning Our Environment: The Chemical Basis for Action* (American Chemical Society, Washington, D.C., 1969).

J.C.T.: Environmental Scapegoat

Lewis Moncrief's article, "The cultural basis for our environmental crisis" (30 Oct., p. 508), is perhaps one of the most important contributions to the amelioration of that crisis that *Science* could have made. The damage done by Lynn White's article (1), most of it by amplification of White's errors, so carefully pointed out by Moncrief, has spread far and wide outside of the technical community. So many, including especially that part of the religious community which has experienced a failure of nerve, have now found a scapegoat for our crisis in "the Judeo-Christian tradition" (J.C.T.) which distracts them from more real culprits. . . .

Moncrief has pointed out that there is no evidence that in other cultures where the same level of wealth exists, the environment has deteriorated less. While comparisons are odious, I find it difficult to hypothesize that, given Calvinistic emphasis on cleanliness as a virtue, a village in Europe would have managed its waste less well than a typical one in India, or Africa, or Brazil. It is sheer ignorance of history compounded by unbecoming brazenness to equate *contemporary* American habits with the J.C.T., the Protestant ethic, Puritan narrow-mindedness, or any other favorite whipping boy. Surely a much better statistical case could be made to correlate environmental degradation with *lessening* of the hold of the J.C.T. at the *personal* level in America. . . .

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Reference

1. L. White, Jr., *Science* 155, 1203 (1967).

Moncrief proposes a model for environmental degradation which follows the steps: Judeo-Christian tradition→capitalism and democratization→urbanization, increased wealth and population, individual resource ownership→environmental degradation. Goldman ("The convergence of environmental disruption," 2 Oct., p. 37), however, clearly shows that environmental degradation in the Soviet Union demonstrates that "not private enterprise but industrialization is the primary cause of environmental disruption." Indeed, as he points out, the state planning officials in the Soviet Union "are judged almost entirely by how much they are able to increase their region's economic growth." It has long been obvious that attempts to interfere with such plans are punished harshly by the Soviet regime.

Goldman substantiates his thesis with an impressive account of pollution in the Soviet Union. Further substantiation may be found in Kasymov's account (1) of the destruction of aquatic life in the Caspian Sea by Soviet industry. Countries that are as yet undeveloped are hastening to make their contribution to consumption of the environment by satisfying the demands of their populations.

Surely it is time to stop constructing spurious "models" such as that of Moncrief. "Environmental degradation" stems from the desire of human beings for food, shelter, health, leisure, amenities, and luxuries. The process is evidently accelerated by any centralized sociological system.

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Reference

1. A. G. Kasymov, *Mar. Pollut. Bull.* 1 (NS), 100 (1970).

Galápagos Verging on Desecration

I recently returned from a trip to the Galápagos Islands. It was a magnificent experience, but I learned of some extremely distressing conditions.

In the game reserves of Africa, all tourists must be accompanied by a ranger, but in the Galápagos, where the government of Ecuador has begun promoting tourism, no such precautions are being taken. If a ranger could be stationed on each of the islands, this would insure the preservation of the environment. In addition to the damage

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which tourists can do, the introduction of pigs and goats by man has caused tremendous destruction. For example, in 1959 it took a full day to walk from the shore to the top of the cone on Abingdon Island. That year a fisherman introduced three goats on the island; today the goat population is estimated at 5000 and it is a brisk 2-hour walk to the top of the cone. Dr. DeVries, director of the Darwin Station, now has an annual operating budget of \$20,000 which covers fuel for the generators, food, supplies, and salaries for the local help. He estimates that a budget of \$75,000 would enable him to place a ranger on each island and thus (i) protect wildlife from the tourists, and (ii) enable the rangers to hunt out the wild pigs and goats.

As illustrated so well by the Sierra Club and National Geographic publications, the flora and fauna on these islands are unique in the world. Unfortunately, Ecuador is not determined to preserve them as I learned from a United Nations official who had just attempted to persuade the government to apply for U.N. funds for conservation projects. He was told that the Galápagos were well provided for. Ecuador is understandably interested in its mainland problems.

Someone must try to preserve the Galápagos. Shouldn't the people who are alarmed about a desecrated U.S. environment do something to preserve one that is not yet destroyed before it is too late?

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When Information Becomes Knowledge

The letter from Jean Sicé (30 Oct.) uses an article of mine to support a statement with which I do not agree. The statement was: "Most examinations, however, test only straight recall." What I wrote in the cited article on that point was this: "... most achievement tests ... consist primarily of items testing specific elements of knowledge; facts, ideas, explanations, meanings, processes, procedures, relations, consequences, and so on" (1). While recall is surely involved in responding to such items, as it is in any other use of knowledge, straight recall would seldom provide a sufficient basis for response.

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