Letters

March of "Progress"

Those seeking an explanation for the disaffection of the young for science and technology need look no further than Thimann's editorial (30 May, p. 1013). To compare the localized air pollution of the Midlands or Pittsburgh, or the prevalence of pathogens in local water supplies with our present conditions of global pollution of the environment, and to conclude that civilization has gained, borders on sophistry. In an age when pesticide residues are present in the tissues of animals from pole to pole and entire species of birds are on the verge of extinction due to disruption of their calcium metabolism by these residues, it is small wonder that there is skepticism about the net benefits of technology. The misuse of our technology has enabled us to totally destroy the ecological balance of bodies of water the size of Lake Erie and Lake Baikal and foul every major river system in North America. Undoubtedly this accomplishment weighs against our triumph over dysentery in the minds of the impressionable young.

To speak of the anticipated elimination of pockets of poor nutrition on the eve of impending world famine seems complacent optimism. At present only about ten of the world's nations produce as much food as they consume, while only three or four are able to export a surplus. The increasing global population pressures which lie at the root of the great majority of society's ills have been hastened by the very technological benefits Thimann cites. Science and technology have proven extremely effective at death control, for the ethos of our culture was already geared for the use of advances in the saving and prolonging of human life. Our culture has not evolved to the point where we can effectively take advantage of already developed technology in birth control.

At a time when the stork has passed the plow and our societies are still harnessed to preindustrial values, ethics, and institutions, the message for teachers to bring to the idealistic young is that the power for good or evil lies not in the tool, nor in the hands of the smith who fashions it, but rather in the wisdom of its user.

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. . . Some people may worry about the minimal level of malnutrition in southern states; I worry about the gross malnutrition and actual starvation in literally millions of children and adults in Biafra, India, and South America. Can anyone truthfully say there is less malnutrition in the world today than there was 50 years ago?

The work of the International Rice Research Institute is truly remarkable, but has it actually "changed the whole nutritional future of Asia"? Increasing the rice yield by even ten times can have little lasting benefit as long as the rate of population growth continues unchecked. Nutrition is only one aspect of the tremendously complex population problem. . . .

Science and technology can obliterate the "residual blemishes and pockets," as Thimann suggests, but they are doing so by burying them under worldwide problems of an entirely new dimension.

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Malnutrition Research

Although hunger and malnutrition in the United States have received much publicity in recent months, almost no public attention has been given to the medical considerations such as precise diagnosis, research needs, and preventive medicine. These are serious matters which should be of major concern to the scientific community. Malnutrition is a *health* problem even though the expanded feeding programs now being considered by Congress are essential.

Preliminary information from the National Nutrition Survey being conducted under Arnold E. Schaefer (director of the nutrition program of HEW) indicates that serious malnutrition exists in some areas. A subsequent investigation of some of the findings, such as the significance of unacceptably low vitamin concentrations, the pathogenesis of anemia, and so forth, is essential.

To ensure an optimum nutritional state for the people, one must involve the entire health and scientific communities, in addition to welfare agencies, the Department of Agriculture, and the food industry. Research in clinical nutrition should be a basic part of this task. For example, despite frequent mention of the evil nutritional effects of parasites, very little is actually known. Almost nothing is understood of the causes and ill effects of eating clay and starch. Yet preliminary findings in the National Nutrition Survey indicate that up to 20 percent of persons questioned in some areas may practice geophagia. The effects and the pathogenesis of deficiency of some trace elements should be studied by the clinician working in conjunction with the basic scientist. It is undoubtedly true, and enormously important, that malnutrition can impair mental development, yet a precise knowledge of the mechanisms is meager.

These few examples of the need for well-coordinated and adequately supported research in clinical nutrition should serve to indicate that prevention of malnutrition in this country is unlikely to occur if the major focus is limited to providing enough money to feed people. In industry sound management practice dictates that a substantial portion of the budget be devoted to research and development. Shouldn't this also be true of a budget allocated to solutions for such a complex and serious problem as malnutrition which is occurring in the most affluent country in the world?

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Pleas of Temporary Insanity

While watching a nationwide telecast of an interview with Sirhan Sirhan, I was struck by his hazy recollection of the events leading up to and immediately following the assassination of Robert Kennedy. Assuming his report was not deliberately fabricated, one received

the impression from it that a trance-like state was experienced by Sirhan throughout the whole tragic episode which was indicative of his deranged frame of mind. It occurred to me that such testimony, which conceivably could be used to support a hypothesis of temporary insanity, is actually evidence for the existence of retrograde amnesia brought about by the shock of the incident.

The retrograde amnesia effect is a well-known and highly reliable phenomenon and has been extensively investigated. Readers will find an excellent report on the phenomenon by McGaugh (*1*). Retrograde amnesia refers to the memory loss of those occurrences immediately preceding a sudden stimulus event. In most cases the stimulus is intense; an electric shock to the cortex is often used experimentally. However, simply a mild, but unexpected, verbal item has been known to suffice (*2*).

If retrograde amnesia is a plausible cause, then a rather interesting question occurs concerning the legitimacy of a plea of temporary insanity. Is it not possible that the assassin is truly in complete control of his faculties up to the moment the victim is felled? The situation that ensues would be intense (traumatic) and, for the murder, unanticipated since it is probable that no thought is given to events beyond the assassination itself. Thus the circumstances which follow the killing might serve to erase or weaken the memory of the events that preceded, thereby giving an illusion of insanity existing prior to and during the bloodshed. Comments from those who are closer to this effect than I may cast some light on the nature of acts such as these.

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References

1. J. L. McGaugh, *Science* **153**, 1351 (1966).
2. E. Tulving, *ibid.* **164**, 88 (1969).

Public Policy: Analyses and Criticism

In his editorial "Public challenge of government action" (2 May, p. 499) Skolnikoff touched on a matter which should be of concern to every country, certainly every technically advanced country. That there is growing international concern is evidenced by the formation of the British Society for Social Responsibility in Science. Skolnikoff came close to stating the solution when he said "it seems clear that what is needed in our political process are new independent mechanisms charged with a task of developing information and analyses of important areas of public interest that have major scientific and technological content." My only objection is to the insertion of the word "new." I see no need to look for the creation of new mechanisms.

I agree that at the present time the universities are not in a position to be this "mechanism" for two reasons. First, the majority of them are too dependent on government for their very financial existence and one cannot yet be assured of the complete objectivity of the political process to be willing to generously support institutions which might emerge as severe critics; and second, the internal struggles going on within most universities of the world today have not yet produced the new form of governance of universities that will lead to a return of the necessary stability to engage in sustained intellectual activity on matters of major public concern.

However, there are organizations such as the AAAS in many technologically advanced countries (unfortunately not yet in Canada). Surely the main burden of Skolnikoff's editorial is a plea for mechanisms to ensure the advancement of science to the benefit of mankind and this should be central to the activities of the AAAS.

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Scientists in universities and research institutes are presently "facing their moments of truth," according to an editorial by Patrick P. McCurdy (*1*). The moments of truth are double-edged in that they concern the ethics of scientists as regards the use to which their research may be put, and the increasing problem of financing their research. Following a lecture I recently gave at the Berkeley campus on the general subject of the social responsibilities of a scientist, an intelligent and well-meaning student suggested that perhaps the best thing we scientists could do for mankind would be to quit work!

What possible avenues are there for the social-minded scientist to follow, besides the usual ones related to dissenting political activities?

1) He can remain aloof to the social problems and "do his thing," a currently popular choice.

2) When budgets are cut, he can adapt and sharply curtail his research with the hope that things will get better.

3) He can enter into the fight as an administrator, politician, or negotiator. After a short period of time, he will most likely cease to be an adequate scientist.

4) He can remain a full-time scientist, but do his work in areas with direct and obvious social goals such as those in medicine and agriculture. This may involve a difficulty in maintaining one's professional competency while, at the same time, avoiding involvement in trivial research.

5) He can remain a scientist and be fully active in his particular discipline, yet contribute to social actions as an expert in his field. He would follow his own conscience as to the social consequences of his research.

A simple course of social action could satisfy the last alternative. The scientist could communicate with nonscientists—for example, within a large group such as the newly formed British Society for Social Responsibility in Science. Or his communication can be performed as an individual speaking to civic and service groups, or by publishing in the general news media—any method that requires him to stand up and be counted!

How one selects areas for social action depends entirely upon the individual and the type and breadth of his training. Many biologists are capable of discussing conservation and ecology and the possibilities inherent in biological warfare. Biochemists, chemists, and physicists are qualified to discuss radiation problems, and so forth. This type of action, of course, brings problems. When does one consider himself an expert? In any event, he must keep his statements in line with known facts.

The communication approach is a tough one, and anyone engaged in it can expect to be attacked. But there are also rewards—not the least of which might be the attainment of a higher level of the scientist's own self-respect and dignity through his direct participation.

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Reference

1. P. P. McCurdy, *Chem. Eng. News* **47**, 5 (1969).