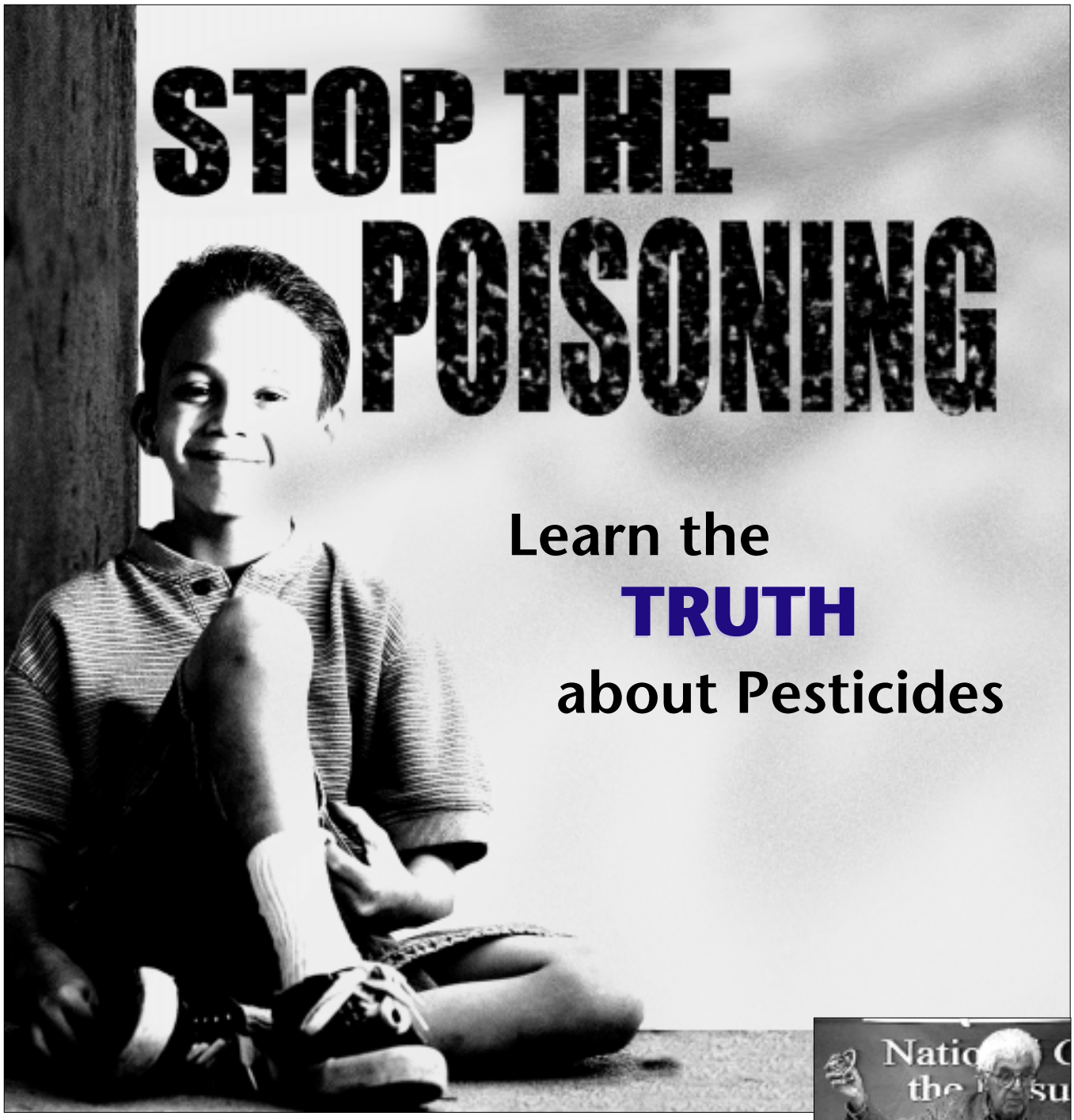
Volume 20 , Number 3 Fall 2000

Pesticides and You

News from Beyond Pesticides / National Coalition Against the Misuse of Pesticides (NCAMP)



A Framework for Environmental Thinking:

A critical scientific look at the biotechnology industry

Letter from Washington

Stop the Poisoning

In October, Beyond Pesticides/NCAMP and 25 organizations in New York, New Jersey and Connecticut convened a forum, attended by 700 people at The Riverside Church in New York City, to call attention to the need to stop the daily assault of pesticides on our communities and put alternatives in place *(see page 15)*. We called for a phase-out of pesticide use, cleaning up EPA's pesticide regulatory program that lacks scientific integrity, and greater public awareness of the hazards of pesticides and the limits of our knowledge of the adverse impacts of pesticides on health and the environment. The widespread spraying of pesticides for West Nile Virus (WNV) in communities has raised public concern about community pesticide use in general.

This issue of *Pesticides and You* provides highlights from the prestigious scientists who attended the Riverside forum, urging swift and broad action to stop unnecessary pesticide use. The forum kicked off with a video by Roy Doremus which captured the widespread public exposure to mosquito spraying as trucks rolled down New York City streets while people, including a pregnant women, walked nearby and sat on front stoops. Lucy Waletsky, M.D. provided the foundation for health concerns about widespread exposure, citing reports of over approximately 200 poisoning reports from New York City after the spraying for WNV. Herbert Needleman, M.D., drawing on his groundbreaking work to stop childhood lead poisoning, charges that EPA's review process on the insecticide malathion this year lacked scientific integrity because of the regulated chemical manufacturers' corporate influence. This is a serious charge that was bolstered by two EPA employees who work with the professional EPA staff union, Bill Hirzey and Dwight Welch. They describe a system at EPA that is unduly influenced by pesticide registrants and retaliatory of those who speak out. Deborah Wallace compared statistics associated with illness and death attributed to WNV with other public health diseases and deaths, finding the massive spraying to be an inappropriate response and disproportionately harmful to people of color communities. Louis Guillette notes that there are chemical effects, such as endocrine disruption, that current regulatory reviews are not testing for. Ralph Nader talked about corporate science, driven by the profit motive, and the power that it exerts over the regulatory process, forcing in pest management a focus on chemical solutions rather than prevention. Other speakers, included Robert Knight, Earthwatch, WBAI-NY radio; Sheldon Krimsky, Tufts University, on the myths of pesticide safety; Roderick Wallace, New York State Psychiatric Institute, on disproportionate impact of pesticides on people of color communities; Joel Kupferman, attorney, New York Environmental law and Justice project on litigation against the City of New York for violations of numerous environmental laws in the WNV pesticide spray program; Elizabeth Shanklin, New York City Greens, on community board resolutions against pesticide use; and Laura Haight, NY Public Interest Research Group, on model policies to phase out municipal pesticide use.

WNV is no longer a problem specific to the New York City region. We returned to Washington, DC from the New York conference to confront jurisdictions in the state of Maryland spraying their communities upon the advice of the Centers for Disease Control (CDC) and state government officials after finding several dead WNV-infected crows, but not one infected mosquito. Throughout this summer and fall, Nassau County, New York found 73 dead infected birds that triggered NO spraying. The county only sprayed an area one-mile in radius when it found infected mosquito pools and even then, not in every case did it do so. The point is Nassau County has a deliberative program to evaluate the need for spraying, tracking drainage basins and mosquito breeding sites. Most communities do not! On top of spraying, most local and state officials distribute terribly misleading information on pesticide safety. Montgomery County, Maryland wrote, "According to the U.S. EPA, permethrin can be used for public health mosquito control without posing unreasonable risks to human health, wildlife or the environment when applied according to the label directions." It will not be until 2002 or later that EPA expects to complete its review of permethrin and synthetic pyrethroids.

Biotechnology: Repeating the Pesticide Problem

In this issue, we print a speech on biotechnology that Barry Commoner delivered at the Eighteenth National Pesticide Forum, *Beyond Pesticides: A Solving a Public Health Crisis*, in April, 2000. His speech is one of the most thought provoking, insightful call to arms. Not only does he explain in clear terms the problems associated with biotechnology and the threat that it poses to our future, he does it in terms that show the parallel to the development of the petrochemical industry and pesticides in the U.S. He draws on his scientific knowledge and his dedication to actively engaging public dialogue and policy change. While we have learned that corporations and government institutions have made bad decisions historically with pesticides such as DDT, which continues to contaminate food and is responsible for the largest Superfund site in the U.S. off the coast of Los Angeles *(see page 4)*, the same corporations and government are launching us into the new dawn of a new technology to replace pesticides, but with the same lack of information and regulation.

As the challenges in front of us mount, we look forward to collaboration in building an informed local response in favor of alternatives that do not pose harm.

— Jay Feldman is executive director of Beyond Pesticides/NCAMP

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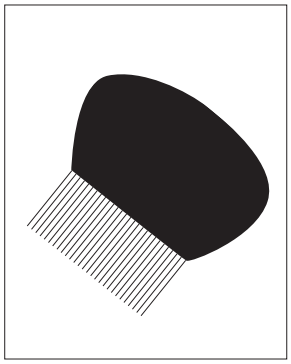

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Mail

New Developments in Lindane

Dear Beyond Pesticides/NCAMP,
It was really a mindblower to read the news about the banning of Lindane in California for the treatment of lice and scabies. I was hospitalized in 1979 after an accident, and while I was in the hospital, an itch I had was diagnosed as scabies. I was scrubbed head to toe, possibly even on my scalp, with Kwell™. Within a year, I had dark circles under my eyes, a sign of liver damage, that have never gone away, no matter what I do. Healers, such as acupuncturists, tell me that my liver and kidneys are weak.

I am very scared at the idea that I have this toxin lodged in my liver. I need to know where and how to get tested to see if it is in my system, where to go to get tested, and if there is any way known to expel it from the system, i.e. what they do in cases of lindane poisoning. I developed a lot of different, very mysterious health problems following my hospitalization, which could be attributed to the antibiotics and trauma of the accident, but would not account for many of the other health problems I have had over the years.

Do you have copies of any published reports on lindane toxicity and studies of individuals who have developed illnesses after being routinely treated with Kwell™? Thanks.
Carol Lipton
Brooklyn, NY

Dear Carol,
I am sorry to hear about your exposure to lindane and your subsequent health problems. Unfortunately, it happens all too often that we find out about the hazards of chemicals because they injure people. The Environmental Protection Agency's (EPA) Recognition and Management of Pesticide Poisonings *states that lindane is efficiently absorbed dermally and is absorbed even more efficiently across abraded skin. This is of high concern considering the severe dermatitis associated with scabies. The chief toxic action of lindane is on the nervous system. Based on liver and lung tumors in mice, the EPA classifies lindane as a possible human carcinogen. According to the National Pediculosis Association's (NPA) website, www.headlice.org, lindane "is rapidly absorbed through the skin into the bloodstream. Its documented effects on humans include vertigo, paresthesia, irreversible neurological damage, seizures, coma, and death. Its breakdown products in the body cause blood and hormonal disturbances, interfere with immune functions, and are known to cause cancer in animals. Unfortunately, it is also the working ingredient in over two million prescriptions issued each year for biocidal shampoos and creams meant to control head lice and mites and frequently prescribed for those most vulnerable to its toxic effects — young children, pregnant women and nursing mothers." The NPA has collected over 500 incident reports related to the use of lindane in 24 months, with reported injuries including seizures, birth defects and brain damage. The Los Angeles County Sanitation District's website describes lindane as an environmental hazard as well as a health risk. "Lindane products, such as shampoos and creams, are rinsed off after use into the public sewers. Even after treatment, lindane persists and passes into creeks, rivers, lakes, and oceans. Lindane is toxic in the water even in very small amounts. In fact, a single treatment of head lice or scabies with lindane pollutes 6 million gallons of water, the equivalent of 300 swimming pools. Lindane lasts for a long time in the environment, where it can contaminate the tissues of fish and other animals. The United States Environmental Protection Agency has declared lindane to be a persistent, bioaccumulative, and toxic chemical." For more information about the toxicity of lindane, see our Chemical Watch Factsheet on page 10.*

California Governor Gray Davis signed AB 2318, by Assemblyman Alan Lowenthal (D-Long Beach), on September 5, 2000, making California the first state to ban the use of lindane in any lice or scabies treatment product for human beings, beginning on January 1, 2002.

Anyone who has been poisoned by any pesticide should notify his or her state and regional EPA offices immediately in writing, and contact Beyond Pesticides/NCAMP or check out our website, www.beyondpesitcides.org — What to Do In a Pesticide Emergency, for a Pesticide Incident Report (PIR). These reports enable us to track the adverse effects of pesticide exposure, which are not adequately documented on a state or federal level. In the case of physical illness of people or animals, see a physician or veterinarian to confirm symptoms, obtain a diagnosis, and receive treatment. Get a written report signed by the physician or veterinarian. (Note: Many physicians and veterinarians are not familiar with the symptoms of pesticide poisoning, many of which resemble symptoms of a cold or flu. Tell them about your exposure, and ask them to check the symptoms. Blood or urine tests may be necessary depending on the chemical to which you have been exposed.) For lindane poisoning, laboratory tests can measure lindane in blood, urine, and semen. These tests do not tell you how much lindane you've been exposed to or if harmful effects will occur. Beyond Pesticides/NCAMP has an information packet about the toxicity of lindane available for $4ppd, which includes accounts of individuals who have been poisoned.

Does IPM Spell Intermittent Pesticide Misuse?

Dear Beyond Pesticides/NCAMP,
I read your latest issue of *Pesticides and*

You with great interest, as it covered certain specific issues I have been looking at recently. Of special interest was your report on epidemiologist, Omar Shafey, who was fired after he refused to alter his report on adverse effects caused by malathion, sprayed during the "Mediterranean fruit fly eradication program." I had just read the Florida Health Department's report on the assessment of the safety of malathion used in this program found on The University of Florida's "Pest Alert" website: http:/extlab7.entem.ufl.edu/PestAlert/.

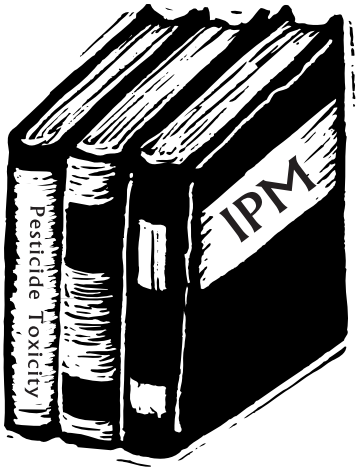
I have read many reports about the adverse effects of malathion, and recently read about one EPA scientist's disagreement about the so-called safety of malathion, a dissenting opinion. I also read about Melvin Reuber's case — another situation where a scientist, reporting adverse effects of malathion lost his job.

I would not have such a problem with UF's website if it provided balanced information about malathion, but, instead, it represented the Florida Health Department's report alone as "FAQ on Malathion," and I could find no other report on the website with any of the information I have read about the adverse health effects caused by malathion exposure.

I wrote the webmaster of this site with my concerns because, as an activist for Least Toxic Integrated Pest Management (IPM), I have, in the past, recommended UF's website on School IPM, which is linked from the "Pest Alert" main page. I do not feel comfortable recommending a site that I feel presents biased and incorrect information about pesticide safety.

Now that I have read your recent report about Omar Shafey, I am even more adamant about this issue of biased reporting on University websites, especially those presenting themselves as proponents of IPM. I think it's very important that we continue to hold health departments and university IPM departments accountable for the biased information they are promoting. The term IPM has been corrupted to the point that I no longer feel comfortable using it at all.

Thank you for the report!
Susan Vaughan
Kill Devil Hills, NC



Dear Susan,
Thank you for your positive feedback about our newsletter. It is always great to hear that our information is both timely and helpful to our readers. You bring up a very important point concerning Integrated Pest Management (IPM) —there is not one universally accepted definition. Universities, health departments, pest control operators, lawn care companies, and environmental organizations may all say that they advocate or practice IPM, but they also may all have a different definition. Beyond Pesticides/NCAMP defines IPM as a managed pest control system that: eliminates or mitigates economic, health, and aesthetic damage caused by pests; uses integrated methods, site or pest inspections, pest population monitoring, an evaluation of the need for pest control, and one or more pest control method, including sanitation, structural repairs, mechanical and biological controls, other non-chemical methods, and (if non-toxic options are unreasonable and have been exhausted) least-toxic pesticides. A good IPM program will minimize the use of pesticides and the risk to human health and the environment associated with pesticide applications. It is a decision making process designed: through monitoring and recordkeeping, identify the nature and extent of the problem and then analyze the conditions causing it; to devise ways to change those conditions to discourage recurrence of the problem or prevent it; and, if problem thresholds are met, select the least-toxic and least disruptive mix of strategies and tactics to directly suppress the pest populations, focusing on mechanical techniques, the deliberate introduction and establishment of natural enemies (parasites, predators, disease) in areas where they did not previously occur, and the selection of least-toxic chemical control strategies only when a mix of other strategies is shown to be inadequate, and only then through spot treatment methods and materials which minimize exposure to humans and other non-target organisms. Contact Beyond Pesticides/NCAMP for a written copy of our definition of IPM or for information about utilizing IPM to control a specific pest. Thank you for your letter!

Write Us!

Whether you love us, hate us or just want to speak your mind, we want to hear from you. All mail must have a day time phone and verifiable address. Space is limited so some mail may not be printed. Mail that is printed will be edited for length and clarity. Please address your mail to:

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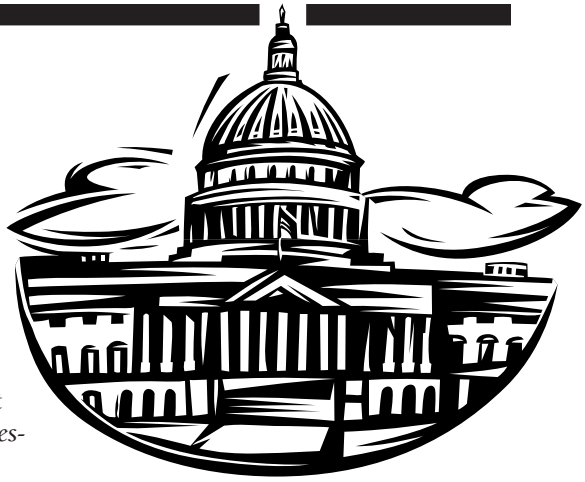
Eleven Members of Biotech Panel Call for USDA to Dump Terminator

Thanks to a growing public awareness and a consumer base that isn't going to let big agriculture decide what's on their dinner plate, genetically engineered "Frankenfoods" are losing ground in today's marketplace. In September, eleven members of the U.S. Department of Agriculture's (USDA) Advisory Committee on Agricultural Biotechnology sent a letter to Agriculture Secretary Dan Glickman, urging him to abandon U.S. government involvement with one specific type of genetic engineering, known as Terminator technology. This technology incorporates a protein into each plant that renders second-generation seeds sterile. Currently, USDA owns the Terminator technology along with DeltaPine, a Mississippi-based cotton and soybean seed company.

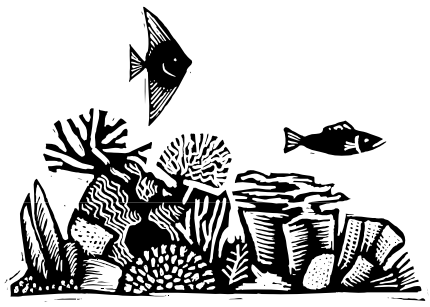
DeltaPine refers to the technology as a "Technology Protection System," arguing that it needs to protect its profits from farmers that save seeds. Environmentalists point out that the technology will cost farmers millions and could cross pollinate with other species. "We are steadfast in our view that USDA's continued association with the Terminator patent is a fundamental mistake," the panel wrote in its letter. "Terminator technology has only one primary purpose - to allow private companies to exert greater control over the seed markets and extract more income from farmers forced to buy their products on an annual basis."

The advisory committee, made up of industry representatives, farmers, environmentalists and research scientists that are appointed by the Secretary of Agriculture, also recommended that: Terminator should not be licensed to companies that control greater than 40% market share for a food and fiber crop in the national seed market; Terminator technology should not be used in crops that can cross pollinate with wild or cultivated neighbors; and, a review should be conducted by USDA and the Justice Department for impacts on monopolies in the agricultural sector, including farmers choice in the marketplace. The letter concludes by recommending that USDA also communicate with farmers on future decisions, not just the big seed companies. *For more information on genetic engineering and Terminator technology or for a copy of the letter sent to Secretary Glickman, contact Beyond Pesticides/NCAMP.*



EPA Plans to Cap DDT Contamination on Ocean Floor

The ecosystem is still feeling the effects of the once widely used insecticide, DDT, whose uses were banned in 1972 and domestic production continued until the mid-1980's. Contaminated food and soil have been detected even in areas where the pesticide has never been used. In some areas, birds, such as the bald eagle, are still unable to reproduce, because their eggshells have been so damaged by DDT contamination. Now, decades later, DDT is the source of the contamination for our country's largest ever Superfund site. EPA released a plan to cap, or cover, the 17 square mile underwater site, located just 2 miles off the coast of Southern California, with clean sediment. The goal of the project is to contain the contaminated sediment, which may harm local marine life.

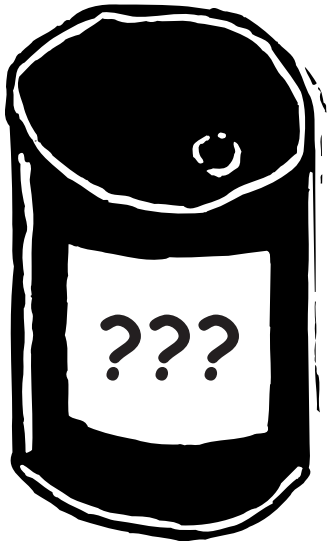


The contaminated region, which lies in the deep blue waters just off the cliffs of Palos Verdes, is the result of 100 tons of DDT that was flushed into the sewer system by the Montrose Chemical Corporation, located in nearby Torrance, California. Unfortunately, at the time, the sewer lines emptied directly into the Pacific Ocean. This October, federal lawyers will go to trial with the Montrose Chemical Company, seeking hundreds of millions of dollars to pay for the cost of cleaning up and restoring the waters off Palos Verdes. The chemical company is fighting the case, arguing that their dumping of DDT directly into the sewers was legal at the time. The company also claims that the DDT is doing no harm, and capping it would only stir it up, creating a bigger mess.

EPA disagrees. EPA's director the California Superfund division, Keith Takata, called the site, "one of the worst hazardous waste sites in the country." Stephen Weisberg, a scientist at the Southern California Research Project (SCRP), explained that the stability of DDT allows for the uptake of the chemical for years to come. Tests from SCRP reveal that DDT is accumulating in the tissue of regional marine life, particularly the white croaker, which is eaten regularly by many residents of Los Angeles. Some fish contain levels of DDT hundreds of times higher than the allowable federal and state safety standards. *While technologies, like DDT and chlordane, were once regarded as an important tools for agriculture and urban pest management, they were later determined to be very dangerous with risks far outweighing the benefits. Today, Beyond Pesticides/NCAMP and other environmental groups are fighting similar battles with chlorpyrifos and other organophosphates, synthetic pyrethroids, wood preservatives and genetically engineered crops. For more information, contact Beyond Pesticides/NCAMP.*

New York State Calls for Labeling of Inert Ingredients

We demand labels on the products we buy so we can see exactly what we're getting. But imagine if your shirt tag read *25% cotton, 75% "other fabrics,"* or if the label on a can of soup listed the ingredients as *tomatoes, chickpeas, secret ingredients*. What else is in it? What's the secret? Maybe it contains a highly toxic substance, an allergen or an ingredient for which you have a sensitivity. It seems strange not to list the ingredients on the food we eat, but on pesticide labels, it's the norm. Pesticide companies are not required to list all of the ingredients in their products, despite the fact that people in the U.S. are inhaling, absorbing and ingesting small amounts of these chemicals almost every day. On August 23, 2000, New York State Attorney General Eliot Spitzer released a report calling on EPA to change this policy. The report asks that EPA require pesticide product labels to list, not only the active ingredients, but also the so-called "inert" ingredients that can make up 95 percent or more of the actual pesticide product, and can often be more toxic than the active ingredients. Inert, or trade secret, ingredients are mixed into pesticide products as a carrier or sticking agent. The term inert is a political slight of hand in the *Federal Insecticide, Fungicide and Rodenticide Act* (FIFRA), which can actually be a biologically and chemically active ingredient. It is distinguished from the "active" ingredients which specifically and intentionally attack the target pest, whether it's an insect or plant.



Currently, under FIFRA, pesticide manufacturers are only required to list the active ingredients in a pesticide product, leaving consumers and applicators unaware of the possible toxics present in the inert ingredients of pesticide products they are using — unless the EPA administrator determines that the chemical poses a public health threat. "Citizens and parents have the right to know about pesticides being used in their neighborhoods, schools and daycare centers," Attorney General Spitzer said. "However, the federal government allows pesticide manufacturers to keep secret the identity of ingredients that generally make up the bulk of pesticide products. As a result, the public is kept in the dark about what is really being used and is not able to adequately assess possible health risks."

Pesticide manufacturers argue they should not have to release information on inert ingredients because they are trade secrets, and if released, their products could be duplicated. With reverse engineering, environmentalists say it is only the public that is kept in the dark. Despite the name, many of these ingredients are neither chemically, biologically or toxicologically inert. While inert ingredients are only minimally tested, many are known to state, federal and international agencies to be hazardous to human health. In fact, one of the most hazardous ingredients in the commonly used herbicide RoundUp® is a surfactant, which is classified as an inert, and therefore not listed on the label.

Beyond Pesticides/ NCAMP has been working with the Northwest Coalition for Alternatives to Pesticides (NCAP) to require that all pesticide ingredients, including inerts, are listed on all pesticide product labels. In 1996, NCAP and NCAMP sued EPA in *NCAP and NCAMP v. Carol Browner, EPA*, to allow people to systematically know what ingredients are in specific pesticide product formulations, through the *Freedom of Information Act*. The case was filed after EPA denied a request for disclosure of the inert ingredients on six pesticides in 1991. The court found that EPA could not deny public access to this information without evaluating manufacturers' trade secret claim. In 1998, NCAP joined by 250 organizations and the Attorneys General from 7 states, including New York, petitioned EPA to require disclosure of the inert ingredients on pesticide product labels. After having their petition ignored by EPA for over two years, NCAP

filed suit on October 23, 2000, in an effort to force the agency to release information on the inert ingredients in all pesticide products.

According to market surveys from 1990, 1997 and 1999 compiled in the Attorney General's report: 72 percent of pesticide products available to consumers contain over 95 percent inert ingredients; fewer than 10 percent of pesticide products list any inert ingredients on their labels; more than 200 chemicals used as inert ingredients are hazardous pollutants in federal environmental statutes governing air and water quality; and, of a 1995 list of inert ingredients, 394 chemicals were listed as active ingredients in other pesticide products. EPA has convened an advisory committee on this issue, on which a representative of the New York Attorney General's office serves. Unfortunately, the committee is purely advisory and lacks authority to resolve the problem. *For more information on the hidden dangers of inert ingredients, send $4 to Beyond Pesticides/NCAMP for the Inerts Information Packet. For a full copy of the New York State Attorney General's report (32 pp), visit www.oag.state.ny.us or send $4 to Beyond Pesticides/NCAMP for a hardcopy.*

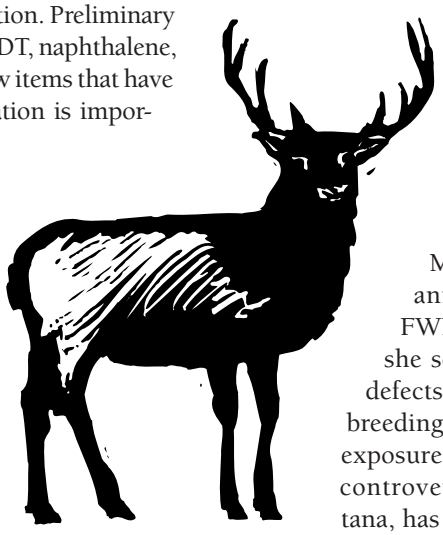
American Indian Artifacts Contaminated by Harvard University Museum

When David Hostler and two other residents of the Hoopa Valley Indian Reservation traveled over 3,000 miles from their home outside of Eureka, California to Harvard University's Peabody Museum of Archeology and Ethnology to reclaim artifacts on display at the university in 1998, they were cautioned by Harvard officials to wear rubber gloves and masks, because their ancestral belongings were most likely contaminated with pesticides and heavy metals. Mr. Hostler and many other officials from the Hoopa Valley reservation, who had the artifacts and remains returned to them under the *Native American Graves Protection and Repatriation Act*, became very concerned that people on the reservation could be exposed to these poisons, because they had intended to return many of the artifacts to their traditional use.

To address this issue, on September 29, 2000, representatives from California's 110 tribes met at San Francisco State University for a three-day workshop aimed at raising awareness of the potential adverse health effects of the contaminants and to look into possible solutions for decontaminating the artifacts. Currently, only preliminary lab tests have been conducted, and experts are unsure as to the extent of the artifact contamination. Preliminary findings have found DDT, naphthalene, and mercury on the few items that have been tested. "Repatriation is important for preserving our culture and educating our youth, and carrying on our religion as it always was," Mr. Hostler, director of the Hoopa museum and ceremonial leader in the tribe, told the *Associated Press*. "At this time, hopefully we'll find solutions on how to get the poisons out." *For more information, contact David Hostler at the Hoopa Valley Tribe museum at 530-625-4110, or visit them online at www.hoopavalleytribe.org.*

Elk Deformities May Be Due to Pesticide Exposure

Montana Fish, Wildlife and Parks (FWP) officials are currently testing a deformed bull elk, trapped and killed near Helena, to determine the source of its abnormalities, which environmentalists believe may be linked to pesticide exposure. FWP officials theorize the elk, which they believe may be a genetic hybrid of an elk and a European red deer, could be the animal that was sent to the state wildlife shelter as a deformed calf in the spring of 1999 by a state wildlife rehabilitator, Judy Hoy. Ms. Hoy told the *Missoulian* that the calf bull elk she sent to the shelter in 1999 came from the Painted Rocks area in the West Fork of the Bitterroot Valley, where it was found, apparently abandoned by its mother. "His legs were crooked, and he had a long lower jaw that gave him a funny smile with his teeth showing," Ms. Hoy recalled. "He couldn't walk and had a hard time eating. I had to feed him with a special nipple." She kept the young elk for two days before sending it to the FWP shelter in Helena, along with a female calf that she was also caring for.

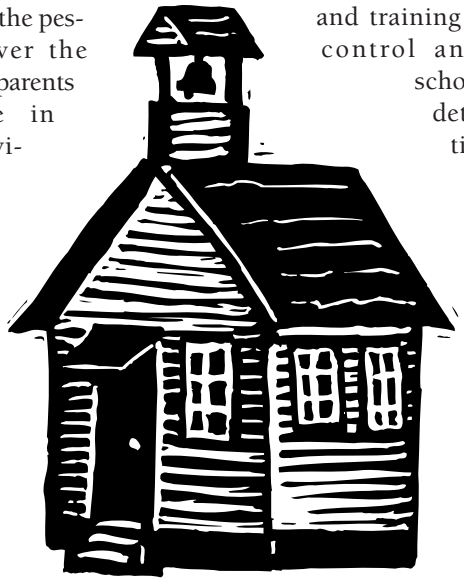


Ms. Hoy believes that if animal trapped by the FWP is the same animal she sent to the shelter, its defects are not due to cross-breeding, but rather, pesticide exposure. Ms. Hoy, currently a controversial figure in Montana, has submitted several reports linking deformed animals in the Bitterroot Valley to pesticide exposure. "It's important for people to know that it's not just a deer with deformities. Lots of other animals have them, both domestic and in the wild." Ms. Hoy is very eager to view the animal, if given

permission by FWP. She claims that if she is allowed to examine the remains of the elk, she would be able to tell whether its deformities were linked to pesticide exposure, by examining characteristics of the skull and teeth. *For an information packet on the effects of pesticides on wildlife, send $4 to Beyond Pesticides/NCAMP.*

California Schools to Notify for Pesticide Spraying

If pesticide exposure is a potential public health hazard — and many scientists believe that it is — then *all* the public has a right to know before exposure occurs. When children are involved, the nature of exposure becomes especially important. For years there has been a dispute between environmentalists and the pesticide industry over the proper way to notify parents of pesticide use in schools. While environmentalists have fought for universal prior notification (all students and staff notified at least 48 hours prior to any pesticide application), the pesticide industry has backed a weaker registry notification system, when it recommends any at all. A registry system only alerts parents that voluntarily put themselves on a list. This system, which is often more expensive, is inadequate because it only affords those who already know about toxic exposure the opportunity to be informed about pesticide use in the school. Both the states of Maryland and Arizona have universal notification laws on the books.



The *Healthy Schools Act of 2000*, signed by California Governor Gray Davis on September 25, 2000 is a compromise between these two notification systems. Under the new law, warning signs will be posted at sprayed areas 24 hours before treatment and for 72 hours after the application. The act also requires schools to tell parents what pesticides will be used through once a year notice and per use notice for only those on a registry. "Next year, parents will not only get their kids' report cards, they'll also get a report card of sorts on pesticide use in their children's schools," said Teri Olle, Toxics Policy Advocate and Staff Attorney for the California Public Interest Research Group. "This is a terrific first step in creating a safer learning environment."

Furthermore, the *Healthy Schools Act* requires the Department of Pesticide Regulation (DPR) to provide school districts with a manual and training on alternative pest control and mandates that school districts maintain detailed records of pesticide use on school sites, including the name of the pesticide, amount applied and location. "With the passage of this bill, we recognize that pesticides pose a significant threat to children," said Martha Arguello, Environmental Health Coordinator for Physicians for Social Responsibility-Los Angeles. "California will now give parents and children an important tool for protecting their health." In addition to the registry, the *Healthy Schools Act* does not ban or restrict any specific chemicals, as has been done in other states. *For a copy of the legislation, visit* www.leginfo.ca.gov. *For more information or a hardcopy (3pp) send $3 Beyond Pesticides/NCAMP.*

Genetically Modified Food: A Recipe for Disaster

Is genetically engineered food the right choice for our health and the environment? Despite the fact that it is not adequately tested, the source of genetic pollution and a threat to the natural balance of our ecosystem, the biotechnology companies are spending $50 million a year to convince us that it's safe. Biotechnology companies claim that genetic engineering will feed the world's poor and reduce pesticide use. However, over 70% of all genetically modified organisms (GMOs) are altered to be herbicide-resistant. In other words, biotechnology labs have changed the genetic make-up of the plant to allow herbicides, which would usually kill the plant, to douse the fields with no damage to the crops; thus, increasing their sales and farmer's dependence on their herbicides. A 30-minute film entitled, *Genetically Engineered Food: A Recipe for Disaster* (Larry Cohen, TriVue Entertainment), featuring Beyond Pesticides/ NCAMP, examines the genetic alteration of our food supply and interviews both opponents and supporters of this technology. After reviewing the evidence, the film concludes that we need to return to farming with nature rather than trying to alter and control it. *Copies of the video have been sent to PBS stations across the country. If you would like to see the film in its entirety, please ask your local PBS station to air it, or send $10 to Beyond Pesticides/ NCAMP. To view a short trailer for the video, visit* ***www.beyondpesticides.org.***

Getting Nit Picky About Head Lice

By Becky Crouse

It's that special time of year again, when you anxiously search through the notices crammed into backpacks, looking for that one special note from your child's school nurse. Yup, I'm talking about the announcement that the annual head lice outbreak has begun.

Now I've done it. I said head lice. A good nit comb, some common-sense knowledge and a lot of patience is all it takes to control these critters.

What are those critters?

Head lice (*Pediculus capitis*) are bloodsucking, parasitic insects that primarily feed on humans. The adults grow to be from 1-3mm long and are typically reddish-brown in color. They are usually found on the scalp, mainly around the ears and at the nape of the neck, but can also be found on eyebrows, eyelashes and other body hairs, on hats and scarves, and on combs and brushes. Generally, they can only survive off of a host for about 2-3 days without a blood meal.

The female adult can lay anywhere from 50-100 eggs (nits) in her lifetime. With cement-like glue, she attaches each nit to a hair shaft, where they will hatch in 8-11 days. The hatched lice will take another 8 or 9 days to become adults, and, a day later, the female can begin laying eggs. The adults live for 9-10 days, making the entire lifespan of a louse at least 24 days.

What can a parent do?

Anyone can get head lice, no matter how often you wash or comb your hair. If you have a scalp to nibble on, lice will like you. They move fairly quickly, and are often transmitted through head-to-head contact with an infected person; via nits on fallen hairs that find their way to heads via carpet, furniture, and bedding; and through contact with infested items, such as brushes, combs, hats, scarves, bedding, towels, and upholstered furniture. They cannot jump or fly, so you can rest a little easier knowing that kamikaze head lice won't be dive-bombing your kids' heads while you aren't there.

Toni Carolina© NPA, www.headlice.org

Now you're wondering how you prevent these little, bloodsucking power walkers from making their home on your child's head. Head lice control involves some pretty basic steps: education, prevention, monitoring, and control. Following these steps should prevent a serious infestation from occurring in your home or school.

Concise Lice Advice

PREVENTION

- Have children establish a no-sharing policy with their friends and classmates when it comes to commonly infested items, such as combs, brushes, hats, scarves, pillows, and blankets or mats at rest time or at home.
- If your kids' classrooms have cubbies or coat hooks that are shared or clustered, have them place their coats and hats in sealed plastic bags to keep wandering adult lice away.
- Braid long hair in the morning, and comb it out upon your child's arrival home.

MONITORING

- Watch for symptoms of head lice: head scratching, sometimes leading to scalp damage; red bites on the scalp, around the ears, and at the nape of the neck; and the presence of nits in the hair.
- Periodically check your child for nits, whether or not he or she is showing symptoms of head lice, especially if you know there has been an outbreak at school or among friends. Viable nits will be yellowish to grey in color, darkening to a tan or coffee color as they mature, and are shaped like a tear drop. One sure way to distinguish nits from dirt, dandruff, lint, or any of the plethora of things that manage to find their way into kids' hair, is that they will not flick or brush out.

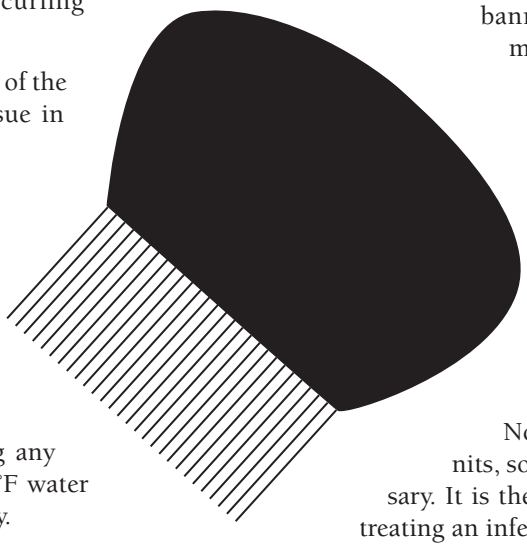
CONTROL

Nit Picking

Nit picking takes time and patience, but can be very enjoyable for both parties. What child doesn't love being the center of Mom or Dad's attention? If, however, your child becomes impatient, sitting in front of a movie or television show, coloring books, or play clay can redirect his or her focus.

- Liberally apply coconut oil to the child's head and scalp. (Any oil should work. It functions as a lubricant to make combing easier and smothers the lice.)
- Once the child is thoroughly slicked, comb through the hair with a wide-toothed comb to remove tangles and straighten the hair.
- Separate the hair into one-inch sections and search thoroughly, both visually and by nit combing.

- Immerse any nits or lice in hot soapy water as they are pulled from the hair.
- Pin cleaned sections of hair aside, curling it close to the head.
- Periodically clean hair and debris out of the comb with a tissue, placing the tissue in hot, soapy water when it is soiled.
- Once finished, wash the child's hair with hot water and blow it dry (remembering that his or her head is much more heat sensitive than yours.)
- Recheck the entire head for stray lice and nits.
- Clean out your nit comb, removing any stray hair and nits, and soak in 150˚F water for 15 minutes before putting it away.
- Repeat on every member of the household showing symptoms of head lice for 12 consecutive days.
- Continue to monitor all members of household while and after treating those infested.



Household Cleaning

Lice don't generally infest your home.

- A thorough vacuuming of all carpets, upholstery, and living space will take care of any fallen nit-carrying hairs or runaway lice.
- Wash all bedding, towels used during nit-picking sessions, and questionable clothing in hot water (150˚F) and dry on high to take care of any potential re-infesters.
- Place non-washables in the hot drier for 20 minutes or have them dry cleaned. (You can also store the items in a plastic bag for 14-30 days, or freeze them in temperatures of -4˚ F (-20˚C) for 5 hours, or -5˚F (-15˚C) for 10 hours.)

Where can I find a nit comb?

If your local drugstore doesn't carry metal-toothed nit combs, you can get the Licemeister® nit comb from the National Pediculosis Association, P.O. Box 610189, Newton, MA 02461, 781/449-NITS, www.headlice.org; or the Derbac ™ comb from Cereal Soaps Company, Division Johanson Manufacturing Corp., Box 329, Boonton, NJ 07005, 201/334-2676. A dog or cat flea comb may also be effective in a pinch.

Anyone can get head lice, no matter how often you wash or comb your hair.

PROBLEMS WITH CHEMICAL CONTROL

Lindane, the active ingredient in Kwell®, a commonly prescribed lice shampoo, is readily absorbed through the skin on the scalp. It is a possible human carcinogen, and has been linked with blood disorders, and neurological and immunological effects. It has been banned for use in lice and scabies treatment in California. Nix® contains permethrin, also a possible human carcinogen and a neurotoxin, which has been reported to cause temporary nervous disorders in the hands or face. (*Please see the Beyond Pesticides/NCAMP factsheets.*)

There is also widespread resistance of head lice to Lindane and permethrin, rendering these products useless in some cases. No head lice chemical effectively kills all nits, so combing is always going to be necessary. It is the safest and most effective method of treating an infestation.

ALTERNATIVES TO CHEMICAL CONTROL

It will always be necessary to nit comb, no matter what course of treatment you decide upon, but if you feel a need to do more than oil and comb, there are **enzyme treatments** for head lice that are not registered as pesticides. Manufacturers describe these products as breaking apart the outer covering or exoskeletons of lice and loosening nits from the hair. They are advertised as non-toxic to humans, but as with any pest control product, **you should be sure to obtain full disclosure of all product ingredients before use**. Enzyme treatments include Not Nice to Lice, 909-372-9850, www.safe2use.com, and Lice B Gone, 877-730-2727, www.licebgone.com. Another plant derived product is Planet Solutions, 301-384-0635, www.planetsolutions.org.

Education

- Talk to school nurses, administrators and teachers, and the parents of your children's friends to ensure that they know proper preventive, monitoring, and control techniques.
- Inform your school and the parents of your children's friends as soon as you discover your child has lice so that they may begin taking preventive and control methods.

With proper monitoring, and preventive measures, and early treatment of your little infestees, you should be able to prevent a serious problem. It's amazing how much aggravation a little education can save.

Beyond Pesticides/NCAMP has a detailed information packet about head lice control available for $4ppd.

LINDANE

Lindane, like DDT and in the organochlorine family, has been controversial for decades because of its cancer causing and neurotoxic properties. Despite its toxicity, lindane is commonly prescribed as a pharmaceutical to treat lice and scabies, and is used as a seed treatment.

While the U.S. Environmental Protection Agency (EPA) regulates pesticide use, it is the Food and Drug Administration (FDA) that regulates medicinal use of lindane to treat lice and scabies. Over 2 million lindane prescriptions for head lice and scabies are issued every year. (NPA, 2000)

Over the past ten years, all uses of lindane have been voluntarily canceled by lindane registrants, except 13 seed treatment uses and prescription-only treatments for lice and scabies, (Howard, 2000). Despite this, FDA residue monitoring in 1999 found lindane to be the 12th most commonly found pesticide residue in food samples tested (FDA, 1999).

Lindane Bans

In September 2000, California Governor Davis signed a bill that prohibits the use or sale of any lindane containing products for treatment of human head lice or scabies by January 1, 2002.

At least 14 countries have banned all uses of lindane and 16 countries have severely restricted its use. In July 2000, the European Union's Standing Committee on Plant Health voted to ban all agricultural and gardening applications of lindane. The European Commission is expected to ratify the decision, which should take effect by 2002 (Schafer, 2000).

Routes of Exposure

Exposure to lindane is a concern, especially considering its inclusion in creams and shampoos for lice and scabies. Lindane is efficiently absorbed across the skin, with a documented 9.3% dermal absorption rate. It is absorbed even more efficiently across abraded skin, which is of high concern considering the severe dermatitis associated with scabies. Absorption across the skin as well as in the gut is enhanced by the presence of fat and fat solvents. Although lindane is not highly volatile, pesticide-laden aerosol or dust particles trapped in respiratory mucous and subsequently swallowed may lead to significant absorption in the gut (Reigart, 1999).

Following absorption, lindane is partially dechlorinated and oxidized, promptly yielding a series of conjugated chlorophenols and other oxidation products in the urine. Excretion of lindane occurs within a few days, primarily through the feces. While exposure to most organochlorines results in significant storage of the unchanged parent compound in fat tissue, the rapid metabolic breakdown of lindane reduces the likelihood that it will be detected in body fat, blood or milk (Reigart, 1999).

Health Effects

EPA classifies lindane as moderately toxic, or a class II, chemical and bears the signal word "warning." The chief toxic action is on the nervous system where lindane, like other organochlorines, interferes with the flux of cations across nerve cell membranes. Adverse health effects include: apprehension, agitation, mental/motor impairment, excitation vomiting, stomach upset, abdominal pain, central nervous system depression, convulsions, muscle weakness and spasm, loss of balance, grinding of the teeth, hyperirritability, violent seizures, increased respiratory rate and/or failure, dermatitis, immunotoxicity, and fetotoxicity.

Lindane is more acutely toxic than DDT and may modify brain function for days and even weeks after a single exposure (Gosselin, 1983). Data from animal tests indicate that lindane may affect the liver, kidney, pancreas, testes, and nasal mucous membrane (Dalsenter, 1997; Sircar, 1989; ETN, 1996, US EPA, 1985; US EPA, 1998). Lindane is an endocrine disruptor and was found to be slightly estrogenic to female rats and mice, and caused the testes of male rats to become atrophied (PAN, 1998; ETN, 1996). Lindane has been shown to induce drug-metabolizing enzymes in the liver (Gosselin, 1983). This tends to accelerate excretion of the pesticides themselves, but may also stimulate biotransformation of critical natural substances, such as steroid hormones and therapeutic drugs (Reigart, 1999).

Diet and age can affect sensitivity to lindane's toxic action. Children are more sensitive, doses of 1.6 and 45 grams are capable of producing seizures in young children and adults, respectively. A low protein diet may render an individual more susceptible as well. Rats on low protein diets were twice as susceptible to the acute toxic effects of lindane compared with animals on a normal diet (Gosselin, 1983).

There is a great deal of anecdotal evidence in medical literature linking chronic lindane exposure to rare blood disorders including aplastic anemia (West, 1967; PAN, 1998). Pulmonary edema has been reported after intentional lindane ingestion (US EPA, 1998), but the exact role of aspiration in producing these changes is not clear. The development of myoglobin in the urine, acute kidney failure, and muscle weakness in the limbs after ingestion of 15-20 ml of lindane suggests that it may be a direct muscle toxin (Gosselin, 1983).

A laboratory study found that a single topical application of 1% lindane on weanling rabbits caused convulsions. Gosselin et al. report six human cases of alleged neurotoxicity associated with the use of this type of product. At least five of these were judged the result of accidental ingestion or inappropriate application. "Some children exhibited seizures after total body applications or after applications that were left on longer than the recommended 24 hours."

Carcinogenicity

The International Agency for Research on Cancer (IARC) has concluded that lindane is a possible human carcinogen (class 2B), and EPA has classified it similarly as a class B2/C possible human carcinogen based on liver and lung tumors in mice (US EPA, 2000a). The State of California has listed lindane as known carcinogen (CalEPA, 1999).

Lindane is linked to breast cancer (Wolff, 1985; Schafer, 2000). There is a significant body of evidence that suggests that where lindane is used extensively, and particularly in areas where cattle were treated, the incidence of breast cancer is elevated (PAN, 1998). The presence of lindane in human and cow milk has been reported in countries throughout the world (Moses, 1993; Schafer, 2000).

Regulatory History

In 1977, lindane was put into EPA Special Review because of concerns over its ability to cause cancer, fetotoxicity/teratogenicity, reproductive effects, blood dyscrasia, and its acute toxicity to aquatic wildlife. In 1980, EPA proposed canceling most uses of lindane because "lindane continues to meet or exceed the risk criteria for oncogenicity and reproductive and fetotoxic effects," noting children's particular risk (US EPA, 1980). However, in its final 1983 decision, EPA continued most registrations with various restrictions. At the time, the Scientific Advisory Panel supported bans on household, pet and homeowner ornamental applications (US EPA, 1983). In 1985, lindane again came under EPA scrutiny because of its link with kidney effects (US EPA, 1985). Over the past 10 years, most uses, including wood treatment, foliar, termiticide, home insecticidal and military use of lindane, have been voluntarily canceled by the chemical's registrants (Howard, 2000).

In 1996, FDA's Dermatologic Drugs Advisory Committee reviewed claims that lindane causes neurological damage in children and required additional advisories on packaging, and a warning against repeated treatment with lindane products, because repeated treatments have been clearly linked to neurotoxicity. FDA stated, "The reason for the product's misuse may be connected with pruritus - itching that continues after ... treatment - due to the residual inflammation in the skin. When treated children continue to scratch, some parents may continue to medicate beyond the recommended procedure" (Kupec, 1996).

Currently, EPA is working on the preliminary risk assessment for lindane as required under the *Federal Insecticide, Fungicide and Rodenticide Act* and the *Food Quality Protection Act* (Howard, 2000). Lindane's preliminary risk assessment and registration eligibility is expected to be released for public comment period in 2001, at which time registered uses will be reviewed and decisions on continued registration for each use will be made (US EPA, 2000b).

Ecological Effects

Lindane is moderately toxic to bird species and can be stored in the fat of birds. Residues can also find their way into egg yolks at measurable concentrations for 32 days after dosing. Lindane is highly toxic to fish and aquatic invertebrate species. Lindane is also highly toxic to bees and certain beneficial parasites and predacious insects (ETN, 1996; US EPA, 1994).

Plants may pick up residues from not only direct application, but through water and vapor phases. Persistence is seen when plants are rich in lipid content, and crops like cauliflower and spinach will build up less residue than crops like carrots (ETN, 1996).

Environmental Fate

Lindane is highly persistent in most soils, with a field half-life of approximately 15 months. It may be mobile in soils and may pose a risk of groundwater contamination. Lindane is very stable in both fresh and salt water and is resistant to photodegradation (ETN, 1996). EPA's Office of Water established the maximum contaminant level for lindane in drinking water at 0.2 parts per billion (US EPA, 1998). From 1987 to 1993, according to EPA's Toxics Release Inventory, lindane releases to land and water totaled 1,115 pounds (US EPA, 1998). Lindane has been found in 239 sites listed on EPA's National Priorities List (ATSDR, 1995).

Resistance

The Centers for Disease Control and Prevention, and the World Health Organization, among others, cite widespread insect resistance to lindane in the U.S. and other parts of the world (NPA, 2000; Downs, 1999; Brainerd, 1998).

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ChemicalWATCH Factsheet
A BEYOND PESTICIDES/NCAMP FACTSHEET

SYNTHETIC PYRETHROIDS

Despite their toxicity, pesticide products containing pyrethroids are often described by pest control operators and community mosquito managers as "safe as chrysanthemum flowers." While pyrethroids are a synthetic version of an extract from the chyrsanthemum, they were chemically designed to be more toxic with longer breakdown times, and are often formulated with synergists, increasing potency and compromising the human body's ability to detoxify the pesticide.

What are Synthetic Pyrethroids?

Synthetic pyrethroids are synthesized derivatives of naturally occurring pyrethrins, which are taken from pyrethrum, the oleoresin extract of dried chrysanthemum flowers. The insecticidal properties of pyrethrins are derived from ketoalcoholic esters of chrysanthemic and pyrethroic acids. These acids are strongly lipophilic and rapidly penetrate many insects and paralyze their nervous system (Reigart et al., 1999). Both pyrethrins and synthetic pyrethroids are sold as commercial pesticides used to control pest insects in agriculture, homes, communities, restaurants, hospitals, schools, and as a topical head lice treatment. Various formulations of these pesticides are often combined with other chemicals, known as synergists, to increase potency and persistence in the environment.

While chemically and toxicologically similar, pyrethrins are extremely sensitive to light, heat and moisture. In direct sunlight, half-lives can be measured in hours. However, the pyrethroids, the synthetic analogues of naturally occurring pesticides, were developed to capture the effective insecticidal activity of this botanical insecticide, with increased stability in light, yielding longer residence times (Gosselin et al., 1984).

While pyrethroids are a synthetic version of an extract from the chyrsanthemum, they were chemically designed to be more toxic with longer breakdown times, and are often formulated with synergists, increasing potency and compromising the human body's ability to detoxify the pesticide.

Pyrethroids and Health Effects

Pyrethroids have irritant and/or sensitizing properties. They are not easily absorbed through the skin, but are absorbed through the gut and pulmonary membrane. Tests of some pyrethroids on laboratory animals reveal striking neurotoxicity when administered by injection or orally. Systemic toxicity by inhalation and dermal absorption is low. The acute toxicity, calculated by LD_{50}'s, ranges from low to high, depending on the specific formulation. Low toxicity is attributed to two factors: limited absorption of some pyrethroids, and rapid biodegradation by mammalian liver enzymes (ester hydrolysis and oxidation). Insects, without this liver function, exhibit greater susceptibility to the chemicals (Reigart et al., 1999).

Pyrethroids interfere with the ionic conductance of nerve membranes by prolonging the sodium current. This stimulates nerves to discharge repeatedly causing hyper-excitability in poisoned animals. The World Health Organization explains that synthetic pyrethroids are neuropoisons acting on the axons in the peripheral and central nervous systems by interacting with sodium channels in mammals and/or insects. The main systems for metabolism include breakage of the ester bond by esterase action and oxidation at various parts of the molecule. Induction of liver microsomal enzymes has also been observed (WHO, 1999).

Signs and symptoms of poisoning by pyrethroids may take several forms. Because of the similarities to crude pyrethrum, pyrethroids may act as dermal and respiratory allergens. Exposure to pyrethroids has resulted in contact dermatitis and asthma-like reactions. Persons, especially children, with a history of allergies or asthma, are particularly sensitive, and a strong cross-reactivity with ragweed pollen has been recognized. Severe anaphylactic (allergic) reactions with peripheral vascular collapse and respiratory difficulty are rare. Other symptoms of acute toxicity due to inhalation include sneezing, nasal stuffiness, headache, nausea, incoordination, tremors, convulsions, facial flushing and swelling, and burning and itching sensations. The most severe poisonings have been reported in infants, who are not able to efficiently break down pyrethroids (ETN, Pyrethroids, 1994). With orally ingested doses, nervous symptoms may occur, which include excitation and convulsions leading to paralysis, accompanied by muscular fibrillation and diarrhea (ETN, Pyrethroids, 1994). Death in these cases is due to respiratory failure. Symptoms of acute exposure last about 2 days.

Endocrine Disruption and Breast Cancer

Many pyrethroids have also been linked to disruption of the endocrine system, which can adversely affect reproduction and sexual development, interfere with the immune system and increase chances of breast cancer. Pyrethroids contain human-made, or xenoestrogens, which can increase the amount of estrogen in the body (Garey et al., 1998). When tested, certain pyrethroids demonstrate significant estrogenicity and increase the levels of estrogen in breast cancer cells (Go et al., 1999). Because increased cell division enhances the chances for the formation of a malignant tumor in the breast, artificial hormones, like those found in pyrethroids, may increase breast cancer risk (PCBR, 1996). Some pyrethroids are classified by EPA as possible human carcinogens.

Pyrethroids and the Environment

While the development of the synthetic pyrethroids was heralded with claims of selective toxicity to insects, both pyrethroids and

pyrethrins are extremely toxic to aquatic organisms, including fish such as the bluegill and lake trout, with LC_{50} values less than 1.0 parts per billion. These levels are similar to those for mosquito, blackfly and tsetse fly larvae, often the actual target of the pyrethroid application. Lobster, shrimp, mayfly nymphs and zooplankton are the most susceptible non-target aquatic organisms (Mueller-Beilschmidt, 1990). The nonlethal effects of pyrethroids on fish include damage to the gills and behavioral changes.

Pyrethroids are moderately toxic to birds, with most LD_{50} values greater than 1000 mg/kg. Birds can also be indirectly affected by pyrethroids, because of the threat to their food supply. Waterfowl and small insectivorous birds are the most susceptible (Mueller-Beilschmidt, 1990). Because pyrethroids are toxic to all insects, both beneficial insects and pests are affected by pyrethroid applications. In some cases, predator insects may be susceptible to a lower dose than the pest, disrupting the predator-prey relationship.

Many pyrethroids have also been linked to disruption of the endocrine system, which can adversely affect reproduction and sexual development, interfere with the immune system and increase chances of breast cancer.

Pyrethroids Residues / Persistence

As mentioned, pyrethroids are designed to breakdown more slowly than the naturally occurring pyrethrins. While pyrethrins, extremely sensitive to light, heat and moisture, break down in a few hours, the synthetic pyrethroids are stable and persist in the environment much longer. As a general rule, pyrethroids break down most quickly in direct sunlight, usually just a few days after application, with a few exceptions. However, in areas with limited sunlight, such as grain silos and subway tunnels, pyrethroids can persist for months. For more specific breakdown times see the sections below on resmethrin, permethrin and sumithrin.

Synergists

Both pyrethroids and pyrethrins are often formulated with oils or petroleum distillates and packaged in combination with synergists, such as piperonyl butoxide (PBO) and n-octyl bicycloheptene dicarboximide (Gosselin et al., 1984). Synergists are added to increase the potency of the pesticide. A range of products, from repellants to foggers to pediculicides (lice killers) to garden sprays, contain synergists. Many formulations of permethrin, resmethrin and sumithrin, including Scourge™ and Anvil™, used along the east coast for mosquito control to combat the West Nile Virus, contain the synergist PBO.

PBO inhibits important liver enzymes responsible for breakdown of some toxins, including the active ingredients of pesticides. Specifically, it has been shown to inhibit hepatic microsomal oxidase enzymes in laboratory rodents and interfere in humans. Because these enzymes act to detoxify many drugs and other chemicals, a heavy exposure to an insecticidal synergist may make a person temporarily vulnerable to a variety of toxic insults that would normally be easily tolerated. Symptoms of PBO poisoning include anorexia, vomiting, diarrhea, intestinal inflammation, pulmonary hemorrhage and perhaps mild central nervous system depression. Repeated contact may cause slight skin irritation. Chronic toxicity studies have shown increased liver weights, even at the lowest doses, 30 mg/kg/day. While not classified as a carcinogen by EPA, animal studies have shown hepatocellular carcinomas, even treatments as low as 1.2% (Takahashi et al., 1994).

Permethrin (Pounce™, Torpedo™, Dragnet™)

Prior to 1978, permethrin was registered for use on cotton crops only. During the early 1980's, registration was expanded to include use on livestock and poultry, eggs, vegetables and fruit. Today, uses also include lice treatments and urban/suburban pest control. Permethrin resembles pyrethrins chemically, but is chlorinated to increase its stability. There are four isomeric forms, two *cis* and two *trans* of technical permethrin. Although the acute toxicity of the mixture (oral rat LD_{50} > 5000 mg/kg, oral mouse LD_{50} = 500) is less than that of natural pyrethrins, the cis-isomer is considerably more toxic (oral mouse LD_{50} = 100), and in rats, the metabolites of the cis-isomer are more persistent biologically. (The *cis* and *trans* isomers differ in the spatial arrangement of the atoms.) Formulations of permethrin can vary greatly in isomeric content. Compared to other pyrethroids, permethrin is very stable, even when exposed to ultraviolet light. Permethrin is strongly absorbed to soil and other organic particles, with half-lives in soil of up to 43 days. When used as a termiticide, permethrin can persist up to five years.

Permethrin receives an EPA toxicity class rating of II or III, (I = most toxic, IV = least toxic) and carries either the word WARNING or CAUTION on its label, depending on the formulation. While it is not extremely toxic to humans, there are numerous reports of transient skin, eye and respiratory irritation. Like all pyrethroids, permethrin is a central nervous system poison. Workers and researchers report tingling in face and hands, and some report allergic reactions. Based on studies demonstrating carcinogenicity, EPA ranks permethrin as a class C, or possible human carcinogen (U.S. EPA, 1997). Other studies have shown effects on the immune system, enlarged livers and at high doses, decreased female fertility. Permethrin is extremely toxic to aquatic life, bees and other wildlife. It should not be applied in crops or weeds where foraging may occur (ETN, Permethrin, 1996).

Resmethrin (Scourge™, Raid Flying Insect Killer™)

Resmethrin is used for control of flying and crawling insects in homes, greenhouses, processing plants, commercial kitchens, airplanes and for public mosquito control. Resmethrin is considered slightly toxic to humans and is rated EPA toxicity class III, bearing the word CAUTION on its label. The oral rat LD_{50} is about 2500 mg/kg. Although resmethrin has a very short half-life (under an hour in direct sunlight), it persists much longer in soil with a half-life of 30 days (ETN, Resmethrin, 1996). Resmethrin breaks down into a smelly byproduct, phenylacetic acid, which binds strongly to textiles and dissipates slowly, smelling like urine.

Resmethrin is absorbed rapidly and distributed to all tissues, including the brain. Skin absorption is low, although it should be noted that some individuals manifest allergic responses, including dermatitis, asthma, runny nose and watery eyes after ini-

tial contact. In laboratory animals, chronic toxicity studies have shown hypertrophy of the liver, proliferative hyperplasia and benign and cancerous liver tumors. EPA reviewers noted slight, but significant, increases in the number of offspring born dead and with decreased viability, which they thought might be secondary to trans-placental toxicity. Tests for neurotoxicity have been negative. Resmethrin is extremely toxic to fish, other aquatic life and bees. The domestic manufacturer of resmethrin, Penick Company, will not identify the inert ingredients in its product, but recommends that it is not sprayed on paint, plastic or varnished surfaces, and that treatment of living areas or areas with large amounts of textiles be avoided.

Because these enzymes act to detoxify many drugs and other chemicals, a heavy exposure to an insecticidal synergist may make a person temporarily vulnerable to a variety of toxic insults that would normally be easily tolerated.

Sumithrin (Anvil™, d-Phenothrin)

Sumithrin has been registered for use since 1975. It is used to control adult mosquitoes and as an insecticide in transport vehicles, commercial, industrial and institutional non-food areas, in homes, gardens, greenhouses and on pets. Chemically, it is an ester of chrysanthemic acid and alcohol. It is a combination of two *cis* and two *trans* isomers. Sumithrin is slightly toxic and is rated EPA toxicity class IV, bearing the word CAUTION on its label. The oral rat LD_{50} is greater than 5,000 mg/kg, and the LC_{50} for inhalation is greater than 1210 mg/m^3. Sumithrin degrades rapidly, with a half-life of 1-2 days under dry, sunny conditions. Under flooded conditions, the half-life increases to 2-4 weeks for the *trans* isomer and 1-2 months for the *cis* isomer. In grain silos, with no sunlight and little air circulation, most of the product still remains after one year (WHO, 1990).

Symptoms of acute sumithrin poisoning include hyperexcitability, prostration, slow respiration, salivation, tremor, ataxia and paralysis. Chronic feeding studies resulted in increased liver weights in both males and females. In rat studies, sumithrin was completely excreted in 3-7 days (WHO, 1990). Studies have shown that sumithrin demonstrates significant estrogenicity and increases the level of estrogen in breast cancer cell, suggesting that sumithrin may increase the risk of breast cancer (Go et al., 1999).

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Stop the Poisoning
A Beyond Pesticides Forum

Beyond Pesticides/National Coalition Against the Misuse of Pesticides (NCAMP) convened a forum with 25 cosponsors at The Riverside Church in New York City on October 14, 2000 to rally public support for the phase out of community pesticide use and the adoption of safe pest management strategies. 700 people attended the meeting. The Presidential and New York Senate candidates were invited.*

Introduction
Jay Feldman, executive director, Beyond Pesticides/NCAMP

We are here to stop pesticide poisoning. We may have been awakened to the daily pesticide assault on our health and the environment as a result of governments' response to the West Nile Virus (WNV). We may have experienced or seen illness or disease associated with pesticide use. We may be aware that widely used pesticides, like those used to attack mosquitoes, can cause a range of health effects — disrupt the endocrine system, cause cancer, damage the nervous system or cause respiratory problems. Public officials repeatedly describe pesticides as safe and harmless. We can see the total disregard for people in the video produced by Roy Doremus, which documents the direct spraying of people in New York City's WNV spray program. The chemical response to WNV and characterizations of safety are symptomatic of a larger problem — whether it is pesticide use in our school, on our food, in our parks or in public places. The response required to some problems is systemic change — changes in regulation, standards of safety, research priorities, and eliminating corporate influence over the scientific process. Other changes start at home and in the garden as well as utilizing our purchasing power. Still other change must happen at the community level. We have an opportunity to join a national movement to remove pesticides from our community. Our future rests with clear protective human health and environmental standards and a clear commitment to programs that effect a transition to sustainable alternatives not reliant on pesticides.

Pesticides and Human Health
Lucy Waletzky, M.D., physician, Westchester, NY

The public health problems resulting from the pesticide spraying for WNV have been grossly understated by public officials and the media. Again this year, there has been no effort made to inform the public where they should report pesticide related health complaints. Some people have managed to figure it out themselves, so that some of the essential data is now being collected. In New York City (NYC), where approximately 200 complaints have been registered, people are being bounced between the WNV hotline and poison control. They are not getting knowledgeable answers to their health concerns. In addition, some people have experienced hotline personnel trying to talk them out of their symptoms. In Westchester, NY, pesticide health data is being collected in four ways. First is their WNV hotline, which had received 43 complaints by September 1st. Symptoms relate to: trouble breathing, including worsened asthma, trouble swallowing, tingling, neuropathy, impaired concentration and a variety of other symptoms related to the eyes. Westchester mailed a letter to internists, pediatricians and family doctors with a simple form to fill out with pesticide complaints. They are also getting information from the Hudson Valley Poison Control and emergency room data from local hospitals. While it is good that Westchester is collecting the data, and the City and other counties should follow suit, the data has not been released to the public, physicians or the media.

Critical Analysis of EPA Decisions
Herbert Needleman, M.D., University of Pittsburgh Medical School, co-author, *Raising Children Toxic Free*, Pittsburgh, PA

A year ago, I was appointed to EPA's Scientific Advisory Panel (SAP), and I began to try to understand the issue of pesticides and their regulation. I participated in the regulation of malathion in August 2000. I want to tell you about this because it is informative and helpful in understanding how things get regulated or how they do not get regulated. The issue was, "Is malathion a carcinogen?" EPA reviews laboratory animal (rats and mice) data, looking at four dose levels –low, medium, high and very high. Then the animals are sacrificed and examined by pathologists for cancer. In February 2000, the Cancer Assessment Review Committee (CARC) classified malathion as a likely human carcinogen. The evidence produced from the rodent studies was persuasive that malathion was a carcinogen and it was likely to have this effect in humans. In April,

CARC reconvened and downgraded the definition to "suggestive of carcinogenicity, but not sufficient to assess human carcinogenic potential." There were no new studies done that led to this revision. Instead, the manufacturer requested a review committee to reevaluate the pathology slides. The number of carcinomas in exposed mice, originally 16, was reduced to eight. If one is permitted after looking at exposed groups and diagnoses to exclude selected groups and to change selected diagnoses, one can achieve, with little effort, any association it wants. If EPA permits this type of analysis for government regulation, its credibility will be severely and justifiably damaged. The conclusions drawn by CARC violate the canons of epidemiology. If written up and submitted to a high quality scientific journal, they would be rejected out of hand. They would never see the light of day.

Corporate Influence of Regulation

Bill Hirzey and Dwight Welch, senior vice president and executive vice president respectively, National Treasury Employees Union, Chapter 280, U.S. Environmental Protection Agency, Washington, DC

(The positions discussed by Dr. Hirzey and Mr. Welch represent their own personal opinions and not of their labor union and not necessarily, or probably not, those of EPA.)

Almost 20 years ago, the professionals at EPA headquarters decided to organize in order to protect our ability to do our job and professional ethics. We have been fighting this battle continuously since then. The function of government in a capitalist society is to protect capital. There is no place in government where that dictum is more obvious and has greater impact on civil servants than the EPA. We see it everyday in our work. It is all about protecting corporations. From the beginning the union has pushed EPA for a code of professional ethics to protect the professionals at EPA from unreasonable interference with their work from politicians. This last year we got seven principles of scientific integrity pushed through and issued by the administrator. The first complaint that we filed as a violation of these principles has to do with how the agency is dealing with malathion. One is the cancer risk assessment in which Dr. Needleman's position tracks precisely with that of a senior EPA toxicologist, Brian Dementi, Ph.D. In addition, EPA management, over scientific objection, rejected a three-fold safety factor, after being contacted by the chemical registrant. These issues have now been brought to the Inspector General of EPA. This is the kind of thing for which people in high positions should be fired.

Public Health Threats in Perspective

Deborah Wallace, Ph.D., Center for Children's Environmental Health, Columbia School of Public Health, New York, NY

While our whole city was sprayed with pesticides, there were very few deaths from the virus we were being protected from. When serum was collected in Queens, it was discovered that many people carried the virus, but showed no symptoms. Yet complaint after complaint of asthmatic reaction to these pesticides was heard. Asthma is linked to diabetes. Annually, in NYC approximately 200 people die of asthma. This is more than ten times the number of people who have died of the WNV. The asthma mortality of East Harlem is five times that of Forest Hills. In the poor neighborhoods, about 20 to 25% of seven year olds have asthma. Nationally, approximately, one quarter of all African American women over the age of 55 are diabetic. Diabetes ranked seventh as a cause of mortality in the U.S. This is a true public health threat; this is not WNV. We cannot conduct proper epidemiological research on either diabetes or asthma because there is no good surveillance system. We have spraying meant to save us from a disease with a very low public health impact. The spraying triggers asthma attacks and asthmatics can die during these attacks. The public health authorities have not even bothered to establish a proper surveillance system for either disease, twenty years after the beginning of the epidemics. Managing these diseases and developing drugs eats a large portion of available funding. We must therefore conclude that the only official solution to public health problems seems to be chemicals, either drugs or pesticides. The public policies that lead to disease or disorder get no contemplation or exploration.

Pesticides and Embryos — A Basis for Concern

Louis Guillette, Ph.D., professor of Zoology, University of Florida, Gainesville, FL

There are effects from pesticides that are beyond what are traditionally tested for. Most of us here recognize Rachel Carson. However, most of the kids growing up today do not, and they assume that the environment is clean and that the government is taking care of us. When Rachel Carson wrote her book, *Silent Spring,* in the 1960s, we were dealing with some 200 chemicals actively being used in the environment. Today, the number is somewhere in the neigh-

borhood of 80,000 to 90,000 chemical formulations. We do not know what these chemicals do even as individual chemicals, and we certainly do not know what they do when they are mixed together. Cells have to talk to one another through signal transduction in order to survive, grow and reproduce. The endocrine system is a system of chemical messengers that controls basically everything that takes place in your body. The hypothesis of endocrine disruption suggests that environmental contaminants can alter how cells talk to one another. Normal hormones in your body (estrogens, androgens, thyroid hormones, insulin, etc.) travel through the blood and go to cells and get a normal response. However, the contaminants act as mimics and interact with cells, or act as hormone blockers, blocking signals to cells or an embryo. Instead of the overt toxicity, we are exposing populations to low level contaminants for a longer period of time. If you are looking for subtle endpoints —changes in intelligence, changes in immune system, and changes in fertility— you do not do high dose experimentation as you do for cancer endpoints, because high dose studies actually give you a lower response. The early studies in wildlife showed reproductive abnormalities, animals that could not take care of their young, alterations in behavior and growth. These animals were showing an accumulation of effects that we call endocrine disruption. In my studies, we find male animals with significantly depressed testosterone (the male sex steroid). We find females with twice the normal levels of estrogen. We find abnormalities in ovaries. These problems persist from birth, creating organizational abnormalities that take place during fetal development and last a lifetime. My studies have shown decreased phallus size among 20% to 25% of alligators living in a chemically contaminated lake, with some difficultly determining their sex at all. Testicular cancer does not show itself until a young man is in his 20s or early 30s, but we now believe that probably 80% of these cancers are set up during embryonic development. Many of the assumptions about thresholds, about the linearity of dose response curves do not work when you look at the nervous system and the endocrine system. The way we are testing pesticides today does not include these approaches. We should use more common sense and more caution.

[T]he assumptions about linearity of dose response curves do not work [with] the nervous system and the endocrine system.

Ralph Nader, consumer advocate, 2000 Presidential Candidate, Washington, DC

One of the most interesting memories that I have is when Rachel Carson came out with her book, *Silent Spring*, and I saw the ridicule that was heaped on her by the so-called scientific establishment. It was then that I realized the distinction between corporate science and academic science. Corporate science has truly become far too powerful for the good of science. Corporate science pervades the whole area of evaluation of the impact that technology has on our health and safety. We see it very heavily, obviously, in biotechnology. We have seen it for many more years in the area of pesticides. One, corporate science is driven politically by the political power. Two, it demands confidentiality, which is contrary to the traditions of free scientific exchange and for peer review. It compromises anyone who touches it with proprietary contracts and confidentiality agreements. Three, it is driven overwhelmingly by the profit motive. When you combine the political power of these companies to get their way in Washington, in state capitals, or in dominating the media, you see a constant drive to sell more chemicals. For example, there is very little profit for these companies in prevention of the situations that lead to the perceived need by farmers and people in homes and schools to use pesticides. There is little money in prevention, but there is tremendous money in responding to a situation that could be foreseen and precluded with a minimal amount of force. That means that the whole process is rigged in favor of more and more chemical application. Corporate science, therefore needs to be a bigger issue.

We also have the situation of inadequate resources for testing. EPA is so far behind in testing pesticides — the combinations, the synergistic effects, the inert ingredients. I think people need to realize how much more EPA should be doing just in testing and evaluation; and what it is doing, or can do, or is allowed to do by a retrograde Clinton/Gore administration. They would be shocked. There are a lot of people that think that they are being protected by EPA and they are not. Even when EPA gets around to banning one of these chemical applications like Dursban, they let the companies sell the rest of the inventory by the end of the year. Imagine the Department of Transportation saying to some car company, "Well, we think that you are selling defective vehicles, and we are now going to prevent you from selling them, but you can sell the rest of your inventory."

Video and audio recordings of the entire Beyond Pesticides Forum will be available in late-November for $10. For more information or to order a recording of the Forum, contact Beyond Pesticides/ NCAMP.

* The groups sponsoring *Stop the Poisoning* included Beyond Pesticides/NCAMP, Cancer Awareness Coalition, Citizens' Action, Committee for Change, Citizen's Campaign for the Environment, Connecticut Seeking Alternatives for the Environment, Consumers Health Freedom Coalition, Earth Save Long Island, Environmental Advocates, Environment and Human Health, Huntington Breast Cancer Action Coalition, International Preparedness Network, Fairfield County Sierra Club, Grassroots Environmental Education, Long Island Neighborhood Network, New Jersey Environmental Federation, Environmental Defense, New York City Greens, New York Coalition for Alternatives to Pesticides, New York Public Interest Research Group, Northeast Organic Farming Association of NY, Northfork Environmental Council, 1 in 9 Breast Cancer Action Coalition, South Bronx Clean Air Coalition, Town of North Hempstead, Westchester Seeking Alternatives for the Environment.

A Framework for Environmental Thinking

A critical scientific look at the biotechnology industry

by Barry Commoner, Ph.D.

Pesticides are an enormously important signal of the way in which we have misused our knowledge of chemistry, in order to place very severe strains on living things — and doing it in a way that is dangerous, because of the ignorance that is involved. We know a lot about the chemistry, but we do not know enough about living things to really be able to predict what the chemistry is going to do. I want to run through with you the history of this predicament because it is not only important to know where we came from, but it is a very important indicator of where we are going, if we do not do something about it.

Synthetic, Organic Compounds: Their impact on Living Things

Take the example of DDT. A chemist made DDT by putting together various atoms around a network of carbon atoms. He had to be very skilled to do it because the chemistry of carbon is very complicated. It took chemists until 1823 to learn how to make a very simple carbon compound in the laboratory. It happened to be urea, which is extremely simple. Over the years, chemists have learned how make bigger and more complicated natural chemicals, things that occur in life. Well, DDT was made, but it does not occur in any living thing. By the time this work had been done, and thousands of Ph.Ds had been granted to people told, "Here's a molecule that's made in a plant, learn how to put it together in the laboratory," enough was learned by doing. People knew the rules and regulations of how to put all these complicated atoms together. Then, they began to put together atoms that did not occur in nature. If you went to any chemist's laboratory in a university, there was a room, usually dark, with bottle after bottle of the products of Ph.D theses. A whole series of unnatural chemicals, that were sort of mementos, had been created by people. A science had been built up that had taught chemists how to make these things in unnatural forms. One of the things on the shelf was DDT. Every now and then, people would take something off the shelf and expose it to living things. As you know, DDT turned out to be a way of killing insects.

Jay Feldman, executive director, Beyond Pesticides/NCAMP introduces Dr. Barry Commoner at the Eighteenth National Pesticide Forum *Beyond Pesticides: Solving a Public Health Crisis*, April 8, 2000 in New York City.

During World War II, an enormous amount of DDT was produced and used very widely. I have to make a confession. I had something to do with the dispersion of DDT during WWII when I was in the Navy. What I was told was, "Here's this stuff. It's dissolved in fuel oil and a very tiny drop of it will kill a mosquito. You have to do it quickly because we're going to invade the islands in the Pacific and there are mosquitoes that threaten the health of the marines when we land." That is all I was told. We began to work to do that. One of the experiments we had to do was to try it out in the jungle of Panama. I learned that it does more than kill mosquitoes. It makes snakes very nervous. By the time we had sprayed the jungle, they were all over the road. I also learned that DDT kills fish. We were told to help out an installation up in Delaware and the flies were bothering them, so we sprayed it. Two days later, they said, "You had better come back," because the flies were all over the place from the dead fish that the DDT had killed.

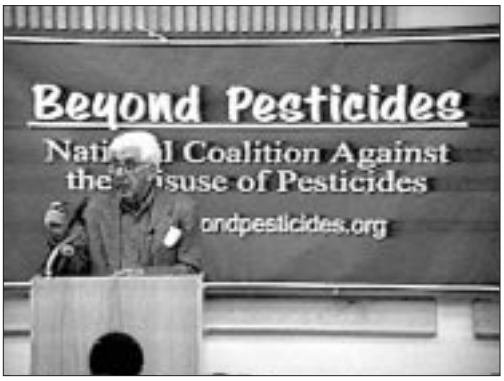
What I'm saying, very simply, is this. Here was a piece of chemistry, to make something that did not occur in nature, that kills insects. Turns out, it irritates snakes and kills fish. As you know, it took years before we learned that DDT, and other pesticides, are endocrine disruptors and can cause birth defects. So what we are dealing with here is a situation in which a science was developed that learned how to manipulate a form of chemistry that, beforehand, had been exclusive to living things. Before 1823, every organic, that is carbon containing, chemical on earth was made by a living thing. After 1823, and in the 1900s, very rapidly, synthetic, organic chemicals were made. For the first time, we had the power, and used it, to produce organic chemicals that were originally produced in living things exclusively. As you know, billions of pounds of these things have been disseminated: insecticides, herbicides, fungicides, and so on.

The Chemistry of Life

The question is, how did this happen? How did it happen that we were unaware of the consequences of what we had

Barry Commoner is the director, Center for Biology of Natural Systems, Queens College of the City University of New York. He delivered this presentation to the Eighteenth National Pesticide Forum Beyond Pesticides: Solving a Public Health Crisis, *April 8, 2000 in New York City.*

done? This came about because the chemistry of the living thing itself was largely ignored. Sure, they needed to know why the insect died, but no one bothered to ask what would happen when this stuff got into mother's milk. The lesson to learn from that is that an organic chemical that does not occur in living things is inherently dangerous to life. Why? Because the chemistry of life is something that began four billion years ago. It is extraordinarily complicated. Over those four billion years, many different types of chemical reactions could take place and what we now have in living things is an enormously selective group of molecules that are compatible with each other.



Dr. Commoner explains how scientists, by the mid 1800s, learned to manipulate atoms and create chemicals that were not produced by living things. Scientists originally rejected the possibility that these new chemicals, like DDT, could affect birds, when they were designed specifically to kill insects.

To think about this simplistically, understand that a protein is a string of amino acids. Well, you see, it is a string. (*At this point, Dr. Commoner shows a length of colored cord, which is rolled into a ball.*) It is hard to unravel. These colored sections indicate the position of an amino acid. There are 20 different amino acids in a normal protein, 20 different kinds. Theoretically, they can be put together in any sequence that you want. Some time ago, a very smart physicist named L. Sasser did the following calculations. He said, suppose that we synthesize one molecule of each of the proteins that can take 20 of these different amino acids, say 100 units long, until we make one molecule of each of the possible ones. Then, weigh all of those possible molecules. How much would it weigh? It turns out, it weighed more than the weight of the known universe. What does that mean? It means that the proteins that are made in living things are a very narrowly selected group of molecules from among the various kinds of proteins that could be made. Now, so much has been learned about proteins that there are chemists busily, right now, synthesizing not-normal proteins. That is, proteins with an amino acid sequence that no one has ever seen in a living cell. I have not seen any results yet, as to what happens when anybody eats it, but I mention this simply to get across to you the idea that in living chemistry there is a fantastic, specific, limitation to the kinds of molecules that can be compatible living in a single cell. What that says is that you have to automatically regard any synthetic, organic chemical (like DDT, Dioxin, PCBs, all of the herbicides, etc.) as likely to be dangerous because, in a sense, they are evolutionary rejects. Think of it this way. At some point 20 million years ago, or more, some living cell took it into its head to synthesize DDT, and it has not been heard from since. In other words, what this tells you is that there is a conflict between the business of making these unnatural things and widely disseminating them into the environment without taking precautions to see what the consequences are going to be.

Regulating Pharmaceuticals

It so happens that we have created an industry of making synthetic, organic compounds, which has very carefully taken this lesson and practiced it. What is the industry? Pharmaceutical drugs. What are pharmaceutical drugs? They are synthetic, organic compounds that are made in the laboratory. They do not occur in living things, but after a lot of work it has been found that they can be usefully taken into the body to correct or change some internal condition. We always knew that they do a lot more. Look at all the adds for drugs now in the paper. There is a full page of tiny type describing the side effects. In other words, if you are taking something for an acid stomach, it turns out that you have to worry about dizziness, under certain circumstances. They are completely aware of the side effects. Look at the precautions. You cannot take most of these things unless you first go to a doctor who looks at you, does a diagnosis, and figures out what might work and what might not work. You cannot get the stuff until the doctor writes it down on a piece of paper, with your name on it, that allows you, personally, to get that particular chemical from a druggist, who goes to jail if he fools around with it. There is a whole structure in the U.S. Food and Drug Administration (FDA) that sets up rules and regulations about it. We have learned that the business of putting synthetic, organic compounds into living things is inherently dangerous. If there are certain things that will help people who have asthma or cancer or diabetes and it is worth doing, with all the precautions being carefully looked at, then we do it.

The lesson to learn... is that an organic chemical that does not occur in living things is inherently dangerous to life.

So what we have been doing in disseminating insecticides, fungicides and herbicides in millions of pounds per year, has been spreading pharmaceutical drugs into the environment, which everybody is exposed to, whether they are sick or not, young, old, without a prescription. We are doing exactly what the FDA was set up to prevent. That is the situation that we have gotten into. We have gotten into it by not paying attention to the evolutionary significance of synthetic, organic compounds as rejects.

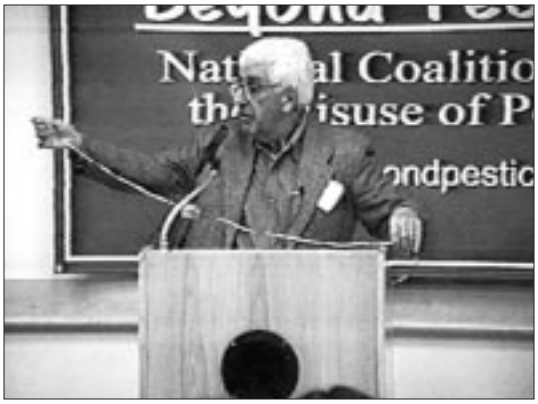
The interesting thing about this is that every time an is-

sue would come up with Rachel Carson and DDT, now with hormonally active compounds and the endocrine disruptors, the first reaction of the industry is to say, "You don't know what you're talking about." You have to remember, Rachel Carson was viciously attacked by Monsanto. They said that it was absolutely, scientifically incorrect to say that birds are susceptible to something that we have synthesized to kill insects. So the result is that we now have a globe, a planet, saturated with these compounds, over which we have almost no control. There are epidemiological studies and so on, but everyone knows that it is not healthy.

Evolution tells us that the transfer of a gene from one organism to a wholly unrelated organism flies in the face of four billion years of evolution because one of the characteristic consequences of evolution is species.

Biotechnology

There is an interesting argument that has come up in the biotechnology industry. You know the Bt gene, which makes a toxic insecticide in bacteria, has been transferred to corn plants and cotton plants. Monsanto makes the following argument. This is a good thing to do because it will cut back on the use of synthetic pesticides. They are now acknowledging that synthetic pesticides ought to be controlled. Why are they doing that? Because they have gotten out of that business. As you know, Monsanto split off its chemical business into a separate company, got heavily into biotechnology, got into real financial trouble and they have now been taken over by a pharmaceutical company and are a subsidiary company within this pharmaceutical company. That is indicative of what? Of the transformation of the whole petrochemical industry into biotechnology. The big biotechnology companies were set up by Monsanto, Ciba, and Hoffman-Laroche. They have transformed themselves into biotechnology companies.



Dr. Commoner uses a colored string as a visual aide to explain that different proteins are particular sequences of amino acids. A small segment of a species' DNA dictates each sequence of amino acids. Genetic engineers can introduce these small segments of DNA from one species into the genetic makeup of a different species, creating novel forms of life with unpredictable results.

What I want to talk about now is whether they have learned their lesson this time and what the dangers are. You notice that in order to deal with this, you have to get the science of it. I had to talk about carbon atoms and so on. Well, when we get to biotechnology we are going to have to do the same thing. Why? Because if you criticize biotechnology, you have to know what it does. The biotechnology industry, through genetic engineering, takes a molecule of DNA, which carries genetic information, from one organism, for example the bacterium that produces the Bt insecticide, and puts it into a corn plant, with the expectation that it will do in the corn plant exactly what it does in the bacterium. That is, there will be an insecticide produced and no other effect on the corn plant. The whole safety issue in biotechnology hinges on that single theoretical point —that the DNA gene has exclusive control over a particular event in the living cell and that no other part of the cell can affect what the DNA does. It is a strict code that says, "Do this."

Now, many people have used the evolutionary argument against biotechnology and that is absolutely true. Evolution tells us that the transfer of a gene from one organism to a wholly unrelated organism flies in the face of four billion years of evolution because one of the characteristic consequences of evolution is species. We are humans. There are humans, mosquitoes, snakes, monkeys, elephants, etc. Living things come in discrete packages, which do not breed with each other. There is no way, in nature, to pick up a gene from another species. The argument has been made. This is an unnatural thing to do and, therefore, dangerous. The argument you get from the other side is, "Well, you don't understand. That's evolution. We're doing molecular genetics." You've heard this, "We do this with surgical precision; we're not just breeding. We're taking one molecule at a time and putting it into another organism."

OK, let's talk molecules. What I want to do now is to tell you what can be learned from the enormous amount of data that has developed over the last 40 years, when the DNA double helix theory was first announced by Francis Crick, the more thoughtful member of the Watson and Crick team who developed the double helix. What biotechnology does is to take a molecule of DNA, which they say is a molecule that dictates a series of very precise chemical events in the cell that leads to an inherited characteristic. So if you have blue eyes, there is some little bit of DNA that broke off from one of your parents that produces chemical changes to make you end

up with blue eyes. The claim here is that DNA has two prime characteristics. One is that it will dictate what happens in a living cell that is inherited, and two, the reason it is inherited is that it also makes itself. A gene makes another gene and that gets transmitted down generations. So, what comes out of it is that the gene, the DNA, is the only source of self-replication and the exclusive source of the individual characteristics that are inherited.

Biotechnology: A Corporate Takeover

Now, what is this sequence? What are these chemical reactions? I thought I would share with you a statement at a U.S. Senate hearing in October of 1999, on biotechnology, in which Senator Richard Lugar (R-IN) brought in all the people from the industry to defend against, what he called, the recent hysteria from Europe. The first witness was Ralph W.F. Hardy, who is president of the National Agricultural Biotechnology Council, an industry group, and formally director of life sciences at Dupont. Here is the way he describes what is called, officially, in the academic world, the central dogma. That is the theory that Dr. Crick, Ph.D developed. And I quote, "DNA (top management molecules) directs RNA formation (middle management molecules), which directs protein formation (worker molecules)." Now it so happens that this is an absolutely accurate description of the Crick theory. You can think of what biotechnology does as, basically, a corporate takeover. It takes the top management of an organism and injects it into another species with the idea that that top management will now dictate what happens in that new organism.

Dr. Commoner compares biotechnology to a corporate takeover. Newly introduced segments of DNA dictate the production of proteins that were never before made by the original host cell.

So, it is a corporate takeover. It says that the rules that are set up by the management are in the DNA that transfers over. The middle management does exactly what the DNA tells it, and then the middle management tells the workers exactly what to do and disregard what they did before. There is a funny piece of irony here because the man who has been the ideological leader in this whole biotechnology reincarnation, Robert Shapiro, is a victim of a corporate takeover. When Monsanto was taken over, not merged, it was announced that Shapiro would retire within the following year. There was an article in *The New Yorker* with a very wistful ending with Shapiro going back to gardening.

An Industry to Prove Safety

At any rate, what I want to make clear here is that the biotechnology industry is absolutely bound to the situation of putting a management, a governing DNA, into a living cell without any other side issues happening. As it turns out in the petrochemical industry, the safety problem deals exactly with that. Are there side effects? There are going to be side effects if you can show that this idea that the DNA is exclusively in control, that there is nothing else in the cell that can do these things other than DNA, is false. If you can show that DNA is in total control, then maybe you are safe. If not, then you are in trouble.

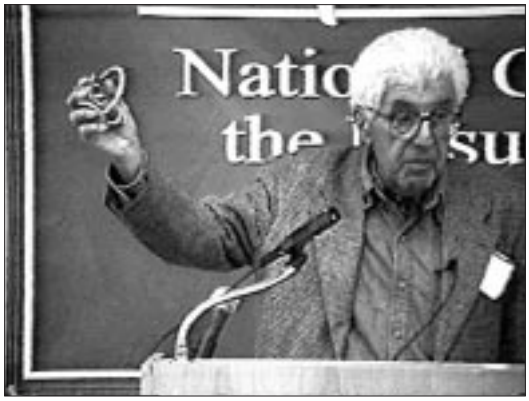
As I said, there has been a lot of research over the last 40 years. In January 2000, a paper came out in *Science* with an exquisitely done molecular study, which proved that this theory was wrong. It proved that at least one aspect of the theory was wrong —that only DNA can replicate itself and that no other molecule can. What was done? Well, it so happens that there are certain types of viruses, called prions. These types of viruses were originally discovered in goats, a disease called Scrapie. Scrapie is closely related to the mad cow disease and a whole series of virus diseases that are known as "slow viruses" because the disease developed very slowly. As early as the 1950s, researchers tried to purify the Scrapie virus and discovered that they could not detect any nucleic acid in it. All other known viruses have nucleic acid as DNA or RNA, but Scrapie has no nucleic acid in it. Ever since then, people have been battling over how this could be. This virus is infectious and it can replicate itself. So, what they did was to show that they could make a normal protein, a pure normal protein, into an infectious prion by attaching to it a piece of protein from the original virus. In the same issue of *Science* it was admitted, in a

[A paper in *Science* in January 2000] proved that at least one aspect of the theory was wrong —that only DNA can replicate itself and that no other molecule can... This contradicted the central dogma on which the biotechnology industry is founded.

commentary on the front cover of the magazine, that this contradicted the central dogma on which the biotechnology industry is founded. Have you read about that in the newspaper? No. What you have here is the development of very important facts that are not being acknowledged by the people who discovered them.

To go on. We now know a lot about how the prion does this trick of being free of nucleic acid, but replicating itself and being infectious. The work was done out in San Francisco in the early 1980s by a man named Stanley Prusiner. He got the Nobel prize two years ago for this work on prions.

He has now worked out how the prion works. The prion is a protein, a pure protein that when biochemically active is folded up and has a particular shape of twists and turns. What Prusiner showed is that this virus, the prion, when it gets into the brain (because that is where the attack takes place), encounters a normal brain protein. That brain protein assumes the folded up shape of the prion and becomes infectious. It then bumps into another normal protein and transforms that, explaining why they are "slow viruses." This is a very slow process. As this goes on over tens of years in humans, finally the brain goes dead. These diseases are universally fatal.



Dr. Commoner illustrates how a sequence of amino acids fold into a specific, functional protein, with the use of a colored string. He explains how the molecular genetic system is under the control of both the DNA and protein folding systems which co-exist and have evolved together.

Here is the key thing about the folding. Remember I said that the whole purpose of this stream of genetic information was to get to the activity of the protein. If it is an enzyme, it is completely dead. In order for it to be active, it needs to be put together into a particular configuration, which brings together two particular amino acids, sometimes three, sometimes another chemical. That is called the active site. The chemical reactivity takes place on the surface of that particular point. You can see how important the folding is because if it were not folded, these two amino acids would be far apart. Folding is an absolutely essential step to making a protein biochemically active and, therefore, capable of bringing about the inherited effect.

Here is the problem that Dr. Crick has. Crick has described, and all the evidence supports it, how the DNA transmits its code to RNA and how the RNA transmits its code to this sequence of the protein. Full Stop! That is the end of the theory. The theory ends by saying we know how the DNA makes a dead protein. Incidentally, Crick said that the information in the protein cannot get out and he said that if you could ever show that genetic information is transferred directly from one protein to another, and I quote, "It would shake the intellectual foundation of molecular biology." Well, that happens.

You will hear this argument. Oh that is a disease. That is not a normal thing. What does this have to do with normal inheritance? Another thing that has happened in the last 20 years in this area of research is the discovery that the folding up of proteins requires a protein. In Crick's theory, he knew that the protein needed to be folded to be active. He said, "We will assume that when you have specified the sequence of the amino acids in the strung out form, then the protein will automatically fold itself up to a highly specific three dimensional form." How specific is that? IBM has announced a new high-speed computer. They also announced that this computer would have a test. This test would be to figure out how many different twists and turns can be made in order to specify the particular arrangement of a folded up protein. And the answer is one, with one hundred zeros after it. In other words, there are zillions of ways of doing this. Then they said that the computer would have to run continuously for a year to work that all out. In the cell, proteins are made linearly and fold up in exactly the right way in two seconds. How do they do it? There are proteins called chaperones. These chaperones are cup shaped and when the linear protein gets into it, it comes out properly folded. In other words, it does exactly what the prion does, a protein combining with another protein and bringing about its proper fold.

It is simply not true that moving DNA from one species to another is a perfectly natural thing to do.

So, Crick was right up to the point of the stretched out protein. But that does not answer the question of how you get the inherited characteristic. A different genetic process, which involves only protein, is essential to carry out the final step. Incidentally, the two are absolutely essential. The scheme to make the stretched out protein is necessary, but not sufficient. The folding up is necessary, but not sufficient without something to fold. Now these two systems, the Crick system and the folding up protein system, coexist in current living things. They must have evolved together and they must be compatible with each other. Otherwise, you have got the same problem that you have got with DDT, when you put an evolutionary reject chemical into a living thing.

It is simply not true that moving DNA from one species to another is a perfectly natural thing to do. What you are doing is putting top management into a potentially hostile situation because you have got workers who do not know from Crick. In effect, the evolutionary argument tells us an essential part of the molecular genetic system is not under the control of DNA and the compatibility of the systems is related to their evolutionary development. You are exactly where you are with DDT. If you only put in one part, you have no way of knowing what will happen when it confronts another part that was built up from the course of evolution. There is enormous research on protein folding and an enormous amount of research on prions. There is tremendous activity in biotechnology. What is it? A third of the corn crops have been taken over? What you have, from the research on folding and the research on prions properly understood, is a denial of the theoretical basis that is essential to biotechnology. Without that basis, it is a completely unpredictable thing to transfer DNA from one organism to another species.

Dr. Commoner receives Beyond Pesticides/NCAMP's Environmental Protector Leadership Award at the 18th National Pesticide Forum for leading the environmental movement with thought and action.

You might say that nothing dangerous has happened. Well, proteins act slowly. DNA, when it comes into a cell, is competing with another molecule. There are thousands of protein molecules within a cell and you will not change that very fast. Very slow processes may be taking place now and at least we know that this is inherently a very unpredictable, dangerous process. The data exists, but the people who are doing the work will not talk about it. There are many reasons for this. One obvious one is that they are in the biotechnology business. Even if they are not in the business, such a huge ideology has developed in research practice that to step out of it means that you will not get many grants.

We are in a difficult situation, but we have been in difficult situations before. We know how to get out of it. The important thing to do is for those of us in the environmental movement to take on the task of educating the public about the molecular facts that show that biotechnology is an unpredictable industrial practice. It is not going to be easy, but I think it is time to do it. Thank you.

Questions & Answers

What is your response to Dr. Anfensen's work on how temperature creates protein folding?

The only knowledge that we have on the living cell is that chaperones are involved and that they are universal. There is a key thing that I should have mentioned here. If Anfensen and Crick are correct, then it is not possible for two proteins with the same amino acid sequence to fold differently. Prusiner showed that the normal protein in the brain has exactly the same amino acid sequence as the prion, yet it has a different folding from the prion. When they interact, the normal protein's shape is changed into the shape of the prion's folding. That makes it infectious. The ironic thing is that the chaperones were first discovered by the biotechnology industry. When they started to make transgenic bacteria with human genes, looking for human growth hormones, they found a lot of protein, but it was inactive. This created a problem in the industry at the beginning. They finally discovered that they could recover more active protein by putting more protein into the test tube to chaperone. So, chaperones were really discovered by the biotechnology industry.

How do we manage to propose education to a public that does not seem to want to know about organic chemistry, wants to put their herbicides on their lawns and does not care if their children and pets play there?

Well, you are describing a certain fraction of the public. I think that the way to do it is by educating people not to have that attitude. Look, we had this problem way back in the Atomic Energy Commission and with the fallout from nuclear bomb tests. How did we do it then? We got smarter than they were. We knew more about the ecology of Strontium 90 than the Atomic Energy commission did and we challenged them! I think that we should be challenging the biotechnology industry by using the paper that came out in *Science* in January — by using Prusiner's work. Prusiner will not do it. I guarantee you.

It is hard for people to go out and talk with your level of skill. How do we convince more scientists who are working on this issue to talk about the consequences of what they do?

In St Louis around the fallout date, that is exactly what we did. It is going to be harder this time. I guarantee you. It is going to take a gutsy scientist to be willing to organize around this issue. There are groups out there like the Committee for Responsible Genetics. I think that what we have to do is organize. What I have described to you is the result of maybe six months of very part-time work digging up stuff on prions and chaperones. Do you know, for example, that the gene for a given protein does not exist in a one piece? This gene exists in scattered pieces, which have to be put together in exactly the right way. In some cells they are put together one way, and in other cells a different way. Where does information come from to know exactly how to do that? Where is the blueprint? We have got to organize the scientists and start a campaign! The way to do that is to put public pressure on the scientists and say, "Come on, do your job!"

by Leslie Haug

National Agriculture Biotechnology Council (NABC) Report — World Food Security and Sustainability: The Impacts of Biotechnology and Industrial Consolidation

National Agriculture Biotechnology Council (NABC Ithaca, NY, 1999). This report is a detailed account of the NABC's 1999 "open forum on agricultural biotechnology." It's a great resource if you want to know what the industry is up to when it comes to agricultural biotechnology. The NABC was formed in 1988, as they describe it, for the purpose of identifying and discussing (in open forum) agricultural biotechnology issues, the "safe and beneficial" development of agricultural biotechnology, and developing public policy recommendations. The council members include representatives of 30 major agricultural schools of the United States and Canada. The council president, Ralph W.F. Hardy, is the former director of Life Sciences for the E.I. DuPont chemical company. The speakers and panel members included representatives of the World Bank, USDA, Dow AgroSciences, Kraft Foods Inc., Monsanto Company and the White House Science and Technology Policy Office, but also included an organic farmer and staff of the Center for Rural Affairs and the Kerr Center for Sustainable Agriculture.

The 1999 theme of this meeting was "The Impacts of Biotechnology and Industrial Consolidation." Even so, some of the biggest concerns facing agricultural biotechnology were not addressed, such as the risks and hazards to public health from allergens in genetically engineered food, the lack of sufficient research to explore the consequences of biotechnology, and the labeling of genetically altered foods already sold in U.S. markets. Instead, the group focused on the premise that both organic and conventional farming would be unable to meet the world's food supply demands in the coming decades without agricultural biotechnology. Per Pinstrup-Andersen (World Bank), a keynote speaker, projected a 60% increase in food demand, given the worldwide population growth over the next two decades. Problems with food distribution in developing countries were not discussed. Chuck Hassebrook (The Center for Rural Affairs) proposed that research for biotechnology should no longer be profit-driven and public institutions should not be given opportunities for profit from research in the form of royalties and contracts.

The product of the meeting, contained in the appendix to the report, is a consensus statement of important issues and viewpoints addressed during the meeting. The report itself is a summary of the workshop discussions, keynote addresses and plenary presentation. There is also an appendix including contact information for all participants. Lecture topics included *Why Biotechnology May Not Represent the Future in World Agriculture* by Dennis Avery (pro-industry researcher/writer in the Hudson Institute), *Changing Consumer Demands Can Drive Biotechnology Adoption* by Susan Offutt (USDA, Economic Research Service) and *Using Biotechnology to Enhance and Safeguard the Food Supply: Delivering the Benefits of the Technology* by John Pierce (DuPont Agricultural Products), one of the keynote speakers. *For a copy, send a check for $5 to NABC/BTI, 419 Boyce Thompson Institute, Tower Road, Ithaca, NY 14853. Checks should be made payable to NABC/BTI. They can also be contacted through e-mail at NABC@cornell.edu or their website at www.cals.cornell.edu/extension/nabc.*

Life's Delicate Balance: Causes and Prevention of Breast Cancer

Janette D. Sherman, M.D. (Taylor & Francis, New York, NY, 2000). Since the 1940s, the chance of a woman developing breast cancer in the U.S. has doubled. Is it coincidence that this directly corresponds to the sharp increase in synthetic

chemical/pesticide use over the last 50 years? The answer to that question is clear. In her new book, Dr. Janette D. Sherman challenges the causes of breast cancer, by rejecting the emphasis on medical cures, and calling for prevention through education. She seeks to inform the female public of the environmental causes of breast cancer, thereby promoting prevention and giving women a chance to avoid harmful chemicals, radiation, and other carcinogens. In a chapter entitled "Hormones Too," Dr. Sherman talks about such hormone mimics as DDT, its metabolites, dioxins & diflubenzurans, hexachlorophene, chlorinated phenols and PCBs and PBBs. Not only does she describe their links to breast cancer, but she explains their history, usage, misuse and their continued use, despite declining efficacy.

She calls for an all out ban on chlorine-based chemicals, stating that many of the pesticides, plastics and industrial solvents that make up 80% of chlorine used are "clearly not essential." EPA is attacked for its behavior under pesticide and toxic substances laws, where products are not proven harmless prior to marketing. Not only does Dr. Sherman reaffirm the link of pesticides and toxic chemicals to breast cancer, but she stresses the fact that women of every age will win the war against breast cancer by preventing use and exposure. She urges all people to seek the banning of cancer causing chemicals by local and federal governments, saying it is time the government begin doing its job of protecting our basic right to health. *For a copy, contact Katherine Smalley, Director of Publicity, Routledge Publishing at (212) 216-7820, fax (212) 564-7854 or e-mail her at ksmalley@routledge-ny.com. This book is also available through the Beyond/Pesticides/NCAMP website (www.beyondpesticides.org) where, for no additional cost, your purchase triggers a donation to our organization.*

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❑ "Speak to the Earth, and It Shall Teach Thee." In green, blue and peach on 100% natural organic cotton. $15 each; two for $25.

❑ Tell the world that FREEDOM FROM PESTICIDES IS EVERY BODY'S RIGHT in teal, purple, and yellow. On 100% natural organic cotton. $15 each; two for $25.

Bumper Sticker

❑ "Is Your Lawn Toxic Green?" White letters on green background.

❑ FREEDOM FROM PESTICIDES IS EVERY BODY'S RIGHT. White letters on blue.

Stickers $2.00 each ($1.00 each when ordering 100+)

Books

❑ *A Failure to Protect.* Landmark study of federal government pesticide use and pest management practices. $23.00. *Summary and Overview* $5.00.

❑ *The Chemical-Free Lawn: The newest varieties and techniques to grow lush, hardy grass with no pesticides no herbicides, no chemical fertilizers.* By Warren Schultz. Published by Rodale Press. $17.95 (14.95 + $3.00 shipping).

❑ *Unnecessary Risks: The Benefit Side of the Risk-Benefit Equation.* Understand how the EPA's Risk-Benefit Analyses falsely assume the need for high-risk pesticides. Explains how "benefits" are inflated, how alternatives might be assessed, and the public's right to ask more from its regulators. $10.00.

❑ *Safety at Home: A Guide to the Hazards of Lawn and Garden Pesticides and Safer Ways to Manage Pests.* Learn more about: the toxicity of common pesticides; non-toxic lawn care; why current laws offer inadequate protection. $11.00

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❑ Pesticides and Your Fruits and Vegetables

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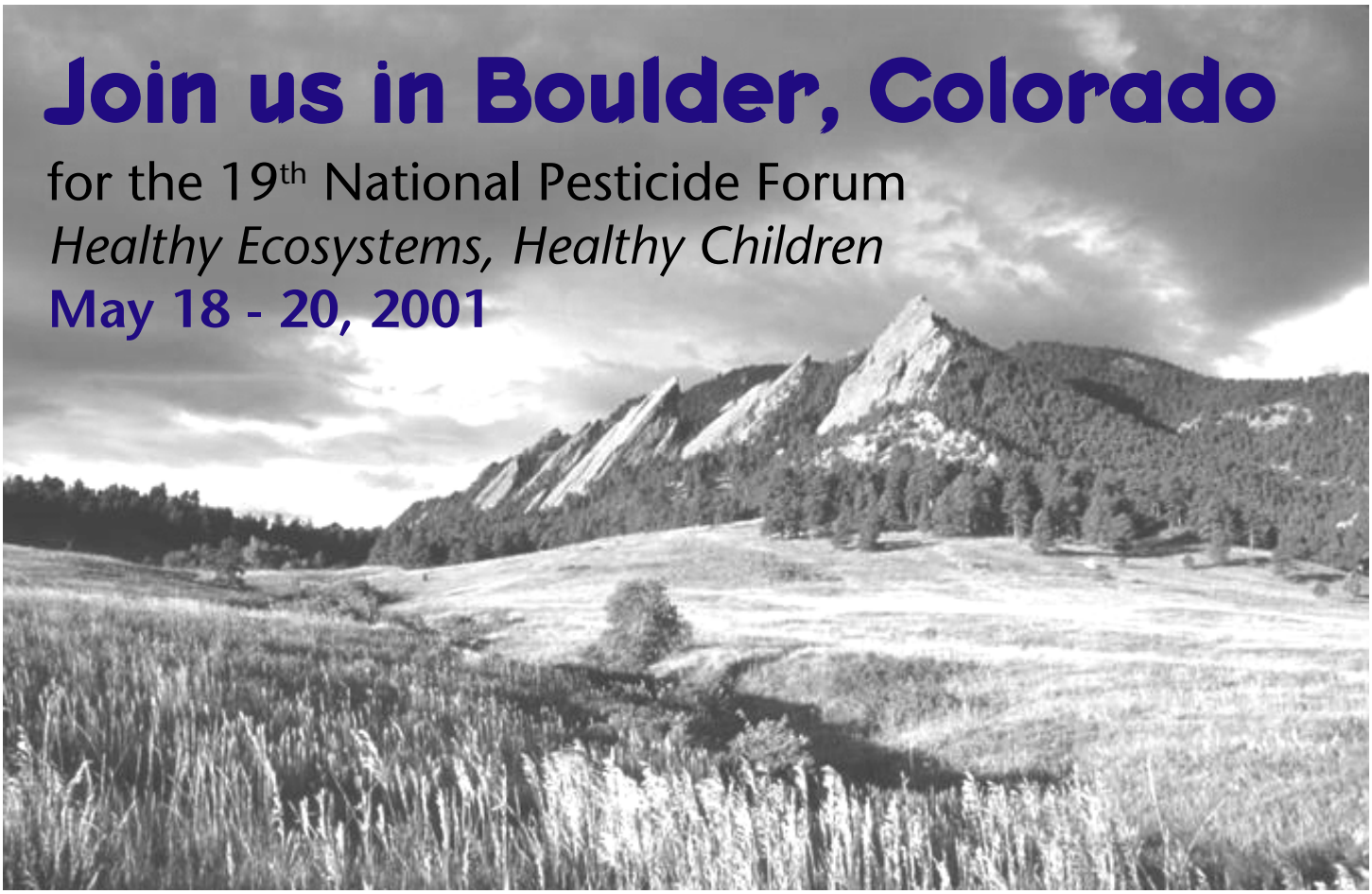

MARK YOUR CALENDARS NOW! Beyond Pesticides/NCAMP will be hosting our 19th National Pesticide Forum, *Beyond Pesticides: Healthy Ecosystems, Healthy Children*, on Friday, May 18th through Sunday, May 20th at the University of Colorado in Boulder. The Forum will focus on adopting alternatives to protect children from the toxic hazards of pesticides, as well as ecological management of open space. **Brochures and registration forms will be mailed early this winter.** Contact Beyond Pesticides/ NCAMP for suggestions and more information, 202-543-5450, www.beyondpesticides.org.

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