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IET Update

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In this Issue ....

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Bringing two sides together

Dioxin contamination in Midland, Michigan

Dioxin is a dreaded, persistent environmental contaminant known to be present in places throughout the world, including in many Michigan communities.

Public discussion of the issue is complex since the presence of dioxins is intertwined with emotionally charged concerns about the risk to human health, animals and the environment, and the concomitant involvement of environmental activist groups, chemical manufacturers, and government agencies.

Noticing an increase in media inquiries for environmental dioxin contamination, especially for the Midland, Michigan area where there is renewed concern about local levels, IET Director Larry Fischer recently coordinated a seminar series on dioxin. It allowed scientists from Midland's Dow Chemical Company to present their accumulated knowledge and latest research on the issue, and to have a non-adversarial debate on their findings with their academic and government counterparts.

Keith Harrison, Executive Director of the Michigan Department of Environmental Quality, advised his employees to attend the seminars.

"It was of tremendous value," he said, noting that it was an opportunity for discussion to take place that wouldn't normally occur. In fact, Harrison noted that this type of forum for scientific exchange would not have happened without the impartial umbrella of IET.

The presentations allowed scientists from Dow and MDEQ to openly discuss the flaws in each other's approaches to risk assessment, Fischer said.

Harrison pointed out that just the proximity of the seminars helped MDEQ a great deal since travel for state employees is currently very constrained.

"IET's outreach project on dioxin allowed scientific interaction among key players while retaining the credibility of IET and MSU as sources of unbiased and truthful information."

MDEQ employees had been invited to present at the seminars, but declined since a study and analysis of the problem in Midland has not been completed, leaving regulatory questions unanswerable, according to Harrison.

"Dioxins" refers to a group of several hundred toxic chemical compounds that share certain similar chemical structures and biological characteristics. They have been linked to suppressing immune systems, liver and repro-

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Faculty profile: John La Pres

Toxicogenomics offers new research avenue

If you ask John La Pres for the big picture of his research, he might tell you he is working to uncover how toxins cause cancer and other diseases. But the day-to-day operations can be a much smaller picture. Very, very small in fact, as La Pres examines cells on the micro level in order to better understand the intracellular activities that he hopes may eventually led to new medical therapies.

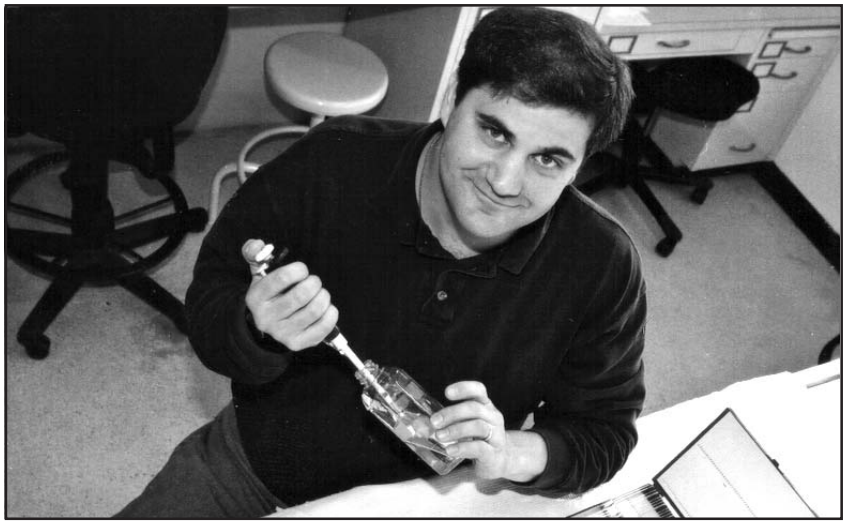
IET welcomed La Pres, Assistant Professor of Biochemistry and Molecular Biology and of the National Center for Food Safety and Toxicology, to campus in August of 2000. La Pres specializes in the emerging field of toxicogenomics, with an emphasis on environmental pollutants and metal mediated toxicity.

The National Institutes of Environmental Health Sciences established the National Center for Toxicogenomics in June of 2000. The new discipline brings together molecular biology and genomics resources with cutting edge technology. The goal of toxicogenomics is to find correlations between toxic responses and genetic profiles. In other words, how our genetic make-up translates into biological functions related to exposure to toxins, La Pres explains.

In La Pres' case, it is an exploration of how exposure to metals may be involved in the promotion of cancer; and an investigation into factors in certain body tissues that make us more prone to toxicity.

In one arm of his research, La Pres is investigating how toxic metals interact with hypoxia inducible factors or HIFs. The hypothesis is that HIFs are essential to a metal's ability to promote cancer.

"If we knew more about how the metals influenced HIF signaling, medical interventions could be developed," La Pres said.



New MSU-IET affiliated faculty member John La Pres demonstrates the washing process for creating the genomic chips he uses in his research.

One of the promising technologies that La Pres actively employs in his research, is DNA microarrays or genomic chips.

Borrowing jargon from the computing world, a "chip" is simply an orderly arrangement of gene samples. Coupled with digitizing technology and powerful computers, chips allow the monitoring of the expression levels of thousands of genes simultaneously.

To begin his study, La Pres first obtained a gene set from the National Institute on Aging and began a tedious process to create genomic chips. The preparation of the chips and their imaging took nearly a year.

Students and research assistants helped prepare the gene set for printing. The chip printing is done robotically with the assistance of MSU's Genomic Support Facility.

Once printed, the chips can be analyzed with fluorescently labeled samples and visualized with specialized scanners. The result is a massive digital storehouse of spots—some 15,000 from each chip—that are used as a comparison to cells that have been exposed to toxins.

La Pres scrutinizes those spots to discern their intensity and color, which encodes information about the expression of specific genes from the sample.

Meanwhile, La Pres is creating cell lines from the embryos of genetically engineered mice that do not express one of the known HIFs. The engineered cell lines and normal cells from wild mice will both be treated with various metals to determine the role each HIF may play in metal induced toxicity. This will allow La Pres to directly link a toxic metal to a cellular target and changes in gene expression profiles.

Human beings can be exposed to these toxic metals from their proximity to certain industrial sites and from the consumption of contaminated fish, La Pres says.

Initial results have provided La Pres with the data needed for funding proposals for larger scale studies.

In another arm of his research, La Pres is interested in factors that mediate or enhance the effects of toxic exposure to chemicals such as PCBs. Most, if not all, of the toxic effects of PCBs and dioxins are mediated by the aryl-hydrocarbon receptor (AHR).

He is currently looking at how cofactors influence the ability of the AHR to bind its ligand(s) such as PCBs and dioxin. AHR is part of the PAS super family of transcription factors that La Pres says he could base a whole research career on.

His interest in metal-induced toxicity actually came second as an outgrowth from his post-doctoral research into dioxin-induced toxicity, he explains.

Of teaching, La Pres says it is "enjoyable, hard work." His teaching responsibilities include one fourth of a Genomics class and Biochemistry 514, required for all MSU medical students. In the latter, he teaches 11 lectures in nine days.

"It is an extremely intense nine days," La Pres says.

When he is not busy studying microarrays, putting together funding proposals and the like, La Pres enjoys spending time with his two young children, daughter Conner and son Jack. He juggles his work schedule with his wife, who practices part time as a nurse and attorney. And he manages to fit in his love of outdoor activity as well as staying in shape with little time for exercise, by bicycling to campus from their Okemos home. When he is occasionally afforded a bit of free time, he relishes reading or watching movies.

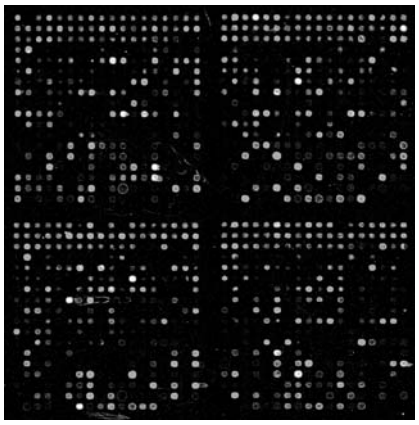
Originally, La Pres set out to be a high school science teacher. A native of Michigan, he completed a chemistry degree at the University of Michigan and spent an extra year obtaining a teaching certificate.

After sending out 120 resumes to schools all over Michigan without encouraging results, he took a job in a U of M lab which soon led to pursuing graduate studies at Northwestern and a Ph.D. in Pharmacology and Toxicology.

Coming to MSU was a lucky coincidence for La Pres and a chance to be nearer to many family members who live in the state. While completing a toxicogenomics post-doc at the University of Wisconsin-Madison, La Pres's major professor was invited to MSU to speak. This gave La Pres the chance to see that MSU had resources behind toxicogenomics and environmental toxicology.

His MSU collaborators include Tim Zacharewski, Associate Professor of Biochemistry and Molecular Biology.

"I knew I wouldn't be working alone here," he said.



An example of the "spots" La Pres examines for color and intensity to characterize a gene's expression levels.

Dioxin, from page 1

ductive damage, cancer and birth defects.

Dioxin forms as an unintentional by-product of many industrial processes involving chlorine such as waste incineration, chemical and pesticide manufacturing and pulp and paper bleaching. Human exposure typically occurs through the consumption of contaminated food, especially animal fats.

While the dioxin levels in the United States environment have been declining for the last 30 years due to reductions in man-made sources, dioxins break down so slowly they will continue to be present into the foreseeable future from past releases.

Dow Chemical Company has permits from regulatory agencies to discharge certain amounts of dioxin into the Tittabawassee River near Midland. Partial results from an on-going MDEQ study have raised concerns regarding the dioxin levels in the river's sediment and floodplain.

IET Professor Emeritus Mike Kamrin, noted that the United States is unique in its policies regarding dioxin levels.

"The rest of the world puts more science into their values," he said.

The U.S. Environmental Protection Agency operates from the assumption that a single molecule of dioxin can increase the risk of cancer, Kamrin explains. European and Canadian agencies believe that there is a threshold where cancer begins to occur.

The EPA policies stem from an initial assessment published in 1985. In 1991, a scientific reassessment began and a draft was completed in 1994. This draft has been revised and is currently still under review by the EPA's Scientific Advisory Board.

Kamrin feels that too often no one is looking at dioxin from the point of view of the public. Regarding the Midland situation he notes, "it is a situation where the science is in second place to the relationships between the regulators and the scientists."

IET's outreach project on dioxin allowed scientific interaction among key players while retaining the credibility of IET and MSU as sources of unbiased and truthful information, Fischer said.

In the coming months, IET-affiliated faculty will provide scientific expertise to Dow on advisory committees as additional study projects are proposed. MDEQ representatives will be invited to present their findings as their studies are completed.

Faculty profile: James Pestka

Foodbourne chemicals: good and bad

It has long been known that environmental and foodborne chemicals can suppress the immune system, contributing to illness and disease. However, it has more recently been discovered that some of these chemicals can also stimulate the immune system—which so long as it isn't over done—can actually have a positive effect in boosting our immunities and even preventing disease.

For James Pestka, professor of Food Science and Human Nutrition; Microbiology and Molecular Genetics; and the National Center for Food Safety and Toxicology; trying to pinpoint how toxic constituents affect the immune system is a passion that drives a productive research lab, keeping himself and a slew of IET graduate students actively engaged in basic scientific discovery.

Their focus is on how foodborne toxins and bioactive constituents affect the immune system either positively or negatively.

For example, a current research project investigates the immunological effect of a group of fungal toxins called trichothecenes. In rodent models, trichothecenes cause the autoimmune disease IgA nephropathy, also a common kidney disease in humans. Pestka has found that the trichothecenes will induce or stimulate cells through several cell signaling mechanisms to evoke a stress-like inflammatory response that in turn causes immunoglobulin complexes to deposit in the kidney. This work resulted in a recent publication in the Journal of Nutrition (132(2):261-9).

Pestka confers with two IET graduate students on an on-going food toxicology research project.

Trichothecenes are found in cereal grains—typically in developing countries where proper storage and harvesting techniques may not be utilized—and sometimes in buildings with air quality problems caused by water damage, commonly called "sick buildings."

Pestka's work in this area led the International Life Sciences Institute to ask him to author a risk assessment document for trichothecens in food. During the past year he also has served on the United Nation's Joint Expert Committee on Food Contaminants for both the World Health Organization and the Food and Agriculture Association.

In previous research, Pestka worked with Dr. Pat Hart in Plant Pathology to develop rapid methods to detect mycotoxins, leading to a series of tests now used at grain elevators, millers and food processors.

The work is patented and sold by a spin-off company from MSU called Neogen. Pestka continues to serve on Neogen's scientific advisory board.

Other research areas currently engaging Pestka are how the immune system is modulated by omega-3 fatty acids in fish oil, probiotic bacteria in fermented dairy products such as yogurt and bioactive chemicals found in popular herbal food supplements such as chamomile, ginseng and feverfew.

Peska's challenge is to relate findings to human health.

"These food constituents can be double-edged swords. Stimulation of immune function is obviously desirable for certain immunosuppressed states whereas immune suppression may help people with inflammatory or autoimmune diseases," he said.

When asked if his research has affected his own nutritional habits, Pestka noted that he eats yogurt everyday.

Pestka says he was drawn to science as far back as he can remember. His father worked for a company that made microscopes so he played with them from an early age.

See Pestka, page 9

Faculty profile: Karen Chou

Public confusion motivates reproductive tox. researcher

On a day-to day basis, IET faculty member Karen Chou does not usually have the satisfaction of seeing a clear end result for her reproductive toxicology research. But recently she enjoyed such a moment.

Chou's research focus is on the effects of chemicals on fertilization and early growth. She is currently investigating endocrine disrupters in the environment, specifically looking at the effects of phytoestrogens in soybeans.

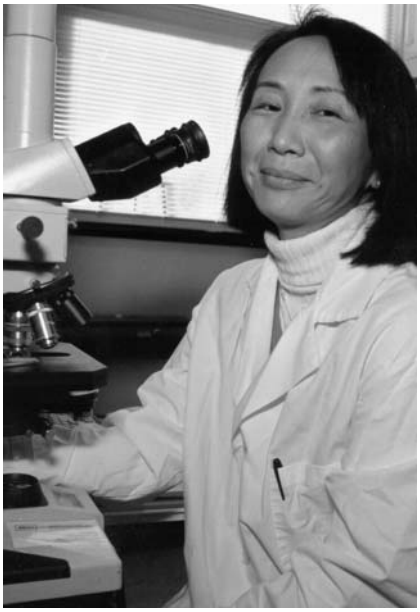
Chou points out that while it is known that reproductive systems don't function well when phytoestrogenic compounds are in the body, this contradicts the popular view that these compounds, typically found in soy products, are essential or beneficial to human health. The public confusion deeply concerns Chou.

In quintessential toxicology risk communication, she explains that "we need to know more about which ones are beneficial and at what dosage and concentration."

Recently, Chou was the first researcher to demonstrate that some phytoestrogens are beneficial to both male and female reproductive systems in animals, a finding that could have profound impact on human diets and help clear up some of the conflicting messages about eating soy.

"Farming and motherhood are the two most undervalued professions."

"It is a happy thing when there is this result!" she enthusiastically stated.



IET faculty member Karen Chou examines a cell culture with a sperm motion analyzer in her lab.

Her preliminary results call for a larger scale study so Chou is currently preparing proposals for further research.

The associate professor of animal science is an integral part of IET currently serving on the Policy and Admissions Committee, the Steering Committee for Graduate Program Review, and the Toxicology Future Committee.

As she puts it, she has been actively involved with IET from "day one", working to secure some of IET's major grants ever since she took a faculty position on campus in 1986.

After starting out her professional life as a dietitian, Chou became interested in environmental toxicology while pursuing an M.S. in dairy science at MSU.

A course she took covered the PBB incidents in Michigan in the 1970's. She saw the connection between consumers, industry, government, academia and the media and felt that there was a need for scientists to build bridges by understanding and practicing good risk communication.

She was inspired to specialize in reproductive toxicology by her mentor Robert Cook, a former leader in Dairy Science, and Professor Emeritus Harold Hofesa who taught a compelling course on the subject.

She began a Ph.D. program at MSU, but ultimately completed her toxicology doctorate at the University of Michigan. Before she finished, however, MSU had already lured her back to head up research in a newly developed reproductive toxicology program. Another important draw was the existence of IET and a new network in toxicology at MSU, she said.

Chou's honors and awards include holding a U.S. patent for the process of sperm capacitation, membership in the Honor Society of Phi Kappa Phi, recognition by MSU Women Achieving Excellence Program and the Excellence Award for Interdisciplinary Scholarship by the Honor Society of Phi Kappa Phi.

Her vitae includes nearly forty funded research projects and almost 200 publications and presentations.

In 1992, Chou suffered a short-term disruption in her work when animal rights activists targeting a nearby researcher set a fire that destroyed some of her data. Today she celebrates her first full year in new space in the renovated Animal Science Building.

Chou grew up in urban Taiwan but says she always had a passion for Agriculture from listening to her father's happy tales from his childhood on a farm in China.

"All his stories were about an Ag. community," Chou said.

Chou believes there is a huge gap in public understanding

See Chou, page 9

Superfund spotlight

MSU-IET research targets site clean-up and health risks

For the past 13 years, MSU-IET-affiliated faculty have been charged with coming up with innovative solutions for reducing toxins and better understanding the health risks at the worst known hazardous waste sites in the United States.

As part of the National Institute of Environmental Health Superfund Basic Research Program, MSU-IET is one of 19 institutions where grants are administered to address the potential toxicity still found at over 1400 Superfund sites nationwide that are currently listed as national priorities. Laboratory research at the cellular and molecular level is needed to overcome the complexities of the contamination at these sites, which usually involve multiple chemicals at various concentrations traveling through air, soil and groundwater.

MSU-IET receives 2.5 million dollars each year, making it one of the major contributors to the SBRP effort and one of the few to have been awarded three consecutive five-year funding grants. MSU-IET Director, Lawrence Fischer, attributes this success to the Institute's ability to facilitate the cross-disciplinary scientific investigation that is required to tackle the many-faceted issues involved in environmental contamination.

Collaborating initially with researchers at the University of Michigan, the MSU-IET led program has expanded to also include researchers at other institutions, currently with projects at Rutgers and Stanford Universities. The broad interdisciplinary structure has proven to be fertile ground for the program's two major research thrusts: alleviating the adverse impacts on human health from exposure to chemicals commonly found at Superfund sites and discovering the means for more effective clean up of contaminated sites. To date, nearly 300 scientific papers have been published from the MSU-IET led research.

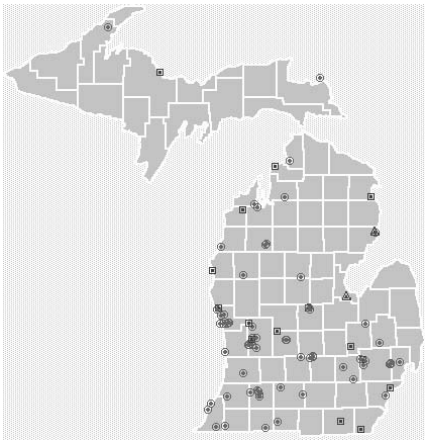
Currently, the MSU-IET SBRP is involved in nine research projects; four in the biomedical area and five in site clean up. The biomedical projects are investigating issues ranging from immune system dysfunction induced by PCBs; PCB effects on uterine muscle and childbirth; and the effects of environmental contaminants on the reproductive behavior of offspring and on the development of nerve cells. The remediation projects include the development and testing of a new technology to improve the speed and efficiency of removal of contamination from groundwater; the development of new chemical structures that will aid in trapping and degrading hazardous organic pollutants in mixtures containing toxic metals; the investigation of PCB bioremediation strategies; and an examination of factors controlling the spread of contaminates in soils and sediments.

These projects have netted important results that have helped provide the foundation for improved Superfund site activities. A few of the current projects and their recent achievements are featured here. For more, visit the MSU-IET web site at www.iet.msu.edu.

Curtains for carbon tetrachloride

Dubbed the "trap and treat" method, a MSU-IET research team created a microbial, biodegrading "curtain" by strategically injecting microbes and nutrients into a contaminated aquifer in Michigan's Schoolcraft County. As groundwater naturally passed through, the curtain converted carbon tetrachloride into carbon dioxide and other harmless end products.

Carbon Tetrachloride often contaminates groundwater and is a suspected human carcinogen that has been found at about 20 percent of the sites on the Superfund National Priority List.



Of the over 1400 superfund sites currently listed as national priorities by the U.S. Environmental Protection Agency, 69 are located in Michigan.

Led by Craig Criddle, Department of Civil and Environmental Engineering at MSU and now at Stanford University, the system used a microbe known as Pseudomonas stutzeri KC. Criddle notes that KC is unique in that it does not produce toxic chloroform during the microbial degradation of carbon tetrachloride, which has been a problem with other microbes. What's more, it can be used where the contamination resides in the subsurface, eliminating the risk and expense of pumping hazardous groundwater to the surface for treatment, Criddle said.

After fine tuning the process and bringing the technology to a commercial level of usefulness, utilizing support from the Michigan Department of Environmental Quality the researchers have moved on to applying the technique to other contaminants, including problematic mixtures containing organic and metal pollutants that are common at Superfund sites.

Genetic approach to eliminate PCBs

Scientists estimate that millions of pounds of polychlorinated biphenyls (PCBs) have been released into the environment as the result of improper disposal practices and accidental spills. PCB contamination has been found throughout the global ecosystem at low concentrations and at high concentrations in specific locations, often within soils and sediments. It is also known that PCBs do not easily degrade and can have significant toxic effects on animals as well as posing dangerous health risks for children.

Led by Dr. Jim Tiedje an internationally recognized leader in PCB biodegradation and MSU University Distinguished Professor of Crop and Soil Sciences and of Microbiology and Molecular Genetics, a team of interdisciplinary researchers are working to overcome factors currently limiting the implementation of promising biotreatment technologies that could eliminate some PCB contamination.

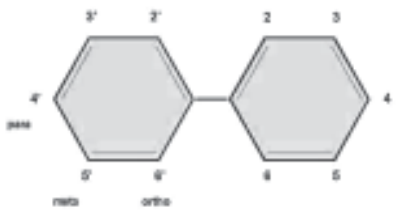
Looking at the ways in which some microbes degrade PCB molecules, the team has found a means to genetically enhance the process using inexpensive soil amendments in a newly developed anaerobic (without air) and aerobic (with air) sequence.

So far the results indicate that a remediation technology using sequential anaerobic and aerobic treatments could be beneficial and cost-effective. Further research is necessary to resolve some remaining questions. Recent advances in genomic sequencing and DNA microarray technology have created new opportunities for the research team to gain more understanding.

New light on PCB health effects

The task of defining the molecular mechanisms underlying the toxic effects of PCBs is important to understanding their suspected adverse health effects on humans.

But understanding how PCBs produce toxicity on a cellular level is made difficult due to the complexity of the cellular biology. A PCB molecule consists of a biphenyl nucleus (see image below) with chlorine at any or all of ten available sites, making 209 different PCB congeners theoretically possible. PCBs in the environment are mixtures of greater than 70 of these congeners.



Structure of a polychlorinated biphenyl (PCB) molecule.

Some PCB congeners have a "coplanar" structure with the two biphenyl rings lying in the same plane. Congeners with phenyl rings in different planes are considered "non-coplanar". Until recently, researchers believed non-coplanar PCBs were biologically inactive since they had a low affinity for binding to the Aryl hydrocarbon (Ah) receptor which is associated with the dioxin-like toxicity of some PCB Congeners.

MSU-IET SBRP researchers have discovered new information about how non-coplanar PCBs can influence the activity of neutrophils (a type of white blood cell) through mechanisms unrelated to binding to the Ah receptor. In studies with rat- and human-derived neutrophils, these researchers have found that non-coplanar PCBs can activate biochemical pathways that lead to the production of reactive oxygen species (ROS).

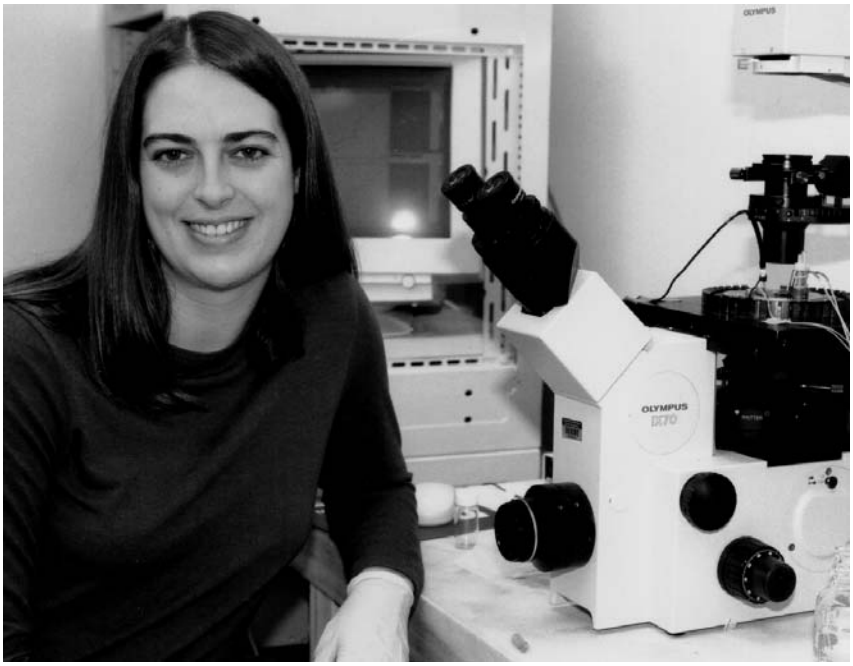
Normally ROS is produced by the white blood cells to destroy bacteria and viruses and to break down tissue damaged by burns, chemicals, and physical injuries. But when ROS is inappropriately activated by PCBs, it could initiate harmful effects on healthy tissues. Further, since these white blood cells are among the first to be sent to sites of infection or inflammation, these results also raise the possibility that exposure to PCBs may alter the body's immune and inflammatory responses.

Recent studies have identified three pathways that are necessary for PCBs to activate the neutrophils. A collaborative effort between co-project leaders, Patti Ganey and Norb Kaminski, MSU Department of Pharmacology and Toxicology and co-investigator B.V. Madhukar, MSU Department of Pediatrics and Human Development, on-going work is helping to elucidate the sequence of events and interactions among these pathways which may lead to treatments to reduce or halt the harmful effects of some PCBs.

Student profile: Tobi Limke

IET grad. wasted no time

Recent IET graduate Tobi Limke stands out as a model for future students not only for her achievements but also for just plain efficiency. She began her IET doctoral program in October of 1997 and defended her pharmacology and toxicology dissertation four years later in November of 2001. After tying up her research, she headed off to Maryland in December to begin a promising career with a post doctorate at the National Institutes of Health, Institute on Aging.



New IET alumnus Tobi Limke has begun post doctoral training at the National Institutes of Health, Institute on Aging.

Her Ph.D. thesis dealt with the effects of methylmercury on the central nervous system, specifically the mechanisms by which methylmercury disrupts the intracellular calcium and contributes to the death of cells. Humans can be exposed to methyl mercury through the consumption of fish and it is a known toxicant to a fetus, causing developmental disabilities, Limke explained.

All this is a long way from her early days as a college student. Limke originally planned to study physical therapy. She came across E.O. Wilson's book Diversity of Life in a class. She was disturbed to see how humans treat the environment and saw so clearly the need for more research that she switched her major to biology and environmental studies.

In her dissertation research, Limke used single cell microfluorimetry of rat cerebellar granule neurons to examine the how methylmercury causes elevations of intracellular calcium and subsequent neuronal death. She also examined how methylmercury interacts with muscarinic receptors.

Working with her major professor, Bill Atchison, Pharmacology and Toxicology, Limke has six publications in press or recently published related to her thesis and the project. She was actually the fourth student to work on the research and has now passed it on to a fifth student.

Before coming to MSU she had her pick of six graduate schools, but was attracted to the flexibility of the MSU IET program that allowed her to double major and still spend significant time in the lab.

"IET lets you keep options open so you can look at jobs in other fields," she said. "It also forces you to relate to people who approach problems from a different perspective—in other words, you are forced out of your comfort zone."

Limke also praised the pharmacology and toxicology program, noting that the course work provides students with "everything they need to know", even for those not previously trained in a hard science.

In her post doc position, Limke will be conducting research in the mechanisms of aging, including Alzheimers and Parkinson's disease. She will be working with stem cells within the nervous system, examining how they grow and why. Limke hopes to contribute to the research necessary to understanding how the developmental aspects of cells can be utilized for potential therapies. Limke plans to stay in research, possibly in industry.

"(IET) forces you to relate to people who approach problems from a different perspective."

Originally from Denver, Colorado, Limke completed her undergraduate work at Lake Forest College just outside of Chicago. While she has now moved even farther east from family, she looked forward to returning to a metropolitan area in Baltimore. Within her family, she holds the distinction of being the only scientist and one of three college graduates.

In her spare time while she was still in the East Lansing area, Limke helped coach the Capital Area Swim Team in Holt. She competes in triathlons whenever she can and is also an avid collector of cookbooks. She hopes she will have more time to use those books in the future.

Student profile: Steve Yee

Liver toxicology captivates

IET doctoral student, Steve Yee, will soon be leaving MSU not only with a Ph.D. in Pharmacology and Toxicology but a solid body of published scientific research to back it up.

Working with his major professor, Bob Roth, professor of Pharmacology and Toxicology, Yee's research focus has been on the synergistic effects of exposure to bacterial endotoxin and the food-borne toxin monocrotaline, on liver injury.

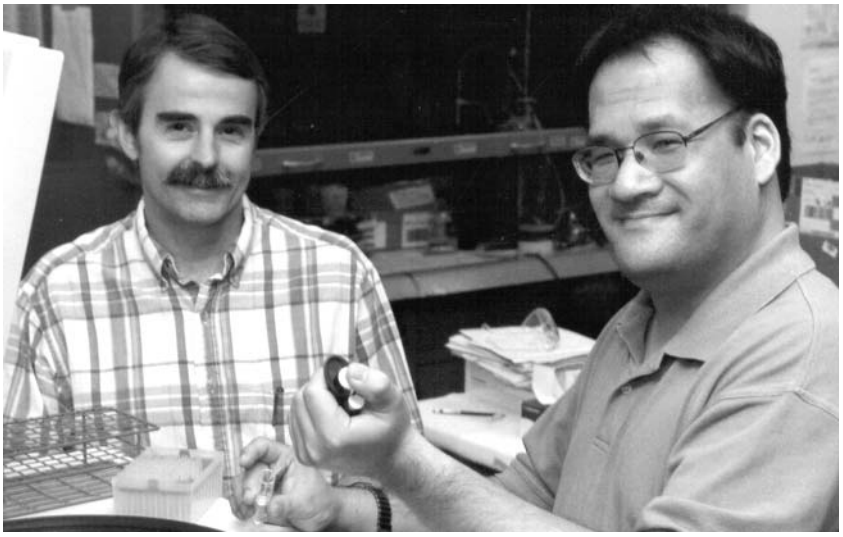
Monocrotaline is a pyrrolizidine alkaloid plant toxin that has poisoned animals and humans. Human exposure occurs from consuming contaminated cereal grains, cooking oils, herbal teas or alternative medicines.

By themselves, exposure to either a modest inflammagen, common in bacterial infections, or a small dose of monocroataline are non-injurious to the liver. But laboratory animals exposed to a modest, non-injurious dose of an inflammagen such as bacterial endotoxin, and a small, non-injurious dose of monocrotaline, have developed significant life-threatening liver injury. This suggests that people experiencing an inflammatory response who concurrently consume monocrotaline may be particularly sensitive to liver injury, Yee said.

Yee has been the recipient of several travel awards and best abstract honors from the Society of Toxicology and the American-Chinese Toxicology Society as well as publishing in various journals including the Journal of Toxicology and Applied Pharmacology. (166. 173-185, 2000, Synergistic Hepatotoxicity from Coexposure to Bacterial Endotoxin and the Pyrrolizidine Alkaloid Monocrotaline)

First coming to MSU about six years ago, Yee noted that the availability of IET training grants was a crucial reason he chose MSU.

"I was impressed with the pharmacology and toxicology program and the professors I met," Yee added, though coming from northern Nevada, he admitted he was wary of Michigan winters.



IET graduate student Steve Yee (left) with his major professor Bob Roth.

Having completed both a bachelors and masters degree in biochemistry, Yee was initially drawn to anti-cancer research. However, Bob Roth's dynamic lab and research in inflammation and liver toxicology attracted him. Yee was especially intrigued with Roth's research in food-borne liver toxicants.

Today, Yee is not only fully committed to inflammation and liver research but says he has become a Midwestern enthusiast—learning to appreciate the beauty of the changing seasons, even winter.

Yee, recently gave his exit seminar, a requirement of the Department of Pharmacology and Toxicology, and will soon defend his dissertation.

Chou, continued from 5

regarding the importance and practice of agriculture. Chou notes that all too often, agriculture is perceived simply as a polluting, moneymaker.

"Farming and motherhood are the two most undervalued professions," she said.

Chou also has first-hand knowledge of the latter profession, having raised two sons. The youngest is finishing high school and the oldest is in medical school. Both her young men have plans to volunteer in either the Americorp or Peace Corp in the near future.

Chou's hobbies include being an avid reader. One day she hopes to retire into writing and woodworking.

Chou discusses reproductive toxicology research results related to soy food products with her lab assistant.

MSU-IET prominent at 2002 Society of Toxicology Meeting

An annual IET tradition, the 41st Society of Toxicology Meeting held last spring in Nashville, Tennessee included over 40 abstracts from MSU scientists.

Symposiums/Courses

M.J. Cunningham, T. Zacharewski, R. Somogyi, B.A. Merrick. **Two-Stepping through Toxicogenomics: A Basic Primer.**

D.C. Dorman, J.R. Harkema. **Olfactory Transport of Inhaled Metals: An Important Route of Delivery to the Brain.**

J.R. Harkema. **Comparative Nasal Structure, Function and Toxicology: Relevance to Olfactory Transport of Metals.**

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Pestka, continued from 4

He also had the unique experience of actually working in a commercial analytical lab while still in high school.

As a college student, Pestka started out interested in food safety and microbiology. He obtained a B.A. in biology from the State University of New York-Buffalo and a Ph.D. in microbiology at Cornell.

"IET has greatly enhanced my ability to train graduate students and the dual degree opportunity really increases my ability to recruit outstanding people."

It was his postdoctoral training at the University of Wisconsin that got him to the Midwest and into toxicology. Soon after he was able to combine his scientific interests at MSU.

"The toxicology program at MSU has a great infrastructure with excellent access to labs and cross-disciplinary activities," he said.

Pestka says the existence of IET was the determinative factor in his choosing to join the MSU faculty.

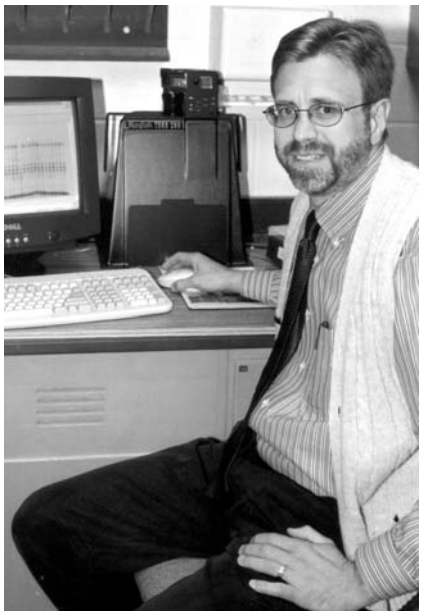
"IET has greatly enhanced my ability to train graduate students and the dual degree opportunity really increases my ability to recruit outstanding people," he said.

He has been recognized with impressive honors throughout his career including the MSU Distinguished Faculty Award in 1999 and the MSU College of Agriculture and Natural Resources Distinguished Faculty Award in 1996.

In 1995 he was elected a fellow of the Academy of Microbiology and was elected to the Phi Kappa Phi Honor Society. He received the Harvey W. Wiley Award in 1993 from the Association of Official Analytical Chemists, an honor presented to an outstanding scientist in food safety assessment.

And in 1992, he received both the Carl. G. Smith Award from the MSU-CANR in recognition of outstanding work in food agricultural science and the Junior Faculty Meritorious Research Award from the MSU Chapter of Sigma Xi.

His family includes a son and daughter who are a recent graduate and sophmore respectively at East Lansing High School and a wife who is a dietitian at Sparrow Hospital.



James Pestka in his food toxicology lab in the GM Trout building.

For a relaxing break from science, Pestka took up the hobby of building model railroads. Although, he cautions, one can find "Type A" personalities in that endeavor as well. He focuses on keeping it fun and often sets up railways with his children.