



COOPERATIVE EXTENSION

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INTRODUCTION

This is our first issue of the *Environmental Toxicology Newsletter* in "electronic" format. The first couple of articles will focus on the implementation of the Food Quality Protection Act of 1996, and we will include links to the EPA sites from which more detailed information can be obtained. The implementation of this Act is gobbling up considerable time and resources from many agencies, agricultural chemical manufacturers, and farmers. University personnel are not immune! Because of the implications of the regulations which may be implemented, there is a whole lot of scurrying going on! As the EXTONET group responds to several of the policies which are being considered by the EPA for adoption to guide the implementation process, they will be published in this newsletter. We will certainly welcome input from our readers on this and other subjects.

I would also like to encourage our readers to let us know if they have found any especially useful links to other websites which they would like us to include.

Thank you.

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EDITORIAL

Several years ago, a friend from the Lawrence Hall of Science at UC Berkeley, Dr. Herb Thier, was giving a talk to some teachers who were receiving training as part of his Chemical Education for Public Understanding Program (CEPUP), which has now become SEPUP, the Science Education for Public Understanding Program. What Herb said was this: "**Half of what we teach students today will be shown to be different or incorrect during the next ten years. Our problem as teachers is that we don't know which half!**"

I think of this often when I consider governmental regulatory policies that are "science-based." Science is a process of discovery, characterized by observation, formation of hypotheses, testing, more observation, revised hypotheses, more testing, and so on, in an unending spiral upwards. The process is ongoing and ever changing. The ever-changing nature of scientific knowledge implies that "science-based" policies would reflect such changes in knowledge. But, do they? Let's take a look back in history.

First, consider the changes which have been made in the testing requirements for pesticides and food additives during the last 40 years. In the 1950's, minimal testing was required before a new chemical entity could be marketed. We learned very quickly that more testing was needed to identify unsuspected environmental and toxic effects, and new requirements were added to the list of required screening tests after each "wreck." Currently, the approval of a new chemical entity as a pesticide or food additive takes years of expensive testing to generate all the data necessary to prevent recurrence of these "wrecks". Does it mean that all of these substances are absolutely safe? Not at all, we always will have more to learn, and there will always be surprises.

In 1958, the Food, Drug, and Cosmetic Act of 1938 was amended, and, based on the scientific knowledge of that time, a clause was added which essentially banned the use of food additives and pesticides which were shown to cause cancer in humans or animals. This clause, called the Delany Clause, was a fine idea based on what we knew at that time. In the 1970's and 1980's however, we came to understand the processes involved in cancer, and that the Delany Clause was based on "old

science" and needed to be changed. In addition, because of the way the law was written, it did not apply to pesticide residues on fresh produce, but it did apply to processed commodities, thus a pesticide might be approved for use on fresh tomatoes, but might not be approved for use on tomatoes used for sauce or ketchup! Despite an overwhelming consensus within the toxicological scientific community that the Delany Clause was outdated, why did it take until 1996 to actually change it? I think it is because it is easier to tighten standards than it is to relax them, because any relaxation of standards can be (and probably will be) interpreted as putting the public at greater risk. As far as I can tell, the only case in which this has not happened has been the relaxation of highway speed limits.

When the Delany Clause was finally addressed in legislation, it was replaced with a new law, the Food Quality Protection Act (FQPA) of 1996, which advanced a new standard of "a reasonable certainty of no harm", and which included the imposition of an additional tenfold safety margin in the setting of pesticide tolerances (legal limits on the amount of residue which may be found on foods) to further protect the health of children. I should add at this point that there is no evidence in humans that shows any problems with the current tolerances, however, predictions of risk to humans based on animal studies will **always** show a reduced risk if the exposures are reduced. All of the provisions of the FQPA, including endocrine disruption testing, combining exposures for all possible routes, combining effects for pesticides which have a common mechanism of toxicity, and increasing the margin of safety for children, appear to be reasonable and "good ideas." Who can disagree with a reduction of risk, especially risk to children?

The difficulty lies in the implementation of these requirements. The US EPA is responsible for the implementation of the FQPA, and they have a formidable task to complete this in a very short time. To accomplish this, they have hired more toxicologists and risk assessors, formed advisory committees, and produced nine "science policies" which will guide them in the process of developing regulations. Pesticide manufacturers and farmers in particular are concerned about the regulations EPA will develop based on these "science policies" and are insisting

that EPA get the science right. They know that once developed, these regulations will most likely provide the framework for pesticide regulation well into the next century.

The EXTOTOXNET (Extension Toxicology Network) group was asked by some of the folks at USDA/CSREES to take a look at these "science policies," and respond to EPA on behalf of the land-grant universities (only a few of which have toxicological and environmental chemistry expertise within their colleges of agriculture). While reading through these, and during discussions with my friend and colleague, Dr. Mike Kamrin at Michigan State University, we agreed that these policies are not "science policies", they are "risk management policies." While these policies can be based on scientific knowledge as we know it now, the policies themselves are not science. These policies can be based on scientifically collected data, and take into consideration our current understanding of toxicology and environmental chemistry, however, whenever a choice is made in setting safety factors or exposure levels, these are risk management decisions and involve a personal point of view. Whenever a decision must be made regarding the use of a safety factor, a confidence limit, etc., a subjective element of choice is injected into the process. Our concern is that some people may come to see these policies as being unassailable, unchanging, and true. Real "science-based" policies would embrace the fact that they must change as we learn more, that is, as our scientific knowledge increases.

A basic recommendation for people who are involved in risk communication is that you should not compare risks of vastly different activities to convince people that something is safe, particularly if some of the activities are voluntary, and others are not. Over the years I have often received requests for information about the relative toxicities of things like gasoline and table salt, to compare to the toxicities of pesticides or food additives. I have generally not provided such information because such comparisons do not convince people, and may in fact alienate some. The best definition of safety that I have ever heard is "acceptable risk." When defined in this way, determining safety is NOT a scientific process. Risks can be estimated using science, but not safety, that is an individual and a societal decision, and determining what we will

accept as "safe" is really a risk management decision.

For example, the January/February 1999 issue of the California State Automobile Association magazine, *VIA*, included some information about the 1997 death rate on California roads. In 1997, 3,671 people died, the lowest number in 40 years despite a doubling of the state population and a tripling of the number of vehicles. This is approximately ten people per day, every day of the year. Despite this, I think almost all of us would consider our roads as "safe", or at least that the risk associated with driving is acceptable. In fact, while most drivers would agree that higher speeds are more likely to result in a greater risk of death or injury if an accident occurs, we would be pleased to see the speed limits on our roads increased. When we drive we make risk management decisions constantly based on visual and auditory input, and adjust our speed and direction to maintain our safety. And then some "idiot" passes us on a curve, or we get stuck behind someone going 45 mph in a 55 mph zone. Why do they make different "risk management" decisions (drive differently than we do) when going over the same stretch of road? Simply put, we come to different decisions based on similar data input, and personal perceptions, and we can all justify our decisions to do things differently **using the same data**.

I accept that individual and societal decisions will not always be based on evidence (data) but may be based on perceptions, for example; "X is synthetic, not naturally occurring and therefore bad." This is a point of view, and it can be argued endlessly. However, stating "X is hazardous and puts your children at a greater risk of cancer" makes it sound much more real (data-based), even if the risks are only predictive. This does bother me. This is using selective data to support an opinion, a process which makes it seem like we actually considered all the data before we made up our mind! The impetus behind the FQPA was not based on any measurable risk, but based on predictive risks derived from experimental laboratory data.

I think sound public health policies should be based on sound science. However, FQPA legislation set deadlines on implementation which are forcing hasty decision-making. The whole FQPA process needs to be slowed so mistakes aren't made which might be more problematic and real than the predicted

risks we are trying to reduce. I have four recommendations that I wish people to consider during the process of implementing the FQPA. First, recognize that the "science policies" which are being circulated by EPA for comment are not scientific, but are risk management policies which will be (or should be) based on data, not on conjecture. Second, recognize that the knowledge-base used to set these regulations will change, and ensure that mechanisms are built into the regulations which make it easy to tighten them or loosen them as our understanding changes. Third, make this process easier to follow and less cumbersome. Fourth, recognize that this is not an emergency. There are no children being harmed by the current pesticide residue tolerances, and the impact of the reduced risks resulting from implementation of the FQPA will never be measurable, except on the computer screen of a risk assessor. ✓

LINKS TO FOOD QUALITY PROTECTION ACT INFORMATION

The following links are ones which I have found useful for trying to keep track of the science policy issue of the FQPA and the review of the policy documents. The Tolerance Reassessment Advisory Committee site has been the most useful and seems to fairly current.

Tolerance Reassessment Advisory Committee Page: <http://www.epa.gov/pesticides/trac/>.

The EPA has issued the final guidance document related to the question of substances having a common mechanism of toxicity. This document is available in Adobe Acrobat or Wordperfect format at this address:

<http://www.epa.gov/fedrgstr/EPA-PEST/1999/February/Day-05/o-p2781.htm>

This is how they describe what this guidance document is:

The draft science policy document discussed in this notice is intended to provide guidance to EPA personnel and decision-makers, and to the public. As a guidance document and not a rule, the policy in this guidance is not binding on either EPA or any outside parties.

Although this guidance provides a starting point for EPA pesticide risk assessments, EPA will depart from its policy where the facts or circumstances warrant. In such cases, EPA will explain why a different course was taken. Similarly,

outside parties remain free to assert that a policy is not appropriate for a specific pesticide or that the circumstances surrounding a specific risk assessment demonstrate that a policy should be abandoned.

The "revised" guidance is not an unalterable document. Once a "revised" guidance document is issued, EPA will continue to treat it as guidance, not a rule. Accordingly, on a case-by-case basis EPA will decide whether it is appropriate to depart from the guidance or to modify the overall approach in the guidance.

Also included in this Federal Register notice is the following information on further steps which will be taken in doing cumulative risk assessments.

The Agency plans to use this guidance as the initial step in its process to assess the possibility of cumulative toxicity to human health that may be caused by pesticides and other substances that are toxic from a common mechanism. The Agency is currently developing guidance for conducting cumulative risk assessments that it will use to characterize the potential for cumulative toxicity to human health that may result from exposure to pesticides and other substances that have a common mechanism of toxicity. That guidance will be made available for public comment in June, 1999.

Editor's Note: If you find this confusing, you are not alone. ✓

NEW WEBSITE FROM THE ENVIRONMENTAL WORKING GROUP

I received this notice from a friend about a new website that the EWG (Environmental Working Group) has put together. After you read this, I have several comments that may be useful in helping to answer questions which may come to you about this site.

New web site lets consumers test their meals and grocery lists for pesticides

Consumers can now go to the Internet and instantly find out what pesticides are in the foods they eat, fed to their children, and are bought at the grocery store. Instead of panicking, consumers can follow simple tips for cutting back on pesticides, just like they cut back on calories, fat or cholesterol, the Environmental Working Group (EWG) announced. The new, interactive website developed by the EWG, allows users to

discover what pesticides they consume daily and what the potential health effects are. EWG is a nonprofit organization known for its research on environmental problems, including pesticides in foods. "When our internal analyses showed that people might eat 20 or more bug killers or other pesticides in their meals everyday, we knew we had to make the information available to consumers," said EWG President Ken Cook. "Despite repeated promises, the government is simply not acting to protect children or anyone else from these toxic chemicals. Consumers have to protect themselves," Cook said. By mouse-clicking a menu of hundreds of foods, visitors to the new site can tap into EWG's search engine that randomly matches a food selection against more than 90,000 government lab test results for pesticides in food. EWG offers digital diners the following options:

Daily Fare: Select breakfast, lunch, dinner and a snack from among more than 150 foods and dishes. "You'll be amazed at how many pesticides you eat in the course of a day."

The EWG Supermarket: Pop in for a few items or wander the aisles and fill your shopping cart from pastas to veggies to seafood. Find out "which pesticides you brought home in your grocery bags, and what their health risks are."

Fruit Salad Roulette: "Mix a bowl full from more than 20 fruits and find out how many pesticides you ate."

Kid's Menu: "Find out which pesticides are in foods children commonly eat including processed baby foods. And check to see if your child's diet exceeded government safety standards for pesticides that harm the nervous system."

"The government has heard plenty from pesticide companies, but not enough from parents," said EWG's Cook. "It will only take a minute for consumers to send a powerful message that they want dangerous pesticides out of their favorite foods. That minute will make a huge difference to food companies and politicians who are sensitive to consumer concerns." With direct email links from the site, consumers can voice their concerns directly to supermarket chains, food companies, and Washington, including Vice President Al Gore. The new EWG site designed to educate consumers about pesticides in the foods they eat is located at <http://www.foodnews.org>.

Editor's Note: As soon as I heard about this site, I linked into it and looked

it over. It is quite flashy and definitely serves the purpose of it's sponsor; to scare people about pesticide residues in their foods. Unfortunately it is also an incredible misrepresentation of fact. What is presented is distorted to make things look far worse than they are. I used their "one minute activist" feature on this website (it will pass on your message to a long list of grocery chains, outlets, and Al Gore) to send the following message:

"Today I discovered the EWG site which purports to offer good advice about avoiding pesticide residues and reducing risks of exposure.

As a Board certified toxicologist with more than 20 years of research and teaching experience, this site is misleading and presents a slanted view of risk and exposure.

As usual, the EWG presents a simple number or potential residues which may be on produce or in food products, without relating it to the actual concentrations of residues in these foods which are found in the Total Diet Study. They ignore the dose portion of the dose-response relationship for the sake of advocacy.

I would encourage you to ignore mass emails which you may receive from this site.

It is unfortunate that this website does not represent the true status of our food supply, but makes it appear as if we are poisoning ourselves and our children, which we are not.

Results of the California State Department of Pesticide Regulation residue tests show that more than 80% of conventionally grown produce has either non-detectable pesticide residues, or concentrations of residues which would be allowed on organically grown produce. That is something that consumers should know when they are given the choice to buy conventionally grown or organic products.

Please continue to do the good job which you are currently doing to ensure the safety of our food supply. If you are going to put more money and effort into any area, please put it into better control of microbial contamination."

Dr. Berna Magnuson, Assistant Professor and Extension Toxicology and Nutrition Specialist at the University of Idaho, also sent the following message through the EWG "one minute activist" feature:

I have recently visited the EWG's Foodnews

website. I am a food toxicologist with degrees in both food science and toxicology. I have been studying the effect of compounds in our diet on health for many years. I have yet to find any information presented by the EWG that convinces me that pesticides in our foods are the cause of health problems in the US.

This site tells you two things. Firstly, that a small amount of pesticides that are used in the production of foods may still be in the foods once they reach the marketplace. Secondly, that these pesticides may, at some exposure levels, cause harmful "health effects. The key point that is intentionally missing is that pesticides are not toxic at all exposure levels. Therefore, eating small amounts of pesticides does not automatically mean you will have the health effects observed at high levels. This is true for all compounds, including natural toxins and medicines. In fact, studies comparing the health of people who eat a large number of fruits and vegetables are healthier than people who eat few fruits and vegetables, even though these fruits and vegetables contain small amounts of pesticides. One would reason that if pesticide residues were so harmful, this would not be the case.

I personally am not convinced that buying organic produce is the way to ensure you have a more healthful diet. Firstly, organic produce is not pesticide free, but it only eliminates the use of synthetic pesticides. Synthetic pesticides have undergone extensive toxicological testing in order to be approved for use in foods. Government regulation of these pesticides is already extensive. Secondly, most often organic produce is more expensive than conventionally grown produce. If a family is on a limited budget and can only afford a limited amount of fruits and vegetables, they are more likely able to provide a more healthful diet by purchasing conventionally grown fruits and vegetables.

I am concerned that attempts to eliminate or drastically reduce the use of synthetic pesticides will have a very dramatic effect on the ability of farmers to produce foods at the low cost that we currently enjoy and demand. Many US farmers are already in economic crisis. Fewer and fewer people are choosing farming as a career. With the picture being painted by the EWG of farmers poisoning our children, it is not difficult to understand why this may be happening.

In closing, I urge you to be skeptical of

the mailings and information from the EWG.

Oh, and by the way, the actual figure is 90% of conventionally raised produce is in compliance with California organic produce pesticide residue standards. ✓

HAFF DISEASE ASSOCIATED WITH EATING BUFFALO FISH – UNITED STATES, 1997

Haff disease is a syndrome of unexplained rhabdomyolysis (*muscle cell destruction*) following consumption of certain types of fish; it is caused by an unidentified toxin. Rhabdomyolysis is a clinical syndrome caused by injury to skeletal muscle that results in release of muscle cell contents into the circulation. In 1997, six cases of Haff disease were identified in the United States (four in California and two in Missouri) among persons who ate buffalo fish (*Ictiobus cyprinellus*), a bottom-feeding species found mostly in the Mississippi River or its tributaries. This report summarizes the investigation of these cases.

Los Angeles County, California

Patients 1 and 2. On March 8, two Ukrainian sisters (patients 1 and 2), aged 70 and 73 years, respectively, and the husband of patient 2 (aged 75 years) ate fried buffalo fish. Eight hours after the meal, patient 1 experienced neck pain followed by stiffness in her arms. On arrival, emergency medical technicians noted both women were rigid, unable to move, and extremely sensitive even to light touch. Patient 2, who had a history of angina pectoris, also complained of chest pain. The man did not become ill. Both sisters recovered. Main sequelae were newly diagnosed hypertension (patient 1) and diminished muscular strength (patient 2).

Patient 3. On March 9, a husband and wife (both aged 33 years) from Ukraine ate fried buffalo fish purchased from the same market where patients 1 and 2 purchased their fish. Eight hours after the meal, the husband experienced left-sided chest pain that radiated to his left arm and increased with deep inspiration. He was admitted to the same hospital as patients 1 and 2. Following discharge, the patient reported occasional chest pain that he had not noticed before this episode. His wife did not become ill.

St. Louis, Missouri

Patients 4 and 5. On June 8, a Ukrainian husband and wife (aged 66 and

58 years, respectively) ate a dish consisting of ground buffalo fish and carp. One hour later, the wife vomited. Six hours after the meal they developed generalized body aches and muscle stiffness. The husband had severe pain on inspiration, resulting in respiratory insufficiency requiring assisted ventilation. Following the acute episode, the husband complained of more frequent headaches, and his wife continued to experience tearing eyes, easy fatigability, and pruritus after eating seafood.

Bakersfield, California

Patient 6. On August 8, an 87-year-old U.S.-born man vomited 30 minutes after eating one-third of a fried buffalo fish. Twenty-one hours later, he awoke with extreme stiffness and generalized muscle tenderness. Following this episode, the patient suffered 6 months of muscle weakness, primarily in his legs.

Follow-Up Investigations

The origin of the buffalo fish eaten by patients 1, 2, 3, and 6 was traced to the same wholesaler in Louisiana who receives fish from approximately 25 fishermen who fish rivers in Louisiana. The fish for patients 4 and 5 were caught within a 100-mile radius of St. Louis, Missouri. The Food and Drug Administration is attempting to identify a toxin from recovered fish samples. The case histories suggest that the toxin is heat stable; no particular mode of preparation seems to increase risk for disease.

Editorial Note: During the 1920s, the name "Haff disease" was given to an illness characterized by severe muscle pain and stiffness that affected approximately 1000 persons living along the Koenigsberg Haff, a brackish inlet of the Baltic Sea. Subsequent similar outbreaks were identified in Sweden and the former Soviet Union. Although the etiology was not determined, epidemiologic investigations linked illness to ingestion of fish, especially burbot.

The first reported case of Haff disease in the United States occurred in Texas in 1984; five additional cases were reported in California during 1984-1986. All U.S. cases have been associated with eating buffalo fish.

Haff disease typically presents as a paroxysm of rhabdomyolysis, with accompanying muscle tenderness, rigidity, and dark brown urine. However, as in patient 3, milder presentations also occur. Although the median incubation period for the patients in this report was 8 hours

(range: 6-21 hours), symptoms generally appear approximately 18 hours after eating fish. Symptoms usually resolve within 2-3 days. Historically, the case-fatality rate is approximately 1%.

Clinicians and public health practitioners are encountering an increasing variety of foodborne illnesses, in part because of a diversification of food preparation and eating habits. International travelers, members of ethnic groups with unique cuisines, and consumers of both imported and domestic specialty food items may be at risk for foodborne illnesses that are rare or have not been reported previously in the United States.

REF: *Morbidity and Mortality Weekly Report*, 47(50), December 25, 1998 ✓

DEFORMED FROGS STILL PUZZLING RESEARCHERS

Researchers have identified and induced deformities in frogs under a variety of environmental conditions, including exposure to insecticides, UV light, coal ash, and heavy metals. There are numerous possible causes for steeply declining populations of amphibians, and a dearth of data to inform ecological risk assessment, scientists said at the Society of Environmental Toxicology and Chemistry's (SETAC) annual conference in Charlotte, NC, November 19, 1998.

Amphibians are "sensitive environmental monitors of pollution stress," most likely a significant contributor to the population losses, Wes Birge of the University of Kentucky said at an all-day session on the ecotoxicology of amphibians and reptiles. "We must look at all avenues of exposure for amphibians," Birge said.

Methoprene link to frog deformities studied

Donald Sparling of the U.S. Geological Survey's Patuxent Wildlife Research Center studied the possibility that methoprene, an insect growth regulator sprayed for mosquito control, could be causing the amphibian deformities occurring in many parts of North America. Six wetland ponds were sprayed with methoprene following label rates, as well as six with temephos, an organophosphate pesticide; southern leopard frogs were collected.

Fourteen of 91 frogs and tadpoles collected from the methoprene-sprayed ponds demonstrated deformities, Sparling said, compared with zero of six collected

from the temephos ponds and four of 77 from the control ponds. The deformities were primarily missing or partially missing limbs, with virtually all cases involving the right hind limb.

"This suggests that something other than predation is going on. I can't imagine a predator preferring a right over a left limb. Interference with the animal's retinoic acid signaling system, a key component of healthy development, is one possible explanation," Sparling said.

UV light also implicated

Gary Ankley of U.S. EPA in Duluth, MN, researched the impact of methoprene and ultraviolet light on the development of northern leopard frogs. The frogs were exposed to several concentrations of methoprene, with and without UV light.

At the highest methoprene concentrations (500 ppb), "severe developmental effects were observed with and without UV light. These animals couldn't swim normally, they couldn't feed, and they died within ten days of hatching," Ankley found.

But at lower pesticide levels alone (0-400 ppb), no impacts were observed. And irrespective of methoprene treatment, about half of the animals held under UV light for more than 24 days developed deformities such as missing digits or legs. Ankley warned that only one dose of UV light was tested, and despite the "remarkable results," they have not yet been repeated. However, he concluded that "laboratory UV light and natural sunlight can cause similar hind-limb deletions and deficiencies." Future studies will look at multiple light intensities.

Impact of coal-ash contamination

Christopher Rowe of the University of Puerto Rico described oral deformities in nearly all bullfrog tadpoles exposed to coal-ash effluent containing trace elements and other contaminants. Frogs inhabiting the site, a series of open basins in South Carolina, had elevated whole-body concentrations of arsenic, cadmium, chromium, copper and selenium.

More than 90% of the tadpoles collected from the site had severe abnormalities in the oral region, Rowe said, which made it difficult for them to graze for periphyton, an important food source. "When the animals are raised in a polluted habitat, they exhibit deformities. Abnormalities are very frequent out there. In the laboratory, the tadpoles had reduced growth and swimming rates, expended more metabolic energy to survive, and were

more likely to be eaten by snapping turtles, a common predator. Chronic exposure to coal-ash sublethally modifies multiple systems which can have direct and indirect ramifications at higher levels of organization," Rowe concluded.

Rowe's colleague, Bill Hopkins of the Savanna River Ecology Laboratory, studied the impact of coal-combustion wastes on banded water snakes that inhabit the same ash disposal facilities. Hopkins found significantly elevated liver concentrations of arsenic and selenium, 134 and 142 ppm respectively, which he believes are "the highest ever documented in a reptile species." The standard metabolic rate for snakes from the polluted site was 32% higher than those from a reference site, which means that they are expending additional energy for survival, and "should therefore have less energy available for growth, reproduction and storage," Hopkins concluded.

The snakes, which are primarily terrestrial, eat bullfrogs, toads, and fish, and are prey for raptors, wading birds, and other higher animals. Trophic transfer of contaminants is more likely than the aqueous route for these snakes, Hopkins said. At the same time, "We've never caught a reproductive female [snake] in the polluted [coal-ash] habitat," he noted.

Puzzle remains unsolved

Not all researchers noted high rates of deformities or other toxicological impacts. Sparling also studied the impact of PCB- and DDT-contaminated sediments from a military wetland on bullfrog and green frog tadpoles. In 30-day assays, liver/body weight ratios were "significantly smaller" in green frog tadpoles collected from the wetland compared to those collected from an incoming stream and reference wetland. He found no deformities or differences in mortality or growth rates, regardless of the treatment. "Even a highly contaminated wetland showed minimal effects on populations of bullfrog and green frog. Under the conditions of our test, we didn't see much effect," Sparling said.

Don Clark from Texas A&M University studied reptiles inhabiting a slough contaminated by agricultural run-off, and an urban lake used as an arsenic dumping site for 53 years. No genetic damage or body damage was detected in the reptiles, nor did Clark find significant differences in trace element concentrations. Nonetheless, one diamond-backed water snake had a DDE level of 3 ppm, and acetyl cholinesterase levels were depressed

in red-eared sliders captured from the slough, indicating pesticide exposure. "This is perhaps something that no one has observed before," Clark said.

Researchers say data needs are huge

Despite what has been learned since frog deformities appeared in 1995, scientists continue to grapple with causes and effects. "Environmental stresses have a direct impact on individuals, but extrapolation to the population-level trends is difficult," Rowe said.

The researchers all worried about the paucity of research into toxic impacts on reptiles and amphibians. Greg Lander of Heron Works Farm in Oregon said amphibians are getting a "double whammy" in terms of exposure to toxics, because they often inhabit aquatic and terrestrial habitats. "No one has looked at these guys from an ecotoxicology perspective," Lander said, while only a handful of papers have examined contamination of various classes. "The data needs are incredible."

Birge recommended the use of an amphibian chemical hazard index to select species for testing, and urged regulatory agencies to consider amphibians in their risk assessments. EPA's current risk assessment criteria are "not protective of biodiversity over time and are not protective of amphibians," Birge said.

Reptiles can also serve as good "ecological receptors" for screening or ecological risk assessments because of their small home ranges, long lives, and high trophic level, said Linda Meyers-Schone of IT Corporation in Albuquerque, N.M. For example, case studies show that snapping turtles are good indicators of organochlorine pesticides, she said. However, "the largest drawback is the lack of toxicity information."

REF: *Food Chemical News*, 40(42), December 7, 1998 ✓

HERBALS, VITAMINS FEATURED IN JAMA ISSUE DEVOTED TO ALTERNATIVE MEDICINE

Expenditures for and use of alternative medicine increased substantially between 1990 and 1997, due primarily to an increase in the proportion of the population seeking alternative therapies, rather than increased visits per patient, according to results of a national survey published in the November 11, 1998 *Journal of the American Medical Association (JAMA)*.

The percentage of people who used at least one of 16 alternative therapies rose to 42.1% in 1997, up from 33.8% in 1990. An estimated \$21.2 billion was spent on alternative medicine professional services, a 45.2% increase from 1990.

The therapies that increased most included herbal medicine and megavitamins. The alternative therapies most frequently used were for chronic conditions, including back problems, anxiety, depression and headaches.

The study was among several presented in *JAMA* as part of an alternative medicine-themed issue that included results of six randomized trials for alternative therapies. One study reported that saw palmetto improved symptoms associated with an enlarged prostate. Another study found that patients with irritable bowel syndrome had significant improvement in symptoms when treated with Chinese herbs compared to those treated with a placebo.

Another study found loss in body weight and fat mass were no different in overweight patients treated with a high-fiber, low-energy diet and *Garcinia cambogia*, (Hydroxycitric Acid) a potential anti-obesity agent, than in those treated with diet and a placebo.

The *JAMA* issue was hailed as a milestone by industry groups such as the Council for Responsible Nutrition (CRN). "Proponents of alternative medicine should embrace enthusiastically the publicity surrounding this issue and related articles in many of the association's other publications. This is an opportunity for alternative medicine advocates to redouble their efforts to work together and advance the science behind the therapies," CRN president and CEO John Cordaro said.

In a *JAMA* editorial, Wayne Jonas of the Office of Alternative Medicine at the National Institutes of Health said the issue illustrated "that quality scientific research can be conducted and published on alternative medicine topics. Alternative medicine is here to stay. It is no longer an option to ignore it or to treat it as something outside the normal processes of science and medicine. The challenge is to move forward carefully, using both reason and wisdom as we attempt to separate the pearls from the mud."

But Jonas cautioned that dietary supplements used by alternative medicine practitioners are largely unmonitored and their quality uncontrolled. He also warned that some products available on the

market may be contaminated or vary tremendously in content, quality, and safety.

"Garlic, for example, claimed for many years to have cholesterol-lowering effects, may not produce such effects if processed in certain ways," Jonas wrote. "Thus, even if one product is proven safe and effective, other similar products on the market may have quite different effects that preclude consistent dosing. Fifteen million Americans are taking high-dose vitamins or herbal preparations along with prescription drugs, thereby risking adverse effects from unknown interactions."

REF: *Food Chemical News*, 40(40), November 23, 1998 ✓

THE AGRICULTURAL HEALTH STUDY: STRENGTHS AND LIMITATIONS

The federal government has recently enrolled over 90,000 farmers, farm family members, and commercial pesticide applicators in a massive health study. The objective is to examine factors that may affect the health of farmers and their families, with a special focus on whether specific pesticide products used on farms are linked to a variety of adverse health effects including cancers, developmental and reproductive effects, and damage to the body's immune system. Called "The Agricultural Health Study (AHS)" and funded by federal research dollars, the AHS is an integrated program of multiple studies directed by a group of scientists at the National Cancer Institute, the National Institute of Environmental Health Sciences, and other federal agencies.

Farmers are known to be healthier, have fewer cancers, and live longer than the general population. However, some previous epidemiologic investigations have found increased rates of several tumors in farmers. The AHS is designed to reexamine these issues while avoiding the many limitations that plagued earlier studies of farmers.

In the main prospective cohort study, the 90,000 enrollees will be followed for many years or until death in order to determine whether use of particular pesticide products or other aspects of farm living are associated with adverse health outcomes. An important design feature of this main cohort study is that information on chemical use is obtained from farmers via survey methods **prior to the diagnosis of disease.**

In addition, more timely yet less conclusive cross-sectional studies are being undertaken to determine whether self-reported health problems are more likely to occur among farmers and members of farm families that report extensive use of pesticide products. The three initial cross-sectional studies are investigating, (1) history of spontaneous abortion, menstrual function, and fertility in young women, (2) menopausal status, reproductive history, and selected chronic diseases in older women, and (3) neurologic symptoms and visual impairment among farmer-applicators.

REF: *Risk in Perspective*, 6(9), December 1998 ✓

'Toxicology Tidbits'

DEAR ANN

"Dear Ann: Inform your readers that the Internet is not a source of information. It is a means of communications.

Saying, 'I read it on the Internet,' is the same as saying, 'I heard it on the telephone.' Chatting by email is like going to the barbershop. You might hear the psychiatrist's opinion of Prozac and the barber's opinion of Brylcreem. But you are more likely to hear the psychiatrist's opinion of Brylcreem and the barber's opinion of Prozac. Joy in Mudville [Ann's reply:] Thanks for an astute observation. I couldn't have said it better myself."

REF: *Ann Landers*. Washington Post, 17 December 98, B24. ✓

SACCHARIN

The executive committee of the National Toxicology Program voted 6-3 to delist saccharin from the Report on Carcinogens, 9th Edition (1999), the government's official list of carcinogenic substances.

REF: *Food Chemical News*, 40(44), December 21, 1998 ✓

GREEN TEA

An anti-cancer compound found in green tea works within a cell to ward off cancer, according to research presented December 14, 1998, at the Society for Cell Biology meeting in San Francisco. Purdue University researchers found that the compound, EGCg, inhibits an enzyme required for cancer cell growth and can kill cultured cancer cells with no ill effects on healthy cells. Their findings offer the first scientific evidence to explain precisely how EGCg works.

REF: *Food Chemical News*, 40(44), December

BREAST CANCER RISK

Women who eat well-done hamburgers, beefsteak and bacon may have an increased risk of developing breast cancer compared to women who eat their meats cooked rare or medium, according to the Journal of the National Cancer Institute. Wei Zheng and colleagues at the University of South Carolina compared meat-preference data from 273 women who had breast cancer to 657 randomly-selected control subjects. Women who consistently ate all three meats cooked very well done had a risk of breast cancer 4.6 times higher than women who ate those meats rare or medium. For individual meats, the risks were less severe: 1.5 for well-done hamburger, 2.2 for well-done beefsteak, and 1.6 for well-done bacon. Family history of breast cancer and other factors associated with an increased risk of breast cancer were adjusted for the study. An accompanying editorial however, pointed out weaknesses in the research, including a failure to demonstrate an association between the amount of overcooked meat consumed and the risk of breast cancer. Until more research is available, the editorial added, the public should be directed to other known health risks associated with undercooking meats. For more information on the study, contact Karen Tant, University of South Carolina (803) 777-5400.

REF: *Food Chemical News*, 40(40), November 23, 1998 ✓

RESTAURANT vs FAST FOOD MEATS

Government scientists found more cancer-causing compounds in restaurant-prepared meats than in fast food meats, according to recent research by the Lawrence Livermore National Laboratory, the National Cancer Institute, and USDA. The researchers believe time-temperature factors probably account for the difference. While the fast food chains would not give out their preparation secrets, the researchers surmised that fast food establishments cook their foods more quickly and at lower temperatures than other restaurants. Hotter temperatures and longer cooking times, typical of other types of restaurants, have been shown to aid in the development of heterocyclic amines, known carcinogens in animals that are believed to contribute to cancer in humans. While not a new issue, the recent spate of stories on heterocyclic amines could signal

the issue's emergence into the mainstream media.

REF: *Food Chemical News*, 40(40), November 23, 1998 ✓

DPR RELEASES 1997 REPORT ON GROUND WATER TESTING FOR PESTICIDES

Cal/EPA's Department of Pesticide Regulation (DPR) has released its 1997 report on ground water testing for pesticides. Based on 2,508 water well samples, the report showed 96 wells — less than 4 percent — had verified pesticide detections. All residues were below levels of health concern. Single copies of the Well Inventory Report can be obtained free from: Environmental Monitoring and Pest Management Branch, Department of Pesticide Regulation, 830 K Street, Sacramento, California 95814-3510, phone (916) 324-4100. The executive summary of the report is also available in the "Publications" section of DPR's Web page: <http://www.cdpr.ca.gov>.

Two tables (in Adobe Acrobat PDF format) summarizing the detections, including a county-by-county breakdown can also be viewed in the press release section of DPR's Website www.cdpr.ca.gov where the free Adobe Acrobat viewer can be downloaded. ✓

H₂O HOME TO OCEAN

The Web site for the "H₂O Home to Ocean" workbook is now online at www.home2ocean.org. In November, the Department of Pesticide Regulation distributed hard copies of the workbook to all of California's wastewater utilities. The workbook (developed under a U.S. Environmental Protection Agency grant) provides step-by-step instructions on how to launch a public education campaign for water quality protection, or enhance an existing program, with the "H₂O Home to Ocean" theme. The focus of the program is proper pesticide use and disposal, and encouraging greater use of integrated pest management. The workbook and related materials including brochures, handouts, and a poster can now be downloaded from the Web site. ✓

LEAD INFORMATION

Lead Poisoning: Federal Health Care Programs Are Not Effectively Reaching At-Risk Children. HEHS-99-18. 67 pp. plus 9 appendices (38 pp.) January 15, 1999. <http://www.gao.gov/new.items/99018.pdf>. ✓

CALIFORNIA PESTICIDE ILLNESS REPORTS, 1996

Cal/EPA's Department of Pesticide Regulation released an annual pesticide illness report that showed 1,580 potential or confirmed cases of pesticide illness in 1996, down slightly from the previous year. About 56 percent — 884 illness reports — were non-agricultural, while 696 reports involved pesticide use in agricultural settings. ("Pesticide" is a general term for substances that kill or control pests. Pesticides include insecticides, herbicides, rodenticides, disinfectants, and sanitizers.) Among fieldworkers, illness reports continued a downward trend that spans nearly a decade. In 1996, DPR identified 137 fieldworker illnesses with a confirmed or potential link to pesticide exposure. Fieldworker illnesses have averaged 157 a year from 1989 through 1996. That compares to an average of 282 fieldworker illnesses annually between 1982 and 1988.

For a copy of the report and a brochure describing the illness surveillance program, contact DPR's Worker Health and Safety Branch, 1020 N Street, Room 200, Sacramento 95814, phone (916) 445-4222. The report can also be downloaded (on or after February 3, 1999) from the publications section of DPR's Web site www.cdpr.ca.gov. DPR is one of six departments and boards within Cal/EPA. Note A table summarizing illness statistics by county is available. It is available by fax by calling the DPR Communications Office at 916/445-3974 or can be downloaded from the news release section of DPR's Web site on or after February 3, 1999. ✓

CHILDREN'S HEALTH PROTECTION

EPA asked the federal Children's Health Protection Advisory Committee (CHPAC) to recommend five existing standards that may merit reevaluation in order to further protect children's environmental health. EPA will reevaluate the (1) chloralkali National Emission Standard for Hazardous Air Pollutants (mercury); (2) the implementation and enforcement of the (Farm) Worker Protection Standards; (3) pesticide tolerances for organophosphates (chlorpyrifos, dimethoate, methyl parathion); (4) atrazine pesticide tolerances and Maximum Contaminant Level in drinking water; and (5) will review indoor and ambient air quality as they relate to asthma.

CALIFORNIA PESTICIDE APPROVALS FOR NEW ACTIVE INGREDIENTS

Cal/EPA's Department of Pesticide Regulation registered 17 new pesticide active ingredients in 1998. Four were reduced-risk compounds. The new pesticides include laundry antimicrobials (found in "Tide With Bleach"), corn gluten meal registered as a lawn weed killer, and several chemicals which were registered by DPR concurrently with their federal licensing by the U.S. Environmental Protection Agency. (A pesticide active ingredient is the specific chemical in a pesticide product that kills or otherwise controls target pests. "Pesticide" is an umbrella term that includes not only insecticides, herbicides, and fungicides, but also disinfectants, sanitizers, and other similar chemicals that kill pests.) ✓

DO YOU KNOW WHAT YOU ARE TAKING?

We were recently contacted by a person who had been taking some pills given to them by a practitioner of acupuncture. The pills had been obtained from China, and the person who contacted us had heard that sometimes these might contain substances which might be harmful to health. We obtained several of these pills, which consistently weighed in about 500 mg. This person had been taking up to 12 of these per day, or a total of 6 grams of the "medicine". We had a couple of the pills run through a heavy metal analytical screen, and the only striking finding was that they contained about 60 ppm of mercury. The metal screen did not determine if the mercury was inorganic or organic, but we suspect that it was an inorganic form. Based on this, we calculated that this person was taking about 360 micrograms per day of mercury. A "provisional tolerable weekly intake" of mercury is 300 micrograms, or an acceptable daily intake (ADI) of 40 micrograms. These pills taken at the level of 12 per day were substantially exceeding the ADI. The ADI does include an inherent safety factor, thus this amount of intake may not cause apparent toxicity, however, mercury may accumulate during chronic exposure (which is the reason for the low ADI) and may cause kidney and nervous system damage. The minimal toxic dose of methyl mercury, which is considerably

more toxic than inorganic mercury, is approximately 300 micrograms per day.

Mercury has been used historically in drugs for a variety of purposes, and was always a "two edged sword" since it could cause toxicity in its own right. It has been replaced by safer drugs with fewer toxic effects. It has what we call a "narrow margin of safety", which means there is little difference between a therapeutic and toxic dose. Remember Paracelsus' words as paraphrased by Dr. Alice Ottoboni: "THE DOSE MAKES THE POISON".

There are several considerations which this situation presents.

First, when you purchase unapproved drugs, their quality is unknown.

Second, the importation and distribution of these pills may very well be illegal.

Third, there are some very sound reasons why powerful, potentially toxic drugs are tested and their manufacture and distribution regulated.

If you are taking some alternative medications/preparations, please bear these considerations in mind when you weigh the benefits and risks of what you put into your mouth.

(Please do not send us samples for testing. If you wish to have something tested, contact a local analytical laboratory.) ✓

RECENT CONSUMER'S UNION REPORT

As we were finishing up this first electronic edition of the Environmental Toxicology Newsletter, the Consumer's Union (CU) issued the following report:

DO YOU KNOW WHAT YOU'RE EATING? AN ANALYSIS OF U.S. GOVERNMENT DATA ON PESTICIDE RESIDUES IN FOODS. February, 1999. Consumers Union of United States, Inc. Public Service Projects Department, Technical Division. http://www.consunion.org/food/do_you_know2.htm

I find it interesting that their title is so similar to the one we chose "Do you know what you are taking?" to present the results of the analysis of the unapproved pills. I have not read this entire report or analyzed it in detail, but have followed some of the "discussion" that has been taking place between the CU and other parties. It appears that this report was not peer reviewed, and from the little I have read of it, the techniques used to "analyze" the data are unusual. The report does not

differentiate between hazard and risk (hazard being the possibility of adverse effect, and risk being the probability of adverse effect). The conclusions of the report are (surprise!) that children and others are being exposed to "unsafe" concentrations of pesticide residues in food. The CU used the Pesticide Data Program analytical results to draw these conclusions. The raw data from these reports can be downloaded at: <http://www.ams.usda.gov/science/pdp/download.htm>.

I don't recommend looking at these raw data unless you are very familiar with databases and data structure. The results are presented for individual chemicals for thousands of samples, thus there are more than 100,000 analytical results per quarter for each year. I downloaded some of the data for 1996 for fresh peaches (which the CU says are way up on the list of hazardous fruits because of excessive methyl parathion residues). I looked at the first quarter data, and found no methyl parathion residues on any of the 378 samples. Of these 378 samples, 166 had detectable pesticide residues and 212 had none. For the second quarter, there were 306 samples, 101 with detectable residues (26 with methyl parathion), and 205 with no detectable residues. For the third quarter, there were 315 samples, 123 with detectable residues (56 with methyl parathion) and 192 with no detectable residues. I did not look to see how many of these might be violative, I was mostly curious to see how the data compared with past monitoring data. Historically, the percentage of produce with non-detectable residues (for California) is 60-70%. These peach samples are right in line with that, so what's the problem?

We have had very few calls about this and will not do much more with it unless there is a reason to do so. Carl Winter has done a more in-depth analysis of the CU claims, and I recommend that you contact him or the Food Safe Webpage for more information: <http://foodsafe.ucdavis.edu/> ✓



VET NOTES



CVM APPROVES SCREENING TEST FOR TETRACYCLINES IN RAW MILK

Nearly five months after FDA's Center for Veterinary Medicine (CVM) raised the tolerance levels for tetracyclines in raw

milk, the agency has approved a modified screening test that can detect the new drug residue levels.

In July, CVM changed the tolerance levels of tetracyclines in milk when it approved Liguamycin LA-200 (oxytetracycline) for use in lactating dairy cattle. At that time, concerns were raised that the new tolerance of 300 ppb for the sum of tetracycline residues in milk would place dairy plants in a bind, since there was no longer any approved screening tests for tetracyclines. Concerns also were raised

that the higher level of drugs would interfere with the manufacturing of cultured milk products.

FDA worked with Charm Sciences Inc. to modify the Charm II Tetracycline Test to detect residues at the new tolerance level. According to the company, the modified screening test detects 257 ppb chlortetracycline, 119 ppb oxytetracycline, and 67 ppb tetracycline with 90%/95% confidence. Any combination of these tetracyclines also will be detected below the total 300 ppb tolerance.

REF: *Food Chemical News*, **40**(44), December 21, 1998 ✓

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