Letters

Canadian Saccharin Study

Several points in the article "Saccharin: A chemical in search of an identity" by Barbara J. Culliton (News and Comment, 10 June, p. 1179) were in error or unclear with regard to the Canadian study in which rats were fed ortho-toluenesulfonamide (OTS) and saccharin. We offer the following corrections and comments in the hope that errors will not be perpetuated.

Incidence of tumors. Fifty male and fifty female Sprague-Dawley rats constituted the original group size. Table I indicates the incidence of benign and malignant tumors observed during the study for the control and saccharin-treated animals only. Diagnoses of the tumors were a consensus of seven eminent pathologists who were not associated with the design or conduct of this study.

Bladder parasites. No parasites or ova of the parasite *Trichosomoides crassicauda* were detected during the course of or upon termination of the study. Samples of urine were passed through a Millipore filter and stained according to the Papanicolaou method. In addition to examining these preparations, we scrutinized serial sections of the bladder for parasites and their ova during our examination for tumors.

Urinary calculi and urinary tract stones. Microcalculi are produced in the kidneys of older rats (*1*) and excreted in the urine. Microcalculi (40 to 70 microns) were detected as an incidental finding in all groups during the examinations of the Millipore filters. They were found with a similar frequency in the urine of the male rats that were receiving either control diets or diets containing saccharin. The incidence of microcalculi in the rats' urine was not related to treatment.

Bladder stones visible to the naked eye were observed in two F_0 males and in two F_1 males from four different treatment groups. One animal from each generation had a benign bladder tumor. Visible inspection revealed kidney stones in three F_0 males from the same treatment group and one had a benign bladder tumor. In addition three F_0 females from three different treatment groups had kidney stones visible to the naked eye but no bladder tumors.

Impurities. Two lots of sodium saccharin, manufactured by the Sherwin-Williams Company (Maumee procedure), were used in this study: lot number G S-1233 and lot number S-1022. Neither lot of saccharin contained detectable amounts of OTS. Lot number G S-1233 was used during the first 25 weeks that the F_0 rats were being tested and the first week the F_1 rats were being tested. Lot number S-1022 was used during the remainder of the study. Both batches contained 8 to 12 different impurities. Lot number G S-1233 contained 10 parts per million total water and organic soluble impurities and lot number S-1022 contained 40 parts per million total impurities (*2*).

Mutagenicity testing. Samples of the saccharin as fed to the rats from both lot numbers G S-1233 and S-1022 were tested for mutagenic activity using the Ames *Salmonella* assay, and the results were negative. However, when the impurities from 1 kilogram of these two lots of sodium saccharin were extracted and the impurities were tested for mutagenicity, only the impurities soluble in organic solvents from lot number S-1022 were found to be mutagenic in the Ames assay (*3*).

One confounding factor was that the impurities soluble in organic solvents from the lot of saccharin used in the previous one-generation rat study by Munro *et al*. (*4*), lot number 191010, manufactured by the Daiwa Chemical Company Ltd. in Japan (Remsen-Fahlberg procedure), gave a positive result in the Ames assay but was negative for the cancer bioassay in rats. Consequently, the relationship, if any, between the incidence of bladder tumors in rats fed saccharin and the positive mutagenic results is unknown at this time.

Table 1. Incidence of bladder tumors among rats fed sodium saccharin (5 percent) and control rats fed a normal diet.

Treatment	Tumors (No.)			
	F_0 generation		F_1 generation	
	Benign	Malignant	Benign	Malignant
Males				
None (controls)	1	0	0	0
Sodium saccharin	4	3	4	8
Females				
None (controls)	0	0	0	0
Sodium saccharin	0	0	0	2

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2. B. Stavric, in *Proceedings, Toxicology Forum on Saccharin* (Center for Continuing Education, Univ. of Nebraska Medical Center, Omaha, 9 May 1977), pp. 73–80.
3. D. R. Stoltz, in *ibid.*, pp. 101–106.
4. I. C. Munro, C. A. Moodie, D. Krewski, H. C. Grice, *Toxicol. Appl. Pharmacol.* **32**, 513 (1975).

Drinking Water: Sources and Treatment

Nicholas Wade's article "Drinking water: Health hazards still not resolved" (News and Comment, 24 June, p. 1421) is an excellent statement of the issues. Because decades may pass before the hazards of using polluted sources for drinking water can be adequately evaluated, prudence is called for on the part of those charged with protecting the public health. Such prudence would, I agree, call for replacing the sand in conventional filters with activated carbon, at the very least.

However, we cannot be sanguine about the efficacy of even this measure, as all synthetic organic chemicals are not removed by activated carbon, particularly when the carbon filters are not properly operated. More than 99 percent of public community water systems in the United States serve fewer than 50,000 people, and such systems seldom have the professional supervision that can ensure adequate monitoring and treatment. Nevertheless, we should move ahead with at least this minor measure for health protection.

What troubles me is that our policies for drinking water permit and even encourage the continued construction of new intakes for potable water supply from our polluted watercourses. Rivers that drain large urban and industrial areas *inevitably* receive pollution. The releases of Kepone into the James River and of carbon tetrachloride into the Kanawha and Ohio rivers were discovered. However, over the years, smaller but continuous chemical discharges are not discerned by routine monitoring and are only partially revealed by their impact on fish in these rivers. Fish from the Hudson River are unsuitable for human consumption, but the Corps of Engineers recommended in March 1977 that New York City tap the Hudson for additional water supply.

While our present knowledge may not justify the great expenditures that changing our present sources of water would require, certainly we might avoid making major new investments in developing water sources of questionable quality. We need a strategy for public water supply, and such a strategy should include preserving and developing protected watersheds for water supplies that are to be used for drinking. Polluted rivers make excellent sources of water for the many nonpotable needs of an industrial society.

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Referring to the views of Stuart H. Brehm, director of the Sewage and Water Board of New Orleans, Nicholas Wade states ". . . there is no point in replacing his sand filters with carbon which . . . would interfere with chlorination . . . ." I don't think so. Carbon filtration can be employed *before* chlorination. This would enhance the disinfective efficiency of chlorination, reduce the chlorine demand, and also reduce the hazard of forming persistent chloroorganics which are of ecological concern.

If for some reason the New Orleans plant must employ chlorination before carbon filtration, there is still good reason to believe that disinfection would be satisfactory. What is encumbered is a residual level of disinfectant desired in the distribution system as a safety precaution against secondary contamination. This can be added by a secondary chlorination procedure. An advantage of this system is that carbon filtration following chlorination will remove chloroorganics formed in the chlorination process as well as excess chlorine. Furthermore, in light of the ecological concern, as well as the human health concern over chlorinated organics, it is becoming fashionable again to investigate use of water supply disinfectants other than chlorine.

Finally, who has informed public utilities that average householders are not willing to pay an additional $7 per year for clean water?

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Energy and Inspiration

Philip H. Abelson's editorial "Energy conservation is not enough" (10 June, p. 1159) criticizes the National Energy Plan for not having enough "inspiration" and for providing "no basis . . . for the public to hope that America's technological capabilities will be effectively marshaled." This statement is inconsistent with the Plan as I read it. Specifically the Plan places tremendous—but realistic—dependence upon U.S. technology. Where else do we look to learn how to utilize coal resources in an effective way? Are we willing to claim that technology offers no hope of our achieving greater use of coal with less environmental impacts? Where else can we place our dependence if we are to develop much more efficient ways to utilize energy?

The great challenge offered in the National Energy Plan is to seriously commit this nation to substituting technological ingenuity for brute-force energy consumption. In the past we have overfocused on developing "gee-whiz" energy supply technologies. The Plan may bring us back a little closer to Earth, but it certainly doesn't lack for challenges to American technological leadership.

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In his editorial of 10 June, Abelson rightly points out that the National Energy Plan's "missing element is inspiration." I think we should be crasser. The missing element is financial incentive to find more fuels, to develop new technologies, and even to bring about more energy conservation.