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

many different cultivars of varying degrees of resistance (or susceptibility) to any one particular strain of fungal pathogen had been planted."

In fact, very many potato varieties were grown in Ireland (and elsewhere in Europe) when late blight first appeared in 1845. Contemporary accounts confirm that the various sorts showed marked differences in susceptibility to the disease. Thus in trials of 176 potato varieties carried out at the time by the Horticultural Society in London, tuber infection was found to range from zero to 64 percent. In the Netherlands a replicated study on 148 potato varieties grown on two different types of soil gave similar results, as did smaller-scale trials in Dublin's Botanic Gardens. It was the increased use of the less susceptible sorts, hitherto in limited cultivation, which enabled the potato to recover from the initial disaster and to survive as a major food crop over the lengthy period until breeding for resistance and the use of fungicides were introduced. A characteristic example was the American Early variety which had been grown on a small scale in England up to 1845, but which graduated to the status of a popular field crop under the name Dalmahoy after 1847.

The tragedy lay in the fact that the potato varieties most widely grown by the poor because of their high yields—such as the ill-famed Lumper in Ireland—were precisely those that succumbed most completely to the new disease. There was a time lag before the less susceptible sorts could be multiplied and brought into general use. In the interim a million Irish had died and another million fled.

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People Who See Flying Saucers

D. I. Warren ("Status inconsistency theory and flying saucer sightings," 6 Nov., p. 599) gives evidence that, among American white males over 21, the highest proportion of UFO sightings are from men with college education but moderate or low income or occupation ranking. He believes this supports the notion that UFO sightings are one reaction by these men to their status inconsistency; that they are one consequence of feelings of status frustration.

It is important to stress more clearly than Warren has the contrast between sighters who interpreted the UFO's as actual objects or vehicles from outer space (8 "believers"), and those who offered some more "normal" explanation (42 "nonbelievers"). Cross-tabulation of frequencies derived from figures 4 and 6 shows that among the nonbelievers with consistent or moderately inconsistent status, there are only about four fewer UFO sighters than would be expected if UFO sighting and status inconsistency were unrelated variables, and only about four more than expected sighters among men with sharp status inconsistency. The relationship in the sample is weak and may well be due to chance (gamma is .2, chi-square is significant at the 10 percent level but not at 5 percent). On the other hand, believers show a far stronger relationship with status inconsistency which is not likely to be accidental (gamma is .8, chi-square is significant at better than the 2 percent level). There are fewer than the expected numbers of UFO sighter-believers among men with consistent or moderately inconsistent status, and more than expected among men with sharply inconsistent status. It appears, then, that what Warren has demonstrated is only a doubtful relationship between status inconsistency and *any* UFO sightings and is primarily a relationship between status inconsistency and sightings coupled with belief in the "outer space" origin of the UFO's.

A more basic question is why the UFO sighters-believers came to have inconsistent statuses in the first place. Warren does not seem to have asked this question, and tacitly implies that if these men had not somehow found themselves underrewarded relative to their education, they would have been much less likely to experience the feelings of deprivation and marginality which led to their seeing (and believing in) UFO's. But, given the generally good academic job market at the time of the survey (1966), it seems likely that college educated men who could not get or did not want high income and high status jobs were men who already differed in significant ways from majority ways of thinking, behaving, or feeling. I suggest that status inconsistency per se may have had relatively little to do with these men's UFO experiences; rather, *both* the UFO experiences *and* their status inconsistency may be consequences or manifestations of other ways in which