THE MAJOR ARGUMENTS OF INDUSTRIAL CONSERVATIVES

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1. Foods contain many natural carcinogens and they represent a larger problem than man made pesticide residues. Thus, regulating the chemical industries is a waste of time and money.

For three major reasons this argument is illogical, conceptually flawed, and incorrect. It is also not supported by numerous replicated peer-reviewed studies. It is illogical because it argues that, since we are exposed to so many natural carcinogens a few thousand more man made carcinogens are not a problem. It is conceptually flawed and easily disproved by a simple and unavoidable fact. The foods we eat today are not substantially different from those eaten at the turn of the century. Thus, exposure to "natural" carcinogens has remained more or less unchanged. However, the remarkable increase in the incidence of cancer (1 in 3 today) directly correlates with the huge increase in industrial chemicals following the early 1940s. Finally, as a consequence of our long evolutionary history, we possess many enzymes that can detoxify natural carcinogens but we possess no enzymes that can specifically detoxify the many thousands of man made chemicals.

The principal proponent of this view is Dr. Bruce Ames, a prominent Berkeley biochemist and paid lobbyist for the California Fruit Growers Association. Many scientists have detailed the flaws in the Ames theory.

First, Ames brands many natural substances as carcinogens on the basis of flimsy or equivocal evidence, such as causing tumors only from a high dose, precisely the argument he rejects when applied to man-made carcinogens (NRC 1993a, Perrera et al. 1988). Second, some of the natural carcinogens cited by Ames are not carcinogens at all. One of his top three alleged natural carcinogens, d-limonene, is not considered carcinogenic by any credible regulatory or international scientific agency (Huff 1993, EPA 1994b).

Second, Ames looks at only a handful of pesticides in the food supply, dramatically understating the total load of cancer-causing pesticides in food and water. Dr. Frederica Perrera and colleagues constructed a more representative, but still incomplete, list of man-made carcinogens and found exposure to these compounds to be about equal to that of natural carcinogens cited by Ames. (Perrera et al. 1988).

Third, Ames incorrectly inflates exposure to natural carcinogens. For example, he assumes that everyone in the United States drinks a cup of coffee each day when illustrating the danger of natural carcinogens, but uses far smaller average food consumption estimates for the entire U.S. population when calculating the dangers of DDT in the diet.

Fourth, Ames does not consider that children may get far higher doses of synthetic or natural carcinogens than adults, based on their unique eating habits. And he ignores the fact that the risks from

some man-made carcinogens are low precisely because these carcinogens have been aggressively regulated.

The issue of natural vs. man-made carcinogens is one of ethics and common sense. Just because natural sources of cancer risk exist, it doesn't follow that we should add more synthetic carcinogens to the food, air, and water supply.

2. Animal tests of pesticides don't predict human cancer risks because the doses tested are so high that "everything causes cancer." Also, animal results are irrelevant to humans, because "mice are not little men."

In fact, animal studies are the public's first line of defense against toxic substances. Major public health disasters have been avoided or minimized, because regulators acted on the basis of animal studies. For example, DDT, thalidomide, and many, many, other toxic substances were banned in the US due to problems first identified in animal tests. The National Institute of Environmental Health Sciences, continues to argue that animal studies must serve as a primary tool of prevention. Epidemiology studies, while valuable, often provide information 25 years too late.

In other cases regulators ignored the results of animal studies, causing great human suffering. Workers were not protected from asbestos until after lung cancer cases in workers were linked directly to occupational exposure to the substance. Evidence that asbestos caused cancer in animals was suppressed by the manufacturer for at least 15 years. Animal evidence was also ignored with the fertility drug DES, which was not banned until the daughters of women who took it developed a rare vaginal cancer.

High dose animal testing is used by every public health agency around the world, from EPA to European bureaus to the World Health Organization-- and even by industry when it likes the results (for example when these studies prove the safety of drugs, cosmetics, or other pesticides).

Animal studies accurately predict risk for humans. Extrapolating from mice to men is logical because rodents and humans are remarkably similar genetically (Rall et al. 1987). It is not surprising, therefore, that all known human carcinogens have also been shown to cause cancer in experimental animals. Most scientists agree that it is prudent to assume the reverse is also true and that chemicals clearly causing cancer in animals present human risks (NRC 1993a). The same is true for chemicals that cause birth defects in humans; they all cause birth defects in animal studies (Kimmel et al. 1992).

In fact, current animal testing protocols, particularly for cancer and subtle multigenerational effects, underestimate human risk (NRC 1993a). People are exposed to pesticides from conception through death. In contrast, animals are exposed typically beginning at 8 weeks (roughly equivalent to 5 years of age in the human), and ending at two years (roughly equivalent to age 65 in the human). One study designed to better understand this shortcoming found that rats fed the carcinogens N-nitrosodiethylamine (NDEA) or N-nitrosodimethylamine (NDMA) for two and one-half years had seven times the cancer incidence compared with rats fed NDEA or NDMA the standard two years required by the EPA (Peto et al. 1991).

A substantial body of evidence points to dramatically increased cancer rates when experimental animals are dosed in the womb and as neonates. A major study of 1,040 animals found a six-fold increase in cancer incidence when exposure began at three weeks, as compared to 20 weeks of life (Gray et al. 1991). Another review of animal studies on 22 chemicals found that more cancers were produced, and were produced earlier in life, when animals were exposed from conception and during weaning (McConnell 1992).

In truth, most chemicals do not cause cancer, even when tested at very high doses. To discredit animal tests of pesticides, industry fixates on the Maximum Tolerated Dose (MTD) (the highest dose that can be fed to an animal without causing tissue damage), claiming that virtually "everything causes cancer" at such a high level. But in fact most chemicals are not carcinogenic even when tested using maximum tolerated doses; of the hundreds of chemicals tested by the National Cancer Institute and the National Toxicology Program, 68% proved carcinogenic when selected for testing because of their suspected cancer-causing potential. When chemicals were tested on the basis of potential high human exposure, only 22% caused cancer in high-dose tests, suggesting that about one-fifth of all environmental pollutants may cause cancer in high-dose animal tests (Rall 1994, Fung, et al. 1993).

Most chemicals that cause cancer at high doses also cause cancer at low doses. A review by the National Toxicology Program found that only 6% of all chemicals analyzed caused cancer at the high dose only (Rall 1994).

While several alternative theories have been advanced, mainstream scientists still agree that there is no dose of a carcinogen that does not increase the risk of cancer (Portier et al. 1994). This is particularly true in the current environment where people are exposed to scores of carcinogens each day, each one adding to the cancer risk of the other.

Several important animal studies have tried and failed to identify a so-called "threshold", or safe dose. Recently, using extremely low doses on over 4,000 rats, researchers were unable to find a dose of N-nitrosodiethylamine or N-nitrosodimethylamine that did not significantly increase cancer rates (Peto et al. 1991).

Industry further complains that the government overreacts to reports of rodent tumors and tries to ban any chemical so implicated. In fact, the opposite is true. According to the Office of Technology Assessment, most rodent carcinogens are not regulated and few are banned (OTA 1987). Of the more than 90 pesticides found to cause cancer in animal studies, the vast majority continue to be used on food crops.

3. The amount of pesticide residues in food or water is so small it poses no health risks, or as one company's brochure puts it: "A child would have to eat 340 oranges every day to consume the amount of pesticide residues found to cause health problems in laboratory mice."

In fact, some children are very likely being sickened each day by pesticides in food. A five-year, consensus National Academy of Sciences study found that "...for some children, exposures [to just five

pesticides on eight foods] could be sufficiently high to produce symptoms of acute organophosphate pesticide poisoning" (NRC 1993a). This conclusion is based on a sophisticated probability analysis of actual exposures to pesticides in the food supply. The same analysis showed that 50,000 two-year-olds exceed federal safety margins for organophosphate insecticides each day, and that about 1,500 two-year-olds exceed these safety margins by a factor of ten (NRC 1993a).

Children are simultaneously exposed to many different pesticides from many sources--in water, food, and around the home. The U.S. Department of Agriculture found eight pesticides on individual samples of apples, seven on peaches, and six on grapes that were washed and prepared for normal consumption (USDA 1994). The FDA reported 103 pesticides on just 22 fruits and vegetables over a two-year period, and 67 pesticides and metabolites were found in Midwestern drinking water sources from 1987 to 1994 (Wiles et al. 1994).

Current regulations do not account for these multiple exposures, nor do they provide specific protection for infants and young children. The young remain unprotected in spite of a five-year, consensus National Academy of Sciences study that called for sweeping regulatory and scientific changes to protect infants and children from pesticides in food, water, and the home environment (NRC 1993a).

4. Cancer rates are decreasing, or: "We're winning the war on cancer".

Cancer incidence in the American population has skyrocketed--up 48% from 1950 through 1990, according to National Cancer Institute statistics. These statistics are adjusted for an aging population and exclude lung and stomach cancers where the causes are generally well-understood.

Those who say cancer rates are decreasing focus on cancer death rates because the cancer death rate overall is stable, despite increasing incidence. While cancer kills the same percentage of people that it always has, far more people are getting the disease.

Framing the debate in terms of death rates is particularly cold-hearted toward children. It intentionally obscures the fact that a greater percentage of children get cancer than ever before in our history. The incidence of childhood brain cancer and childhood leukemia has increased 33 percent since 1973 (Ries et al. 1993). Cancer kills more children under the age of 14 than any other disease.

Focusing on childhood death rates further minimizes the pain and suffering of these children, the higher incidence of subsequent cancers that these people face as adults, and the costs of maintaining a growing number of childhood cancer wards.

Since 1950, cancer rates for the general population (excluding lung and stomach cancer) have risen at a rate of about 1.2 percent per year, with extraordinary increases in certain cancers, including cancers of male and female sexual organs, notably the breast (up 52%), prostate (up 134%), and testis (up 125%) (Miller et al. 1993).

Other organs exhibiting huge cancer increases during the past 40 years -- which are also shown in lab tests to be prone to tumors from carcinogenic chemicals--are the kidney (up 116%), liver (up 88%), brain (up 74%), and thyroid (up 102%), as well as non-Hodgkin's lymphomas (up 172%) and multiple myelomas (up 183%) (Miller et al. 1993). Farmers, otherwise healthier than the average population, have elevated rates of several types of cancer that are associated with chemical exposure (see farmer reference, Appendix 2). Although some of these higher cancer rates could be due to better detection, detection alone does not account for such enormous increases (Miller et al. 1993).

5. Nobody has ever been hurt by exposure to pesticides at the low doses found in food and water.

Numerous epidemiology studies argue that this is an incorrect statement. The landmark 1993 National Academy of Sciences study of children and pesticides concluded exactly the opposite when it found, based on an examination of actual residues in actual diets, that some children are exposed to so many organophosphate pesticides in food each day that they could experience "acute organophosphate insecticide poisoning" (NRC 1993a).

Mainstream scientists agree that real world exposure to cancer-causing chemicals presents real risks (Portier et al. 1994), particularly in the modern, polluted environment where people are routinely exposed to complex mixtures of cancer-causing chemicals. Between 30,000 and 60,000 people each year die from exposure to cancer-causing environmental pollutants.

At least 20 additional epidemiology studies in the peer-reviewed literature document a relationship between exposure to pesticides and increased risk of cancer in children. Children are generally more susceptible to the toxic effects of these chemicals than adults, and current animal tests and regulations do not protect children. Children are routinely exposed to hundreds of pesticides in food, as well as contaminants in air and water. The combined toxicity of these chemicals is not known, nor is it being studied. Meanwhile, the incidence rate of childhood cancers, particularly brain cancer and childhood leukemia, continues to rise.

Researchers at the National Cancer Institute have found that farmers have elevated rates of several types of cancer that are associated with chemical exposure, including pesticides. Other effects, such as disruption of the endocrine system, have been shown to occur in animals at extremely low doses. Scientists agree that there is a biologically plausible relationship between many chlorinated chemicals in the environment, including pesticides, and endocrine-related effects, such as declining sperm counts and rising rates of testicular and breast cancer that are widely reported in the industrialized world

6. Alar on apples was a "scare," indicative of environmentalists' use of emotion and scare tactics, not sound science.

The EPA's initial decision to ban Alar has been reaffirmed by subsequent industry-sponsored animal tests, which led the agency to quietly ban the chemical for all food uses in 1992. The unavoidable breakdown product of Alar, (asymmetrical dimethyl hydrazine, UDMH) routinely found in apple juice

and apple sauce, has been classified by the EPA as a probable human carcinogen, and at the time it was discontinued for use on apples in 1989 it was the most potent carcinogenic pesticide allowed in the U.S. food supply.

Meanwhile, apple production, sales, and profits have soared since Alar was banned for use on apples. Since 1989, apple industry revenues have increased by nearly 50 percent, and production has increased by nearly 10 percent (USDA 1993a). Per capita consumption of apple products has remained steady since Alar was removed from the market (USDA 1993b).

At the time of the Alar report on "60 Minutes", two states (Massachusetts and New York) had already banned the chemical, and the American Academy of Pediatrics had urged such a ban at the federal level. A subsequent lawsuit brought by apple growers against CBS and 60 Minutes was dismissed, with the judge noting "that governmental methodology fails to take into consideration the distinct hazards faced by preschoolers. The government is in grievous error when allowable exposures are calculated...without regard for the age at which exposure occurs."

In 1993, the National Academy of Sciences confirmed the central message of the Alar case, which is that infants and young children need greater protection from pesticides. Finding that federal calculations for allowable levels of pesticides do not account for increased childhood consumption of fruit, for children's lower body weight, or for their heightened sensitivity, NAS called for an overhaul of regulatory procedures specifically to protect kids (NRC 1993a).

7. Restricting the use of pesticides will cause food shortages and raise the price of food.

This and the following are major arguments of "Citizens for a Sound Economy" and "The Institute for Reason". In fact, experience shows that this claim is totally false. Since 1985, the EPA has banned various uses of 12 pesticides on more than 200 crops. The cancellation of these pesticide uses had absolutely no effect on the price or availability of any food anywhere in the United States (Elderkin 1995).

The reason is that there are plenty of available alternative pesticides and pest control techniques for farmers of every crop in the United States (NRC 1989, NRC 1993b). Perhaps the best example is that of Alar (see above), which caused a tremendous uproar from apple growers when it was removed from the market. Yet after Alar sales were halted by the manufacturer, apple yields, sales and profits went up, while consumer prices remained steady (USDA 1993a, USDA 1993b, Elderkin 1995).

Many pesticides that are widely used here are banned for health and environmental reasons in other countries. One example is atrazine--the most heavily used pesticide in the U.S.--which is banned in many European nations. Another is alachlor, a heavily used corn and soybean herbicide that is banned in Canada. Most other countries also ban the chemical now universally used in the U.S. to prevent potatoes from sprouting. Indonesia, a tropical country with extreme pest pressure, has gone so far as to ban whole categories of pesticides used in the United States, in a successful effort to contain surging pest resistance to pesticides and to promote integrated pest control measures.

In fact, pesticides are increasingly ineffective. American farmers used 33 times more pesticides in 1990 than they did in 1945, yet crops losses from pests during that time increased from 31 to 37 percent (Pimentel et al. 1992). The reason for this is genetic pest resistance to the growing chemical assault.

8. Pesticides cost money, so farmers currently use as few pesticides as possible.

Two consecutive National Academy of Sciences studies--Alternative Agriculture, and Soil and Water Quality: An Agenda for Agriculture--have concluded the opposite, that farmers currently have no compelling economic incentive to reduce pesticide use. At the same time, these two studies showed that major reductions in current pesticide use levels are possible with available off-the-shelf pest control methods (NRC 1989a, NRC 1993b).

Farmers maintain unnecessarily high levels of pesticide use because pesticides are weakly regulated, because farmers pay none of the costs to remedy the pollution caused by pesticides, and because pesticides account for a relatively small percentage of overall production costs and per-acre crop value.

The average value of an acre of Florida tomatoes is about $14,000, while the average cost per acre for pesticides is about $750, or about 5 percent of the crop's value. Reducing pesticide costs by 20 percent, or $150, for example, provides virtually no potential economic reward compared with the perceived risk of change and the cash value of the crop.

In corn and soybean crops, pesticide use is less intensive and an even smaller percentage of production costs or crop value. The value of an average acre of corn is $322 (assuming $2.80 per bushel for corn, including subsidies and 115 bushel yield). The cost of using cancer-causing herbicides that pollute the drinking water of at least 11 million people in the Corn Belt is about $5.00 per acre, or only about 1.7 percent of the value of the crop.

There is little economic incentive to reduce use when the profits on the line are so relatively great, and when farmers pay none of the costs associated with the pollution caused by pesticide use.

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