Political Toxicology and Its Impact

by Jerome H. Heckman

“The whole aim of practical politics is to keep the populace alarmed by menacing it with an endless series of hobgoblins, all of them imaginary.”

—H. L. Mencken

Ever since James J. Delaney and the 85th Congress gave the Delaney Clause to the world in the form of a legislative mandate included in the first piece of food additive legislation,¹ a number of well-meaning, but sometimes suspiciously motivated scientists have been fingerling a variety of chemicals to indent as human hazards.² True, indeed, that the modern crop of chemicals had some predecessors such as the elixir of sulfanilamide that caused 100 deaths as a result of drug contamination in the 1930’s,³ but it at least seemed in the pre-1958 era to require actual proof of harm to bring about public reaction and federal legislation.

Now the legislators are leaping to introduce bills that purport to ban useful materials because someone, somewhere, has reported controversial results on the basis of esoteric or unconventional studies to try to show that specific chemicals are reproductive or developmental toxicants, and may be potentially carcinogens. The horse they most often ride is a pseudo-scientific concept alluringly labeled “The Precautionary Principle.”⁴

As a prelude to the 1958 Food Additives Amendment, substances such as diethylstilbestrol (DES), proven to cause cancer to the daughters of pregnant women given the drug to help ease them through pregnancy; beta-naphthylamine, used to manufacture azo dyes but shown to cause cancer in the workplace; and a myriad of metals such as cobalt and nickel were shown to cause cancer when fed to animals. These substances were not used, per se, as food additives but were put forth as examples of the type of chemical to be feared if deliberately added to foods.

As a result of the substantial testimony presented on these situations during the House of Representatives hearings that led to the Food Additives Amendments,⁵ and despite vigorous industry efforts to have all additives subject only to the requirement that they be proven safe under their intended conditions of use, at the last minute the Congress did include a Delaney Clause in the Food Additive Amendments of 1958. This clause, incorporated in Section 409 (c)(3) of the Federal Food, Drug and Cosmetic Act of 1938 (FDCA), as amended, provides that “no additive shall be deemed to be safe if it is found to induce cancer when ingested by man or animal.”

Here then was a clause that effectively ordered the Food and Drug Administration (FDA) to forego issuing a food additive regulation for any chemical proven by any sort of feeding test to cause cancer, whereas other additives could be deemed safe so long as adverse effects did not occur when they were tested in a manner generally simulating their intended conditions of use. This was a completely disqualifying proviso opening the door for all sorts of testing that might show a substance caused cancer at some level of exposure greatly exaggerating, or in some other way, perverting the intended conditions of use.

Early on after 1958, most observers felt that the Delaney Clause would not be implemented in such a way as to cause much discomfort, since the FDA topside had not proposed the clause and was believed to be opposed to its inclusion. This view was probably a correct one, as FDA did find ways

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to distinguish a number of types of cases. For example, it ruled that Delaney would not be applied to bar an additive that contained a carcinogenic component if it were shown that the food additive as a whole, including the component, was not a carcinogen, and the carcinogenic component did not present a significant risk. In some other cases it deemed Delaney inapplicable if evidence of cancer causing was so remote that it could be held irrelevant to any real life dietary situation.

Nonetheless, in 1969, Abbot Laboratories, the main supplier presented data to FDA showing that a then very popular sweetener, cyclamates, could cause cancer in animals if ingested in huge amounts (the equivalent of 350 cans of diet soda per day). The agency reacted by ruling on October 18, 1969, that Delaney applied so that cyclamates could not continue to be marketed on the basis of long time safe use as a sweetener and therefore, they had to be taken off the market. The producers and commercial users of cyclamates protested vigorously and spent a great deal of time and money on attempting to convince FDA that this ruling was inappropriate. This effort has been unavailing to this time even though cyclamates have been found safe and permitted for use in most other countries, including Canada.

At the time the cyclamates ban left only saccharin on the market as a non-sugar sweetener available for use by diabetics and dieters. In 1977, the marketplace and many consumers were hit again with data tending to show that gross exposure of animals to saccharin (the equivalent of 800 cans of soda a day) could also lead to stomach cancer. FDA was faced with banning the only remaining non-sugar sweetener on the market and was ruefully considering doing so. This led the Congress to hold hearings on the situation and, in due course, it passed the Saccharin Study and Labeling Act of 1977 derogating from Delaney and permitting saccharin compounds to remain on the market. Much time passed and other sweeteners such as aspartame, acesulfame-K, and sucralose came along to meet the needs of diabetics and dieters, so some began to ask if it was not time to reconsider saccharine and perhaps ban compounds using it. This has not been done and seems unlikely, at least unless some new outcry comes along, but FDA has now reaffirmed the generally recognized as safe status of the substance.

Other substances began to receive industry and consumer group attention as the years went by and the environmental movement spawned many new advocates, some dedicated and well-meaning, some merely opportunistic. In the 1950’s, the plastics industry began to study phthalates generally used to modify polyvinyl chloride and for many other product modification purposes. The early studies showed some effects on test animals but the effects noted were peroxisome proliferations in the liver of the test animals, an effect irrelevant to humans since such proliferations do not occur in the human liver except perhaps at unrealistically high exposure levels. As a result, industry and FDA were not unduly alarmed by the test results and, in fact, in 1982, the National Toxicology Program released a study and report indicating it did not believe there was data to indicate that most of the phthalates used in toys, medical devices, or for packaging presented any cancer hazard for humans.

More recently, however, a suddenly aroused Consumer Product Safety Commission (CPSC), chaired by Ann Brown, found it might have a way to increase Congressional attention for its activities and perhaps obtain more power and financial support by bellowing about phthalates and child safety issues. Brown and her cohorts started berating toy manufacturers and the plastics industry over the use of phthalates in toys and devices such as pacifiers. In the opinion of most in industry, this was an act or series of acts grounded only in political motivation because there were no scientific studies to indicate that any safety hazard existed or exists. The CPSC movement was heavily supported by such organizations as Greenpeace, Healthy Child for Healthy World, and Health Care without Harm, among others. The issue of what to do about phthalates is currently on the legislative agenda in Congress, and in many state legislatures. Strangely enough, it has even transcended the child safety area and has resulted in some proposals to ban the use of phthalates generally, FDA clearance of the same as indirect food additives notwithstanding. While there is some worldwide attention being devoted to evaluation of phthalates as hazardous to children, nowhere else is there talk of broad bans on what are a very useful and widely used family of adjuvants.

Other emanations of health risks from chemicals were also occurring during these times. Thus, in the early 1970’s, FDA was presented with data and ultimately a petition to clear acrylonitrile/styrene (called Cycle-Safe) polymers for use as beverage containers. It being well known that acrylonitrile as a monomer is toxic, the petitioner, Monsanto Company, had gone through many stages of development and finally come up with an acrylonitrile/styrene polymer that could be demonstrated to...
be so stable when molded into bottles that one could not detect any being extracted in tests with dry, aqueous and oily solutions sensitive to 50 parts per billion. Later tests were made sensitive to 10 parts per billion and still there was no migration from the Monsanto test bottles. At first the company took a self-determined position that it did not have a food additive issue because there was no migration of any substance from the bottles, i.e., that there was no reasonable expectation of migration and, hence, no food additive problem under the provisos of the Food Additive Amendments of 1958. Indeed, on June 5, 1972, after the data indicating no migration was presented to FDA at its request, the agency issued a letter confirming the acceptable status of the bottles. Construction of plants to make the bottles for Coca Cola commenced.

Soon after this, however, partly because of data submitted by DuPont, the Commissioner determined that, because of putative migration, acrylonitrile copolymer was a “food additive” within the meaning of the statute. The agency, therefore, published a regulation prescribing the conditions under which the chemical could be used safely in beverage containers. Acceptable migration of the monomer was set at 300 parts per billion.

Two years later, FDA noted test results adverse to acrylonitrile on the basis of animal studies so the agency announced that the migration limit would be lowered to 50 ppb and all approval for beverage containers would be withdrawn. This regulation was held to be invalid by the Court of Appeals and the Court told FDA it could not do this without a hearing. It ordered FDA to stay the administrative action on March 18, 1977 and ordered that the required hearing be completed within 60 days. Subsequently, on a joint motion of the parties, the time limitation was extended by 120 days.

A hearing then ensued with FDA’s Administrative Law Judge Daniel Davidson issuing a decision in 1977 upholding the ban on beverage bottles. This Initial Decision resulted in a Final Order prohibiting the manufacture of beverage containers made from acrylonitrile polymers irrespective of residual monomer or migration levels. The issue in the case that was deemed determinative was the question of whether or not there was migration of anything to food that would bring the acrylonitrile/styrene bottle under the Food Additives Amendment of 1958. The Hearing Examiner and the Commissioner sided with the agency’s attorneys and held that since the bottle would be in contact with food, there had to be migration sufficient to bring into play the Food Additives Amendment because the Second Law of Thermodynamics decrees that substances in contact will result in the diffusion of some molecules from one to the other.

The agency decision was appealed to the United States Court of Appeals for the District of Columbia Circuit. Extensive briefs were filed by all parties, and lengthy oral arguments took place on March 15, 1979. On November 6, 1979, then-Judge Harold Leventhal, writing for a unanimous panel, ruled that FDA’s reliance on the Second Law of Thermodynamics was ill-founded and that it could only sustain its view if it could show that there was significant and substantial evidence of migration in the test data. Said the Leventhal opinion:

“Congress did not intend that the component requirement of ‘food additive’ would be satisfied by … a mere finding of any contact with food … . For the component element of the definition to be satisfied, Congress must have intended the Commissioner to determine, with a fair degree of confidence that a substance migrates to food in more than insignificant amounts.”

Since FDA could not make such a determination, in due course, a Food Additive Regulation was issued in 1984 for acrylonitrile/styrene copolymers for use in making beverage bottles. Here was yet another case where protestations from consumerist groups like the Natural Resources Defense Council, Inc. led to exhaustive government action that finally resulted in a reaffirmation of the safety of the package attacked; more significantly, however, all of the due process here led the market for the container to go elsewhere so that by the time FDA finally issued its regulation, the safety issue was moot.

Unfortunately, the phenomenon of the raising of questions about materials, no matter how spurious, often, if not always, leads to the abandonment of a material by the food processor, and sometimes his retailer customers make this decision with little or no scientific basis so that there occurs a departure from use of the substance for reasons having no relationship to the science. Even more interesting, it can lead to the use of substitutes that are less safe or less desirable but about which there is not yet data to indicate any problem.

A very current debacle points up the problem here. Beginning in 1997, Frederick vom Saal, a biology professor at the University of Missouri,
announced to the world that he had conducted studies that showed that Bisphenol-A, a very valuable monomer used in making polycarbonate containers, can enamels, compact discs, dental fillings, and in other cases where a very stable polymer or modified coating composition is required, could result in some form of reproductive toxicity to animals when administered at extremely low doses.28

Amounts like 0.05 trillionths of a gram were held by vom Saal to affect prostate glands in fetuses, and to have likely long term impact on human development.29 He noted that the effects he observed occurred only at low dose exposures and did not occur with higher dosages. These reports aroused considerable reaction from the toxicological community since, inter alia, if vom Saal’s work could be validated, a very fundamental toxicological proposition, Paracelsus’s theorem that “the dose makes the poison” might be negated. Indeed, in another vein, even today, vom Saal continues to label BPA as a toxicant in the public media despite the fact that almost all expert panels have rejected this conclusion.

Various government and industry scientists have attempted to reproduce the studies vom Saal conducted and relied upon to derive his theory that there are low dose effects with irreproducible dose-response effects but have been unable to confirm his results. Indeed, since his revelations were made, there have been any number of studies including especially a very comprehensive set conducted by the scientists at the National Toxicology Program and very recently reported with the conclusion that there is, by and large, no safety hazard presented.30

Reviews of the now massive amounts of data on Bisphenol-A have been conducted by the relevant officials at FDA, the European Food Safety Authority (EFSA) of the European Union (EU), and Health Canada.31 In every case the conclusions reached were to the effect that there is no safety problem presented by the current uses of Bisphenol-A. At the same time, however, passing mention has been made of the possibility of neural and behavioral effects on fetuses, all without citation of any hard data to support this conjecture.

Demands have been made by some authorities, and especially some of the self-proclaimed consumerists,32 that legislation should impose restrictions on the use of polycarbonate baby bottles and any children’s toys made from the polymer on the basis of the so-called “precautionary principle.” This “principle” espouses the view, characterized here as an especially dangerous bit of political toxicology, that action should be taken by governments and others whenever a threat of possible danger is at hand, with or without any supporting data. In a sense, at least, the “precautionary principle” can be viewed as a revival of Ludditeism with a bit of linguistic subtlety.

Nonetheless, on the strength of the outrages from consumer groups based on the vom Saal work, and the precautionary principle champions, legislators in California, a few other states, and in Congress have introduced measures33 expressly aimed at banning the use of polycarbonates and other Bisphenol A-containing products.34 Most of this legislation targets use in baby bottles, toys and other children’s products but there are some that propose outright bans on all products containing Bisphenol A.35

The fact that there is now a plethora of legislation pending that purports to protect the public from phthalates and Bisphenol A is the penultimate manifestation of the mischief of political toxicology. The ultimate manifestation is the simple fact that a number of major retailers and manufacturers of end products are now putting a ban into effect in their stores and factories. This is undoubtedly the most desirable end from the viewpoint of the pseudo-scientists and activists (in this author’s view, the neo-Luddites) who embrace the precautionary principle. What is happening will probably be a featured story in the next version of “Alice in Wonderland,” whenever it is written. △

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2 Last there be any misunderstanding, this is not a critique of toxicology or its legitimate practitioners. The quarrel is with those who misuse or mischaracterize the toxicological data and pervert it to indent materials for reasons that have nothing to do with valid toxicological principles.

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