

BY WILLIAM P. KUCEWICZ



**THE GREAT APPLE SCARE:**

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20  
Years  
Later**



American Council on Science and Health

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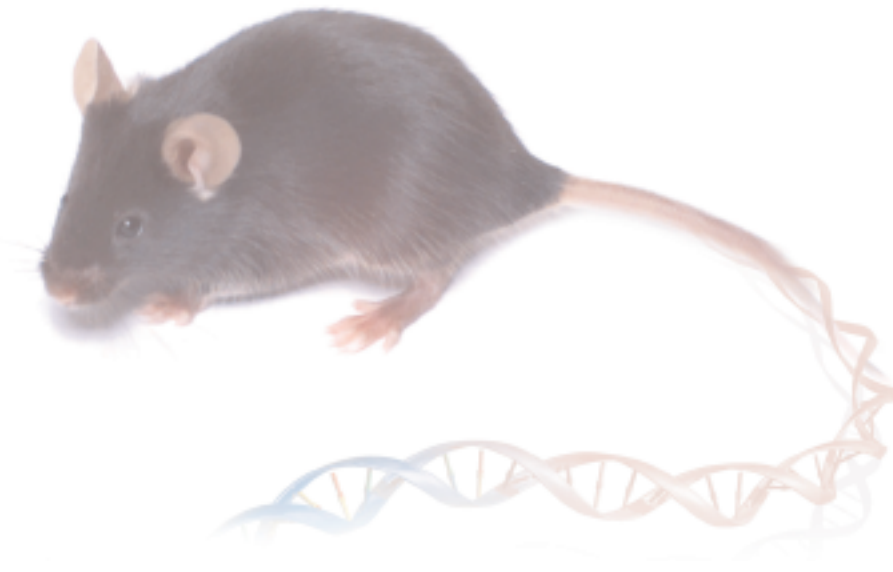
## OVERVIEW



A cancer scare in early 1989 caused millions of consumers throughout the country to stop buying and eating apples and apple products. The fear was that apples were being sprayed with a cancer-causing chemical. Children, in particular, were thought to be at especially high risk. (Rosen 1990, Sewell 1989) The case remains to this day one of the supreme examples how a combination of environmentalists, “public interest” lawyers, publicists, and members of the news media can foist a bogus health scare on an unwitting public.

Now, on the twentieth anniversary of “The Great Apple Scare,” the American Council on Science and Health (ACSH) means to recall the events that led up to the mass hysteria over apples and explore some of its many ramifications in hopes of preventing another fabricated crisis from fooling a too-gullible public in the future.

## INTRODUCTION



The chemical in question goes by the trade name Alar, a product of Uniroyal Chemical Company, Inc. of Connecticut. Developed in the 1960s as a means of slowing plant growth, its active ingredient is daminozide, a man-made, hormone-like chemical. It was initially registered in 1963 for use on potted chrysanthemums. Later, apple growers in the United States and elsewhere routinely used Alar to prevent pre-harvest fruit drop, promote color development, and increase storage life. (PSD 1989, OPPTS 1993) However, following the burst of negative publicity about the chemical in early 1989, Uniroyal Chemical canceled all sales of Alar on June 2, 1989. (Rosen 1990, Smith/Raso 1999) And in November 1989, the U.S. Environmental Protection Agency (EPA) approved the company's request to voluntarily cancel all food-use registrations of daminozide. (EPA 1989)

Three federal bodies are responsible for the regulation of chemicals and food – the U.S. Department of Agriculture (USDA), the EPA, and the U.S. Food and Drug Administration (FDA), which is part of the U.S. Department

of Health and Human Services. The EPA establishes tolerances for pesticide residues on raw commodities under Section 408 of the Federal Food, Drug and Cosmetic Act. The law stipulates that tolerances are to be set at levels deemed necessary to protect the public health, while taking into account the need for “an adequate, wholesome, and economical food supply.” According to a 1987 study by the National Academy of Sciences’ National Research Council (NRC), “Section 408 thus explicitly recognizes that pesticides confer benefits and risks and that both should be taken into account in setting raw commodity tolerances.” Section 409 (enacted in 1958) also contains the famous Delaney Clause, which prohibits federal approval of a food additive that has been found to “induce cancer” in humans or animals. (NRC 1987)

Two years of carcinogenicity testing of Alar on rats had preceded its approval for commercial use on food – specifically, apples -- by the FDA in 1968. (Smith/Raso 1999, PSD 1989) Studies of Alar nonetheless continued to be made. Bela

Toth of the Eppley Institute for Research in Cancer in Omaha, Nebraska in 1973 reported finding that a breakdown product of Alar -- UDMH, or 1,1-dimethylhydrazine (unsymmetrical dimethylhydrazine) -- administered at several times the maximum tolerated dose (MTD) for males (i.e., in quantities that might render an intrinsically uninjurious substance harmful), was responsible for the appearance of tumors in the blood vessels, kidneys, livers, and lungs of mice. Commercially available Alar contained about 1 percent UDMH. Toth in 1977 further reported a high tumor incidence in mice given Alar itself, again at several times the MTD. (Rosen 1990, Smith/Raso 1999, Toth 1973, Toth 1977)

The National Cancer Institute (NCI) in 1978 published the results of a carcinogen bioassay (i.e., a test of a substance's activity in organisms such as rodents) of daminozide that found it was a weak carcinogen. The daminozide's carcinogenicity measurement was so trivial, however, that the EPA could not use the NCI data for quantitative risk assessment. Alar's manufacturer subsequently sponsored several other carcinogen bioassays of daminozide, and no carcinogenicity was found. (Smith/Raso 1999) The EPA nonetheless announced plans in 1980 to conduct a "special review" of Alar. Such reviews are normally triggered when new data become available regarding a product already approved for use. (Rosen 1990, NCI 1978)

## RESEARCH CRITICIZED



An EPA advisory panel, made up of academic experts, was asked as part of the special review of Alar to review Toth's results and methods. The panel in September 1985 reached some startling conclusions. It discovered several errors in scientific procedure in Toth's work and considered his data inadequate to serve as a basis for quantitative risk assessment. Toth's research, it concluded, failed to provide the EPA with sufficient justification for banning Alar. (Rosen 1990)

A 1989 British review reached similar conclusions about the reliability of Toth's research. Published by the Pesticides Safety Directorate of the U.K. Department for Environment, Food, and Rural Affairs, the study, conducted by an advisory committee, looked into possible consumer risk from the use of products containing daminozide on apples and pears. It found much to criticize in Toth's work. The panel cited a lack of concurrent controls, poor record keeping, insufficient documentation, and, worst of all, the use of dose levels that were much too high,

with doses exceeding the MTD. "In this situation in which a chemical causes severe and biologically significant physiological change," the reviewers stated, "it is this change itself, caused by toxicity, which can result in tumours [sic]." (PSD 1989)

The EPA announced in January 1986 that it would permit continued use of Alar but would require Uniroyal Chemical Company to provide residue and chronic toxicity data. None of the subsequent studies, conducted over two-year periods, showed any increased incidence of cancer when Alar, even at very high doses, was administered to mice and rats. The UDMH studies on rats at all doses found no evidence of any carcinogenic effects related to the Alar contaminant. Similarly, no tumors appeared in mice that received UDMH at the level previous studies had found was the maximum dose that they could tolerate without experiencing high levels of toxicity. There was an increased incidence of pulmonary neoplasms in female mice in one study, but its authors noted that this type of lesion, which is very common in this strain of mouse, is not considered a reliable

indicator of a direct oncogenic effect in the species. A second mouse study did find oncogenic effects in both male and female mice, but the researchers said that the MTD in this case may have been exceeded. (Rosen 1990, PSD 1989)

U.K. reviewers looking at these and other data concluded that neither daminozide nor UDMH was a genotoxic carcinogen and that then-current levels of exposure to the chemicals pose no risk to the health of adults or infants and children. (PSD 1989)

The EPA, meanwhile, acknowledged that the study that used very large doses of UDMH – doses that were almost as high as the Toth study -- made its results questionable. As the EPA's own news release conceded, "it may be argued that the deaths are the result of excessive toxicity, which may compromise the outcome of the study." Nevertheless, on February 1, 1989, the agency ordered a phaseout of Alar. The chemical's use would end by July 31, 1990. The EPA had concluded that Alar's continued use would result in an increased lifetime risk of 45 cancers per one million exposed individuals. Agency policy forbids the use of any agricultural chemical that causes more than one cancer per million exposed individuals. The EPA chose the July 31, 1990 deadline because it estimated that less than one cancer per million exposed persons would occur by that date. (Rosen 1990, Smith/Raso 1999)

## ORCHESTRATED MEDIA CAMPAIGN



Within weeks of the EPA's Alar announcement, environmentalists and public interest lawyers, led by the Natural Resources Defense Council (NRDC), began an orchestrated public relations campaign. The opening salvo came on February 26, 1989, with the airing of a report on Alar on the CBS television newsmagazine "60 Minutes." Titled "'A' Is for Apple," the segment's insignia was an apple embossed with a skull and crossbones, a symbol for poison. (Rosen 1990, Smith/Raso 1999, Smith 1994)

The segment opened with the following summary from "60 Minutes" reporter Ed Bradley:

**The most potent cancer-causing agent in our food supply is a substance sprayed on apples to keep them on the trees longer and make them look better. That's the conclusion of a number of scientific experts. And who is most at risk? Children, who may someday develop cancer from this one chemical called daminozide. Daminozide, which has been sprayed on apples for more than 20 years, breaks down into another chemical called UDMH. (Auvil 1996)**

CBS offered its viewers a scoop – an advance look at a new NRDC analysis of the risk of Alar to public health, entitled *Intolerable Risk: Pesticides in our Children's Food*. CBS made no attempt at balance. It only presented information and opinions that fit with its anti-Alar template. (Rosen 1990, Smith/Raso 1999)

The "60 Minutes" broadcast was the springboard for the NRDC's new Children's Environmental Health Initiative. David Fenton of Fenton Communications\*, a public relations firm that had been engaged by the council, negotiated an exclusive deal with the producers of "60 Minutes" to break the findings of the new NRDC report. However, two important facts about the report went unpublicized – first, that it was compiled mainly by two nondoctoral public interest activists and, second, that it was never published in any peer-reviewed journal. (Rosen 1990, Smith/Raso 1999)

The report made some extraordinary claims. For instance, it estimated 240 cancer cases per one million population among children who were average consumers of Alar-treated food and 910

cases per one million for children who were heavy consumers – that is, “an additional cancer case for every 1,100 children exposed.” (Sewell 1989)

The NRDC assessments far exceeded the levels measured by EPA. There were several reasons for this, according to Joseph D. Rosen, a professor of food science at Rutgers University. In an insightful analysis of the science behind the controversy published in the fall 1990 edition of *Issues in Science and Technology*, the official journal of the National Academy of Sciences, he cites at least three reasons: First, the NRDC used the Toth data, which indicated cancer potency ten times greater than that found in the studies used by EPA. Second, the NRDC used a time-dependent mathematical model that builds in an increased risk on the assumption that exposure to a genotoxin early in life is much more serious than subsequent exposures, because the cells affected by the genotoxin have much more time to multiply and that children are more sensitive than adults. EPA, in comparison, used a time-independent model that did not specifically account for age at exposure. In fact, neither Alar nor UDMH is a genotoxin. Britain's aforementioned advisory committee on Alar concluded that its nongenotoxicity, coupled with extremely low human exposure to the chemical, was reason enough to declare it safe for all consumers, including children. (PSD 1989) Third, the EPA and the NRDC differed in their estimates of apple and apple- product consumption. The former used data from a 1977-78 consumption survey by the U.S. Department of Agriculture (USDA) of about 30,000 people. The latter also relied on a USDA study, but this 1985-86 report surveyed only 2,000 people and suggested a 30 percent increase in fruit and vegetable consumption since the prior study, conducted just eight years earlier. (Rosen 1990)

The NRDC report was released the next day, and press conferences were held in 13 cities. Within a fortnight, actress Meryl Streep announced the formation of an organization called Mothers and Others for Pesticide Limits. The message throughout was that chemical residues on food are a major health hazard. (Rosen 1990) Streep would later say that she had young children at the time and was concerned for their well-being. “I had very small kids then who were mainlining apple juice,” she told an interviewer for *Style* magazine, “and there was one particular substance that was on apples called Alar that was something you couldn't wash off the fruit.” Criticizing what she termed “the pesticide treadmill,” the actress-activist went on to say that people are “suspicious of their government regulations and of their food sources.” (Schnall 1996)

## PREDICTABLE RESPONSE - PANIC



The public's response to the Alar reports was predictable. Panic set in almost overnight. Parents poured apple juice down the drain, and many consumers stopped buying apples and apple products. Numerous school systems removed apples and apple products from their luncheon menus. Stores pulled apple products from their shelves, and supermarkets were inundated with requests for organic produce. By May, apple growers estimated losses at \$100 million. (Smith 1994, Rosen 1990)

"Throughout the extensive media coverage of the issue, a few important facts were conspicuously absent," Rosen points out. "After 40 years of widespread pesticide use, there is no evidence of increased cancer linked to pesticide residues on food." Cancer epidemiologists do not consider chemical residues to be a significant food-safety problem. Many naturally occurring chemicals in food are carcinogenic and are found at levels 100 to 1,000 times higher than even the most heavily applied synthetic chemicals. What is more, as Rosen, a food toxicology expert, notes, the

organic produce recommended by the NRDC, among others, is not treated with fungicides and therefore may contain high levels of carcinogenic mycotoxins. Most significant, the daily dose of the Alar breakdown product UDMH administered in the studies on which the NRDC relied for its risk estimates is about 280,000 times the amount that is ingested daily by preschool children – and that is according to the NRDC's own calculations. (Rosen 1990)

A study by the California Department of Food and Agriculture (CDFA) illustrates how much risk estimates can vary with seemingly minor changes in methodology. Like the EPA, the CDFA used the 1977-78 USDA consumption survey and the more recent cancer assays, but it parted ways with the agency by factoring in the results of studies that found no cancer risk associated with Alar. Like the NRDC, though, it built in an extra safety factor for children, albeit not as large as the one used by the NRDC. The CDFA arrived at a worst-case risk estimate of 2.6 excess cancers per million population, a risk that could easily be reduced below one per million

by banning the use of Alar-treated apples in the production of apple juice and apple sauce. More important, the CDFA calculated probable lifetime risk, which it estimated at 3.5 cancer cases per trillion population. (Rosen 1990, CDFA 1989)

## EXAGGERATED HEALTH HAZARDS



Bruce Ames, a noted biochemist at the University of California at Berkeley, suggested that reliance on extremely high doses in cancer testing may in fact be one reason why about half of the synthetic and naturally occurring chemicals tested up till then had been found to be mutagens and possible carcinogens. (Rosen 1990) In a follow-up broadcast aired May 14, 1989, "60 Minutes" reporter Bradley interviewed Ames, who subsequently sent a letter of complaint to CBS Executive Producer Don Hewitt, alleging that the show "grossly distorted the scientific arguments I presented, thus dishonestly discrediting me." Ames goes on to point out in the June 1989 letter that "new research suggests that conventional worst-case extrapolations from very high-dose rodent cancer tests to very low-dose human exposures to chemicals . . . enormously exaggerate the possible hazards." (Ames 1989) Despite such qualifiers, the data obtained in these studies are used to calculate the risk that the substance poses for humans. And those calculations also are laden with assumptions and uncertainties that further compound the problem of obtaining accurate risk assessments. (Rosen 1990)

Since 1987, the U.S. Food and Drug Administration's (FDA) pesticide residue monitoring program has prepared annual reports summarizing their findings. The FDA's Total Diet Study (TDS) program analyzes market baskets of about 300 foods four times per year that represent the typical U.S. consumer's diet. The food samples are analyzed using methods that permit enhanced measurement of pesticide residues, generally at levels up to 10 to 100 times more sensitive than normal regulatory monitoring procedures. TDS residue levels as low as 0.1 part per billion are routinely reported. The results of the latest analysis, for 2006, as well as earlier reports, continue to demonstrate that levels of pesticide residues in the U.S. food supply are "overwhelmingly in compliance" with EPA's permitted pesticide uses and tolerances. (CFSAN 2008)

Disputable public health concerns like Alar need to be put in context, and one of the best ways is to compare them with nature. Ames makes the point well in his letter to CBS:

**Nature's pesticides are one important group of natural chemicals that we have investigated. All plants produce toxins to protect themselves against fungi, insects, and predators such as man. Tens of thousands of these natural pesticides have been discovered, and every species of plant contains its own set of different toxins, usually a few dozen. In addition, when plants are stressed or damaged, such as during a pest attack, they increase their natural pesticide levels many fold, occasionally to levels that are acutely toxic to humans. We estimate that 99.9% of the pesticides we eat are all natural.**

**Surprisingly few plant toxins have been tested in animal cancer bioassays, but among those tested, again about half (20/42) are carcinogenic. Even though only a tiny proportion of plant toxins in our diet have been tested, natural pesticide carcinogens have been shown to be present in the following foods: anise, apples, bananas, basil, broccoli, brussels sprouts, cabbage, cantaloupe, carrots, cauliflower, celery, cinnamon, cloves, cocoa, coffee, comfrey tea, fennel, grapefruit juice, honeydew melon, horseradish, kale, mushrooms, mustard, nutmeg, orange juice, parsley, parsnips, peaches, black pepper, pineapples, radishes, raspberries, tarragon, and turnips. Thus, it is probable that almost every plant product in the supermarket contains natural carcinogens. The levels of the known natural carcinogens in the above plants are almost always much higher than the levels of man-made pesticides, and many are in the range of thousands to millions of parts per billion. (Ames 1989)**

## WINNERS AND LOSERS



Months after the “60 Minutes” broadcast, The Wall Street Journal editorial page got its hands on a copy of a celebratory memo by political publicist David Fenton of Fenton Communications about his firm's public relations coup. He cites a “sea change in public opinion” that has “taken place because of a carefully planned media campaign, conceived and implemented by Fenton Communications with the Natural Resources Defense Council.” One of the extracts from the memo printed in the Journal reads:

**The intensity of exposure created by design for the NRDC pesticide story is uncommon in the non-profit world. Our goal was to create so many repetitions of NRDC's message that average American consumers (not just the policy elite in Washington) could not avoid hearing it -- from many different media outlets within a short period of time. The idea was for the “story” to achieve a life of its own, and continue for weeks and months to affect policy and consumer habits. (WSJ 1989)**

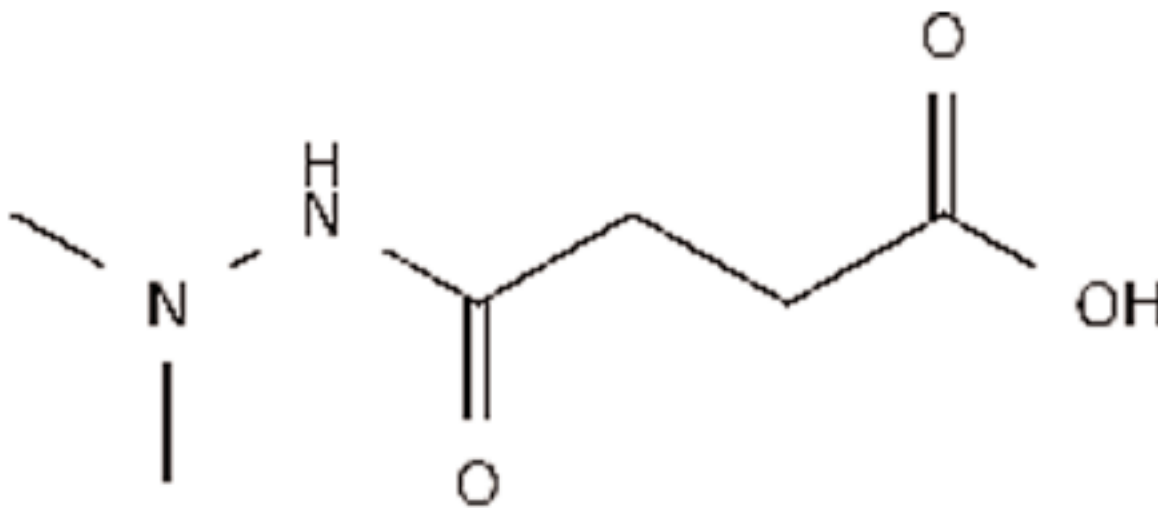
For the NRDC, indeed, the great apple scare was a money-making proposition from the very start. As its media consultants, Fenton Communications, baldly stated in a Propaganda Review interview: “The [public relations] campaign was designed so that revenue would flow back to NRDC from the public.” (Smith/Raso 1999)

With many family-owned orchards facing bankruptcy because of the great apple scare, growers in Washington State filed a lawsuit against CBS, the NRDC, and Fenton Communications in November 1990. The apple growers asserted, inter alia, a claim for product disparagement. Washington State produces about 60 percent of the nation's apple crop, and the U.S. Department of Agriculture said Washington apple growers lost at least \$125 million in the six months after the initial CBS Alar broadcast. The U.S. Court of Appeals for the Ninth Circuit in 1996 found against the apple growers, as a lower district court had earlier, and granted CBS's motion for summary judgment, saying that “the growers have failed to raise a genuine issue of material fact as to the falsity of the broadcast.” (Egan 1991, Auvil 1996)

When the dust had finally settled, it was estimated that apple growers had lost \$250 million and apple processors had lost another \$125 million (Lieberman Kwon 2004). Some good perhaps came out of the apple scare, however. A renewed emphasis has been placed on understanding the risks of pesticide exposure to infants and children. A detailed study by the National Research Council (NRC) of the National Academy of Sciences in 1993, *Pesticides in the Diets of Infants and Children*, found both quantitative and occasionally qualitative differences in toxicity of pesticides between children and adults. "Qualitative differences in toxicity are the consequence of exposures during special windows of vulnerability—brief periods early in development when exposure to a toxicant can permanently alter the structure or function of an organ system," it stated, adding:

**Quantitative differences in pesticide toxicity between children and adults are due in part to age-related differences in absorption, metabolism, detoxification, and excretion of xenobiotic compounds, that is, to differences in both pharmacokinetic and pharmacodynamic processes. Differences in size, immaturity of biochemical and physiological functions in major body systems, and variation in body composition (water, fat, protein, and mineral content) all can influence the extent of toxicity. Because newborns are the group most different anatomically and physiologically from adults, they may exhibit the most pronounced quantitative differences in sensitivity to pesticides. The committee found that quantitative differences in toxicity between children and adults are usually less than a factor of approximately 10-fold. (NRC 1993)**

## CONCLUSION



Alar is no longer a source of controversy, as daminozide has ceased to be used for any food-related purpose. Furthermore, the use of pesticides containing daminozide, says the EPA, “will not pose unreasonable risks or adverse effects to humans or the environment.” (OPPTS 1993) Ironically, the environmentalists who perpetrated the scare may have done more harm to themselves than they ever could have imagined, for even The New York Times had to admit in the aftermath of Alar that “consumers are subject to 'scare of the week' stories by environmental groups.” (Egan 1991) It was a startling admission for a newspaper that rarely says a word against environmentalists and other public interest types.

In his 1990 critique, “Much Ado About Alar,” Rosen, the author of numerous articles published by ACSH, finds that “the significance of the Alar case clearly goes beyond Alar,” explaining:

**The Alar episode provides a window on the forces influencing agricultural chemical regulation in the United States. On one side are**

**agricultural and chemical interests that believe the products they use and sell are safe and essential to the continued success of U.S. agriculture. On the other side are consumer activist groups who believe that many chemicals in current use harm public health and the environment. These groups have long been frustrated by what they perceive as excessive corporate influence on government policies and do not hesitate to manipulate the media and exploit the public's fear of cancer to get their point across. In the middle are government agencies that, while under considerable political pressure, must make decisions based on incomplete scientific information and sometimes-contradictory laws. Meanwhile, many Americans have lost faith in their government's ability to protect the food supply and have turned for advice to people unqualified to give it. (Rosen 1990)**

Environmental conservation of the type associated with Theodore Roosevelt, John Muir, George Perkins Marsh, and Gifford Pincher (called “the father of American forestry”) had during the 1960s and 1970s evolved under the aegis of something called “public interest law” into what

is now known as environmentalism. The public interest law movement, comprised mainly of young, idealistic attorneys and other activists, sought to skirt the traditional political process by using the nation's legal system to affect social, political, and, of course, environmental change. Public interest law was born of a 1960s Ford Foundation project aimed at providing political representation for what it called the "unrepresented" and "underrepresented." Such a nebulous concept was bound to be interpreted in all manner of ways, and so it was, as numerous public interest law firms sprang up across the country, all claiming to represent "the public." Once given standing in the courts, these firms were off to the races, suing whomever they could if they thought the suit would help bring about the political changes they sought, without recourse to the ballot box. (WSJ 1979)

To conclude, Rosen perhaps summed up the entire controversy best when told a newspaper reporter: "There was never any legitimate scientific study to justify the Alar scare." (Egan 1991)

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