idence it assembled in its most recent draft. If so, it will be a major step forward in providing the basis for a scientifically based policy to protect the public health.

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Cancer Risk Assessment

Richard Stone's article "A molecular approach to cancer risk" (21 Apr., p. 356) is an excellent discussion of the necessity of using mechanistic information in risk assessment when extrapolating data from animals to humans. Chloroform regulation is a good example of progress in scientific understanding, but not a good illustration of misuse of cancer information in regulatory decision-making. In reference to the 1979 drinking water standard for chloroform (and other trihalomethanes) established by the U.S. Environmental Protection Agency, the article implies that it was determined on the basis of simplistic cancer risk assessment.

Chloroform and other trihalomethanes (THMs) were regulated in drinking water at 0.1 part per million for a host of reasons that were well articulated at the time, including cancer bioassay results. These included, among many others, that THMs are *indicative* of the presence of a host of other halogenated, oxidized, and potentially harmful by-products of drinking water chlorination that are concurrently formed and that have not been fully characterized chemically. In some water samples, THMs accounted for only a few percent of the organically bound chlorinated by-products. More of these other chemicals have since been identified, but many more remain uncharacterized. A few of the known by-products include halogenated acids, alcohols, aldehydes, acetonitriles, and phenols, and many of them show more significant toxicology than chloroform.

The chloroform–by-product indicator concept was an important factor in the rule, and it has an apt analogy in the traditional use of coliform bacteria in drinking water standards. Rather than identifying, measuring, and setting standards for each of the many pathogenic bacteria potentially in drinking water, controlling for easily measured coliforms provides a good indication of the likely absence of significant amounts of pathogenic bacteria. In the same vein, THMs are relatively easily measured, and water treatment processes that lead to reduced THM concentrations will usually provide less of the other gratuitous by-products.

EPA made logical deductions based on all of the available science to arrive at a reasonable technology-based standard. The aim was to reduce exposure to unnecessary chlorination by-products with means that were safe and feasible. The determination that chloroform is not likely to be carcinogenic to humans at low doses does not negate either the overall rationale for regulating chloroform and the other THMs in drinking water, or the original standard.

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Sugar-Coated Stress Relief

In her informative news article "Biopreservation: Putting proteins under glass ("Frontiers in Materials Science," 31 March, p. 1922), Karen Celia Fox discusses the superior protective effect of sugars during freeze-drying of engineered human growth hormone. Occurrence of the unusual disaccharide trehalose in nature might be of interest to readers.

In the hemolymph of most insects (possibly also in arthropods), trehalose, not glucose, is the sole "blood" sugar. Also, trehalose protects bacteria against osmotic shock; for example, when vegetative streptomyces turn into spore forms, the cellular trehalose content increases 50-fold and raises the spores' heat stability by two orders of magnitude.

To counter environmental stresses of any kind (heat, cold, or desiccation), nature appears to have chosen the unusual α,α^1-1,1 disaccharide trehalose as the most effective.

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