Letters

Exposure to Alkyl Mercury

As one who has investigated the chemistry of mercury compounds for the past 40 years, personally and with a number of Ph.D. candidates, I was taken aback by the technical comment, "Precautions with alkyl mercury" (21 May, p. 872).

Evidently my students and I live charmed lives. In 1931, because of a cracked flask under reflux, I was exposed for 3 hours to inhalation of dibutyl mercury. The dosage was sufficient to cause loosening of my teeth; subsequently I lost two teeth because of infection but otherwise suffered no ill effects. In 1934, I was exposed for 2 days to dimethyl mercury, which was being repeatedly distilled at atmospheric pressure, until I realized the composition of my by-product. Again I suffered no damage.

In 1940, when Canadian scientists were commissioned to make life unpleasant for Hitler's Germans, I decided to test dimethyl mercury as a lethal gas. I devised an economical manufacturing process (aluminum carbide with aqueous mercuric chloride). In collaboration with the University of Toronto, School of Hygiene, I allocated 500 grams for use in vapor exposure to 25 rats in a suitable enclosure (108 cubic feet) at a dosage of 25 grams per day.

The atmosphere of the enclosure was only changed once each day, for feeding and observation prior to the introduction of a new dose. The behavior of the rats during the administration of a new dose was of interest. They loved it! They would gather about the inlet like hogs at the feeding trough, day after day, until the 500 grams was used up. The experiment was concluded after we were unable to cause the death of any rats or to observe any abnormal symptom or behavior.

In 1968–70, my technician (a man subject to allergic reactions from many chemicals) determined the temperature coefficient of the electric moment of dimethyl mercury under conditions in which he could not avoid exposure to the vapor. He was unaffected visibly during the 200 days of exposure.

My students and I were similarly "careless" about manipulation of alkylmercuric salts. Except for occasional skin rashes, no physiological abnormalities occurred. We may have been encouraged in our "carelessness" by the knowledge that organomercurials (maximum dosage is more than a gram per day when given intravenously) were essentially the only diuretics used for therapy prior to 1952 and are still used.

Perhaps the toxicity of alkylmercurials is a matter of human idiosyncrasy. In 1931, following the "mercury scare" of that period, in an experiment supervised by Gilman at Iowa State University, it was demonstrated that as an individual I eliminated mercury at the rate that I absorbed it. Perhaps the students who worked under my direction (and whose present positions attest that they have not suffered debilitating effects) were attracted to the organomercurial field because they were equally immune.

If this was the fact, then attention should be devoted to a study of the idiosyncrasy rather than to outright condemnation of mercury. Many citizens besides myself enjoy eating tuna and swordfish steak. Some citizens earn their living by harvesting fish. Also, the impending protein deficiency of the growing world population indicates that we must depend, more and more, on fish as a source of this essential nutrient. In these circumstances can we tolerate condemnation of mercury by dedicated (and some less dedicated) zealots unless they can prove that the derivatives of this element are deleterious to the majority of the human race? I have yet to see scientific evidence to support the limit of 0.5 part per million set for mercury in foodstuffs.

I am not impressed by the clinical references extending back to 1940 cited by Klein and Herman. The side effects of mercurials used as drugs (and not within the parts per million limit) have been known for some centuries, certainly longer than the side effects of modern pharmaceuticals. Why, then, have we not heard these gory details earlier?

During the mercury scare that occurred about 1930, the studies made by the U.S. Department of Agriculture placed lettuce at the top of the list of herbiferous mercury accumulators. Since antimercury zealots must have a target, I suggest that they attack lettuce, which may be a less critical human requirement than fish.

Beneath all of this scientific small talk is an underlying social principle. What is the cutoff ratio at which the few must be favored at the expense of the many? In the case of penicillin, the ratio of 1 to 1000 was enough to persuade people, via their doctors, that penicillin should continue as a controlled therapy, despite the 0.01 percent mortality rate from violent allergic reaction.

I am not advocating detriment to the few for the advantage of the many. I do claim that governmental regulatory bodies are also part of the citizenry. Such bodies have a responsibility (all too frequently lacking) to ascertain whether an arbitrary regulation redounds to the detriment of the many for the sake of the few. If these bodies discover that such a situation exists, then it is their further responsibility to find ways to protect the few without detriment to the many.

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Need for Graduate Education

It may well be true that fewer Ph.D.'s will be needed in the next decade as teachers in our colleges and universities (see 9 April, p. 139). To conclude from this that the extended training of gifted and highly motivated young people interested in scholarly careers should therefore be curtailed shows, however, a lack of imagination. Such people are needed as never before, not only in the natural sciences, but in all fields of learning.

Those of us who appreciate how little men yet know and how much there is to find out should not throw up our hands and agree with the cost accountants and some of the politicians that graduate education should be curtailed. Rather we ought to begin now