Letters

Radioactive Materials: Problems under Scrutiny

The type of problems reported by A. Broido in "More mislabeling—more frustration" (Letters, 4 Dec.) has led to the formation of an ad hoc panel on radioactivity standards under the chairmanship of L. R. Zumwalt of North Carolina State University. Bernd Kahn of the Environmental Protection Agency and his National Research Council Subcommittee on Use of Radioactivity Standards (SOURS) advised on the formation of the panel and its program. The report of the panel, *National Uses and Needs for Standard Radioactive Materials*, is available free from the NRC Division of Physical Sciences. It contains examples of inaccurate standards of various nuclides, as well as the observation that manufacturers often give too little information for proper application of their products. Investigators who need standards should consider the services of the National Bureau of Standards which are briefly described by Garfinkel and Mann in their letter (5 Feb.). It is strongly recommended that traceability of derived standards to calibrations by NBS be clearly established. Two SOURS reports, *Certificates of Radioactivity Standards* (1966) and *Users' Guides for Radioactivity Standards* (1967), can also be obtained from the NRC Division of Physical Sciences.

A full-day symposium on "Standard Radioactive Materials and Their Applications" will be sponsored by the American Chemical Society division of nuclear chemistry and technology and division of analytical chemistry in Los Angeles 29 March. The papers will include a survey of the recent work of the National Bureau of Standards, the Public Health Service, the British Radiochemical Centre, the radiostandards program of the College of American Pathologists, and the findings of the panel described above. Discussions will conclude the session.

Perhaps Broido and others will be glad to know that "someone cares." New problems and needs should be communicated to SOURS at the National Research Council.

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Too Little Gene Exchange

I agree with Ugent ("The potato," 11 Dec., p. 1161) that we are witnessing the rapid elimination of genetic wealth in those centers of diversity where many of our basic food plants have evolved. The expanded genetic base of introgression by which many of our cultivated plants are still evolving is clearly illustrated by the gene exchange between the cultivated potatoes and their wild relatives. This system that promotes genetic heterozygosity and the continued evolution of the domesticated plant is being eliminated in the name of "progress" as described by Ugent: the introduction of genetically uniform high-yielding varieties from the developed nations and clean cultivation weed control of agro-business.

I can cite almost exactly the same phenomena with teosinte, the weedy wild relative of cultivated maize, which hybridizes with maize in Mexico and Guatemala. Based on specimens collected in the past and preserved in herbaria, the distribution of teosinte today is about one-half the area it occupied 100 years ago, and, in the 10 years I have been observing fields where maize and teosinte hybridize, extinction of teosinte has accelerated.

Elimination of these pools of genetic wealth is serious because the genes introduced into improved varieties and those exploited for heterotic effects come from known sources of variation in these centers of diversity and not from artificially induced mutations. These centers hold much more variation than could readily be induced in over a century of induced mutation. The only way we can assure the continued development of these crop plants is to maintain the ancestral genetic base for the variation and heterotic effects of introgression and polyploidy.

Ugent presents us with the problem of elimination but does not fully elaborate a solution. Twenty years ago it was believed that gene banks (seed collections) could encompass and preserve the variation in our basic crop plants. Although these collections have been very useful reserves, they have failed as a foolproof storage system. The better alternative is to preserve the genetic wealth in situ by setting aside World Genetic Resource Areas where the native agriculture would be continued. The agriculturalists would, in essence, be curators of a living collection of diversity where heterogeneous plantings and hybridization with the weedy relatives would continue. Several national governments have already set aside areas of natural beauty or historical significance as sites to be preserved. These centers of genetic diversity could be preserved by some international body like the Food and Agricultural Organization.

Based on my experience with maize, these areas need not be large. Five carefully chosen strips of 5 by 20 kilometers in Mexico and Guatemala would include a wealth of diversity in approximately 25 races of maize and most of the known areas where teosinte and maize hybridize. Specialists working with other crop plants could select comparable areas of hybridization and variation. Since approximately 90 percent of the human calories of plant origin come from as few as 15 plants, the total number of areas maintained as living collections could be as small as 75. Actually, several of the plants have overlapping areas of diversity, and both maize and beans, for instance, could be preserved in the same area.

The problem of elimination of sources of diversity in our crop plants is serious. We must establish something like the proposed World Genetic Resource Areas if man is to survive the burgeoning population.

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Ugent claims that the disastrous crop failures in Ireland in 1845 to 1846 "might have been entirely avoided if