

# EMERGING ISSUES IN NEUROTOXICOLOGY

NOVEMBER 18-21, 2002 / The Peabody Hotel Conference Center / LITTLE ROCK, AR

**Monday Aft & Evening 18 NOV 2002 4:30 – 8:00 PM**

1:00 – 8:00

**Poster & Exhibit Set-up in the Conference Center on the 2<sup>nd</sup> Floor of The Peabody Hotel.** Follow Signs to locate assigned space in Poinsett, Chicot and Grampas Rooms. Posters should be up no later than Wednesday at noon.

*2<sup>nd</sup> Floor Balcony of The Peabody Hotel*

4:30

**Registration Opens**

5:00 – 5:15

*"March of the Peabody Ducks"*

*Led by Duck Master-for-a-Day Joan Cranmer*

5:00 – 8:00

**Welcoming Reception and Buffet  
Dinner  
Cash Bar and Camaraderie**

**Tuesday Morning 19 NOV 2002 8:30 – 9:00 AM**

SESSION I.

**OPENING, WELCOME AND OVERVIEW**

*Chair: Joan M. Cranmer, PhD*

8:30 – 8:35 **Opening of the Conference**  
Joan M. Cranmer, PhD  
*University of Arkansas for Medical Sciences  
and Arkansas Children's Hospital*

*WELCOME ON BEHALF OF THE HOST INSTITUTIONS*

8:35 – 8:40 **On Behalf of UAMS**  
E. Albert Reece, MD, PhD, MBA  
*Vice Chancellor and Dean, College of Medicine,  
University of Arkansas for Medical Sciences*

8:40 – 8:45 **On Behalf of NCTR**  
Daniel A. Casciano, PhD  
*Director, National Center for Toxicological Research*

8:45 – 8:50 **On Behalf of the Pine Bluff Arsenal**  
Colonel Mark R. Henscheid  
*Commander, Pine Bluff Arsenal*

*OVERVIEW OF THE CONFERENCE*

8:50 – 9:00 **Overview and Goals of NTX XX:  
Emerging Issues in Neurotoxicology**  
Joan M. Cranmer, PhD - UAMS & ACH

*We are committed to making this conference accessible to all individuals. If you have a disability, as identified in the Americans with Disabilities Act, please notify Tina Daniel or a Staff person at the Registration Desk.*

**Tuesday Morning 19 NOV 2002 9:00 – 11:50 AM**

SESSION II.

**NEUROIMAGING: STRATEGIES TO ILLUMINATE  
ENVIRONMENT-DISEASE LINKAGES**

*Focusing on Unique Needs, Tools, Challenges and  
Strategies for Neurotoxicologists*

*Chair: William Slikker, Jr., PhD*

*This session addresses recent technological innovations which now make it possible to apply many in vivo neuroimaging technologies such as positron emission tomography (PET) and magnetic resonance imaging (MRI) to small animals, including nonhuman primates, rats and mice. The availability of these new technologies coincides with progress in developing animal models of various neurodevelopmental and neurodegenerative dysfunctions and improvements in assessment protocols for identifying deficits in animals that correlate well with human deficits. The integration of neuroimaging techniques with traditional neurotoxicological assessments has the potential to enhance greatly the ability to relate behavioral, cognitive or motor dysfunction induced by a toxicant to structural and functional brain pathology.*

9:00 – 9:20 **Neuroimaging as a New Approach to Neurotoxicology**  
William Slikker, Jr., PhD  
*Director Division of Neurotoxicology, NCTR/FDA*

9:20 – 9:40 **Innovative Imaging Approaches: PET and Its Applications**  
Ronald C. Walker, MD  
*Director of PET Research, UAMS*

9:40 – 10:15 **Small Animal Imaging using Positron Emission Tomography**  
Arion Chatziannou, PhD - UCLA and Crump  
*Institute for Molecular Imaging*

10:15 – 10:30 **Break**

10:30 – 11:05 **Magnetic Resonance Spectroscopic Imaging and Its Potential Application to Clinical Neurotoxicology**  
H. Cecil Charles, PhD  
*Duke Image Analysis Laboratory, Duke University*

11:05 – 11:40 **High Resolution Imaging: From Organism to Molecule**  
Mark P. Ellisman, PhD  
*National Center for Microscopy and Imaging  
Research, University of California - San Diego*

11:40 – 11:50 **Discussion**

11:50 **Announcement re: Evening Session**  
**Break for Lunch**

1:15 PM **Reconvene for Session III**

**Tuesday Afternoon 19 NOV 2002 1:15 – 5:00 PM**

**SESSION III.**

**EMERGING TECHNOLOGIES IN NEUROTOXICOLOGY**

**Chairs: G. Jean Harry, PhD**  
**Kent E. Vrana, PhD**

*As in the case of other areas of biology, the study of how chemicals affect the nervous system is being influenced by a number of emerging technologies in addition to new neuroimaging technologies. This session will focus on computational toxicology, microarray technology, genomics, proteomics, metabonomics and bioinformatics. All of these emerging technologies exploit recent discoveries in molecular biology to study effects of chemicals at the genetic or molecular level and/or the use of computer technology to process patterns of biological changes to characterize pathways leading to neurotoxicological effects. Computational toxicology integrates computing and information technology with molecular biology to predict neurotoxicological changes based on knowledge about structure other physical properties of pollutants.*

- 1:15 – 1:30 **Emerging Technologies in Neurotoxicology: Overview**  
 G. Jean Harry, PhD  
*National Institute of Environmental Health Sciences*
  
- 1:30 – 2:05 **Computational Toxicology: An Approach for Prioritizing Chemical Risk Assessment**  
 Steven P. Bradbury, PhD  
*USEPA/ORD Mid-Continent Ecology Division*
  
- 2:05 – 2:40 **Microarray Technology**  
 Kent E. Vrana, PhD  
*Wake Forest University School of Medicine*
  
- 2:40 – 3:15 **There's No Place Like Ome: "Omics" at the NCTR ~ Genomics-Proteomics-Metabonomics-Bioinformatics**  
 Daniel A. Casciano, PhD  
*National Center for Toxicological Research/FDA*
  
- Invitation to Tour the National Center for Toxicological Research**  
 Daniel A. Casciano, PhD - *Director, NCTR*
  
- 3:15 – 3:35 **Break**
  
- 3:35 – 4:00 **cDNA Array Analysis of the Changes in Gene Expression Specifically Produced by Neurotoxic Doses of Amphetamine: Not Quite Mission Impossible**  
 John F. Bowyer, PhD  
*National Center for Toxicological Research/FDA*
  
- 4:00 – 4:25 **NMR Study of [1-13C] Glucose Metabolism and Astrocyte-Neuron-Trafficking in Manganese Neurotoxicity**  
 Claudia Zwingman, PhD  
*Hospital Saint-Luc, Canada*
  
- 4:25 – 4:50 **Toxins and Behavior: Implications of 'Toxicogenomics' for Public Policy**  
 Roger Masters, PhD  
*Dartmouth College, Hanover, NH*

SESSION IV: *Informal Workshop (Cash Bar)*

**ACRYLAMIDE TOXICITIES AND FOOD SAFETY**

*Chairs:* **Richard A. Canady, PhD**  
**Richard M. LoPachin, PhD**

*Acrylamide is a chemical with a variety of uses in industry including water purification, cosmetics, soil stabilization, and special grouting applications. It was first discovered to be present in certain foods as the result of work announced in Sweden in April 2002. It is a known animal carcinogen and causes nerve damage. The Swedish research and subsequent studies in Norway, Switzerland, the United Kingdom and the United States, have found that acrylamide levels in certain starch-based foods indicate a need for evaluation of risk management alternatives. Reviews of the toxicity of acrylamide have focused on occupational exposures or low-level exposures through water, not the relatively constant exposures that appear to be occurring through food. As the chair of the WHO consultation put it: "After reviewing all the available data, we have concluded that the new findings constitute a serious problem. But our current limited knowledge does not allow us to answer all the questions which have been asked by consumers, regulators and other interested parties."*

*This session will lay out the issues facing us, including rapidly developing information about exposure and toxicity, with the intention of drawing ideas from the substantial expertise at the conference regarding what is known and what should be explored for this important new toxicant in our food.*

7:00 – 7:05 **Creation of a Database for Use in Environmental Health Policy Activities**  
Jerome A. Paulson, MD  
*George Washington University*

7:05 – 7:40 **Acrylamide Contamination of Food: Risk Assessment and Regulatory Issues**  
Richard A. Canady, PhD  
*FDA/CFSAN, Division of Risk Assessment*

7:40 – 8:15 **Is Acrylamide Neuropathy an Axonopathy or a Terminalopathy?**  
Richard M. LoPachin, PhD  
*Albert Einstein College of Medicine*

8:15 – 9:00 **Panel Discussion:**

***Acrylamide is Widespread in our Food Supply: Do We Know Enough About Its Neurotoxicity?***

*Chairs:* Richard Canady and Richard LoPachin

*Panelists:* Deborah Cory-Slechta, Jean Harry, Virginia Moser, Merle Paule, Deborah Rice, Andrew Scallet, Theodore Slotkin and Evelyn Tiffany-Castiglioni

**Questions to Panel:**

- 1) Based on the mechanistic thinking presented, are there new data needs for neurotoxicity relevant to the exposure levels expected through foods?
- 2) Have neurodevelopmental endpoints been adequately assessed for acrylamide?
- 3) What specific studies would be needed to address data gaps (if identified)?
- 4) What is the priority of the studies identified?

**Wednesday Morning 20 NOV 2002 8:00 – 9:25 AM****SESSION V:****PARKINSON'S DISEASE, ENVIRONMENT AND GENES****Chairs: Cindy P. Lawler, PhD  
Marie-Francoise Chesselet, MD, PhD**

*A progressive disorder characterized by muscular rigidity and tremors, slow movement and impaired balance and coordination, Parkinson's disease affects between 1 and 1.5 million people in the U.S., with 50,000 newly diagnosed cases a year. The disease is marked by the death of cells in the substantia nigra that synthesize and release the neurotransmitter dopamine. Current drug therapies, which attempt to replace the lost dopamine, can relieve some symptoms but do not cure or slow the disease. A variety of lines of evidence suggest that both environmental and genetic factors contribute to sporadic Parkinson's Disease (PD), the most common form of the disease. This session will highlight promising new findings that provide a foundation for understanding the molecular pathways leading to PD and how environmental exposures can trigger these pathways. These findings have emerged in a variety of setting, ranging from epidemiology studies to identify risk factors for PD to the development and validation of new animal models. The integration of findings across such disciplines will be essential to understanding the puzzle of Parkinson's disease.*

**8:00 – 8:25 A Novel Proteolytic Activation of PKC $\delta$  Promotes Apoptotic Cell Death in Dopaminergic Neuronal Cells during Pesticide Exposures: Relevance to Environmental Factors and Parkinson's Disease**  
Anumantha Kanthasamy, PhD  
Iowa State University

**8:25 – 8:50 Developmental Pesticide Exposures and Subsequent Vulnerability to the Parkinson's Disease Phenotype**  
Deborah A. Cory-Slechta, PhD  
University of Rochester Medical School

**8:50 – 9:15 Selective Dithiocarbamates Increase Synaptosomal Dopamine Content and Brain Concentrations of Paraquat and Correlation with Potentiation of MPTP and Paraquat Neurotoxicity**  
Eric K. Richfield, MD, PhD  
University of Rochester Medical Center

**9:15 – 9:25 Discussion**

**Wednesday Morning 20 NOV 2002 9:25 – 11:50 AM****SESSION VI:****INTEGRATIVE APPROACHES TO PARKINSON'S DISEASE ENVIRONMENTAL RESEARCH****Chairs: Cindy Lawler, PhD and Annette Kirshner, PhD**

*Recent ground-breaking studies suggest that Parkinson's disease (PD) may result from a combination of a person's exposure to harmful environmental agents and the person's inherited susceptibility. What is lacking, however, is a clear mechanistic understanding of these*

*interactions in the causation of PD. The National Institute of Environmental Health Sciences (NIEHS), a component of the National Institutes of Health, recently announced five-year grants totaling \$20 million for three centers to conduct research on the relationship between exposures to environmental agents and subsequent Parkinson's disease.*

*In this session the Director of NIEHS will describe how the CCPDER will provide a formal mechanism for "Cross-Talk" between PD clinicians, basic research scientists, and patients in an effort to accelerate the pace of progress in this important area. Principal Investigators or Project Directors of the three new Centers will present rationale for the approaches and framework of their program.*

**9:25 – 10:00 The NIEHS Collaborative Centers for Parkinson's Disease Research Program: An Innovative Approach**  
Kenneth Olden, PhD - Director, National Institute of Environmental Health Sciences

**10:00 - 10:15 Break**

*Presentations of the three new PD Centers:*

**10:15 – 10:45 "Environmental, Genetic and Cellular Determinants of Parkinson's Disease" at The Parkinson's Institute, Sunnyvale, CA with J. William Langston, M.D. as center director.**  
Presented by Donato Di Monte, MD

**10:45 – 11:15 "The Emory Collaborative Center for PD Environmental Research" at Emory University, Atlanta, GA with J. Timothy Greenamyre, M.D., Ph.D. as center director.**  
Presented by Gary Miller, PhD

**11:15 – 11:45 "Center for Gene-Environment Studies in Parkinson's Disease" at the University of California at Los Angeles with Marie-Francoise Chesselet, M.D., Ph.D. as center director.**  
Presented by Marie-Francoise Chesselet, MD, PhD

**11:45 – 11:50 Discussion**

**11:50 – 1:00 PM Break for Lunch**

**1:00 – 3:30PM**

**Reconvene for Concurrent Break-Out Sessions:**

**Session VII-A:** (Workshop) *In Conway Theater (2B)*

**Session VII-B:** (Synaptic Function) *In Harris Break Theater (2A)*

**Wednesday Early Aft 20 NOV 2002 1:00 – 3:45 PM**

SESSION VII - A (Conway Theater) (Concurrent with VII – B)

**Workshop/Panel Discussion:**

**TESTING FOR DEVELOPMENTAL NEUROTOXICITY**

**Chairs: William Boyes, PhD  
Donald J. O'Shaughnessy, PhD**

*Adverse effects on the nervous system following exposure to environmental chemicals during development have been well documented. In a number of cases (e.g., lead, methylmercury) the developing nervous system appears to be a highly susceptible target. Developmental Neurotoxicity Testing (DNT) guidelines were developed and promulgated in 1991 in response to the need for regulatory-based screening methods for developmental neurotoxicity. In the first broad-scale data call-in for these data (Sept. 99), EPA expanded the scope of the 1991 guideline in recognition of the advances in the science, as well as legislation (i.e. FQPA). The purpose of this Workshop/Panel Discussion is to review history and use of the Developmental Neurotoxicity Testing guidelines, and to discuss, in a panel format, areas for improvement.*

*Speakers will avoid detailed description of highly focused work. Rather, they will use ongoing or recent work to exemplify development of knowledge about developmental processes, risk, and regulation.*

1:00 – 1:10 **Chairmen's Overview of the Workshop on Developmental Neurotoxicity**

Donald J. O'Shaughnessy, PhD  
*D O'Shaughnessy Consulting*  
William Boyes, PhD  
*USEPA/NHEERL/NTD*

1:10 – 1:30 **Protecting Children's Health and Development: A Non-Profit Perspective**

Barbara McElgunn, RN  
*Learning Disabilities Association of Canada,*

1:30 – 1:50 **A Government Perspective on the History and Use of the Developmental Neurotoxicology Guidelines**

Susan L. Makris, MS - *USEPA/OPP/HED*

1:50 – 2:10 **Testing for Developmental Neurotoxicity: Perspective from an Industry Laboratory**

Larry P. Sheets, PhD  
*Bayer CropScience*

2:10 – 2:30 **The Perspective from Academia: Biological Mechanisms versus Regulatory Issues**

Theodore A. Slotkin, PhD  
*Duke University Medical Center*

2:30 – 2:50 **A Review of the Reference Dose and Reference Concentration Process: Identified Gaps in Testing Guidelines**

Deborah C. Rice, PhD  
*USEPA/NCEA*

2:50 – 3:30 **Round Table Discussion**

*Chairs: William Boyes, PhD  
Donald O'Shaughnessy, PhD*

3:30 – 3:45 **Break**

**Round Table Discussion Topics**

- 1) A review of the experience using the current guidelines. What is working well and what areas could be a focus for improvements? Data Quality, Sensitivity/ discriminatory power, Study Design, Training
- 2) Alternatives to the DNT: What is the potential for targeted guidelines designed for specific classes of compounds such as the major classes of pesticides such as carbamates or pyrethroids (i.e., if we know the mechanism of action can we do something other than a first tier 'screen'?)
- 3) Additions to the DNT: How do we incorporate the need for pharmacokinetics and age-dependent sensitivity data, e.g., evolution of guidelines to include "relative sensitivity" evaluations and quantification of offspring exposure.
- 4) Introducing modern neurobiological concepts and technology to the guideline. What have we learned in the last decade that can guide, direct and improve the ability to evaluate compounds for potential developmental neurotoxicity?

**Wed. Early Aft 20 NOV 2002 1:00 – 3:45 PM**

SESSION VII-B. (Harris Break Theater) (Concurrent with VIIA)

**NEUROTOXICANTS AND SYNAPTIC FUNCTION**

**Chair: William D. Atchison, PhD**

*Chemical synaptic transmission is the fundamental process by which information is transferred in the nervous system. This process is critical to learning and memory as well as growth and differentiation in the nervous system. It is also a surprisingly "plastic" function which can be modified in response to changes in activity in the brain. Synaptic transmission is very sensitive to the actions of a number of environmental chemicals which can affect the process on either the sending (presynaptic), or receiving (postsynaptic) ends of the process- or at multiple sites. Some of these chemicals such as lead have been proposed to alter learning and memory perhaps by actions on aspects of synaptic function. Talks in this session will focus on the variety of actions which environmental neurotoxicants have on synaptic function.*

1:00 – 1:30 **Presynaptic Disruption of Transmitter Release by Pb- an "Illegal Substitution"**

Janusz B. Suszkiw, PhD  
*University of Cincinnati*

1:30 – 2:00 **Alcohol-Neuroreceptor Interactions: New Concept of the Mechanism of Action**

Toshio Narahashi, PhD  
*Northwestern University School of Medicine*

2:00 – 2:30 **Disruption of GABAergic Function of Cerebellum by Methylmercury: A Possible Approach to Differential Vulnerability**

William D. Atchison, PhD  
*Michigan State University*

2:30 – 3:00 **Chronic Exposure to NMDA Receptor and Sodium Channel Blockers During Development in Monkeys and Rats: Long-term Effects on Cognitive Function**

Merle G. Paule, PhD - *NCTR & UAMS*

3:00 – 3:30 **Discussion**

3:30 – 3:45 **Break**

## SESSION VIII.

**BIOLOGICAL AND CHEMICAL TERRORISM***Chairs: Larry E. Wright and James L. Bacon*

*This session addresses Post 9-11 activities in chemical biological matters ranging from scientific findings on agent exposure to evolving national policy on homeland defense. Topics include the expansion of the nation's warfighting spectrum into a "two-front" war, the chemical and biological expertise located at the US Army Pine Bluff Arsenal, and the Arkansas Economic Development initiative to secure the nation's vaccine production facility. Through decades of experience with chemical and biological warfare, the nation's military is uniquely qualified to support homeland defense and domestic preparedness. Pine Bluff Arsenal has over 60 years of chemical and biological program management and unmatched expertise in insuring effective protection from agent contaminants. Well before the 9-11 attack, Pine Bluff Arsenal participated in technology transfer programs to assist municipalities, through the Department of Justice and the American Red Cross in the area of Homeland Defense and Weapons of Mass Destruction Awareness Training for first responders. The unusually high concentration of military, federal and academic resources in central Arkansas (including the Pine Bluff Arsenal, National Center for Toxicological Research, Arkansas Regional Laboratories, Arkansas National Guard Professional Education Center, University of Arkansas for Medical Science and the Little Rock Air Force Base) command centrally located and established expertise to support Chemical and Biological Counter-Terrorism. Due to favorable assets, a 1994 government study indicated the Pine Bluff Arsenal as the "best" and most economical location for a government-owned vaccine production facility. The Army and Arkansas continue to develop programs to support the Nation's war on terror.*

**3:45 – 4:15 Chemical Terrorism: Chemicals of Concern and a Prospective Examination of Laboratory Preparedness***Jimmie L. Valentine, PhD  
UAMS & Arkansas Children's Hospital***4:15 – 4:45 Sarin-Induced Neuronal Degeneration: Unexpected New Findings***Mohamed B. Abou-Donia, PhD  
Duke University Medical Center***4:45 – 5:30 National Chemical Biological Defense Security Policy and Readiness in a Post 9-11 Era – Fighting a Two-Front War***Colonel Mark R. Henscheid  
Commander, Pine Bluff Arsenal***Biological and Chemical Terrorism: The Role of the Pine Bluff Arsenal***Larry E. Wright  
Civilian Executive Assistant, Pine Bluff Arsenal***Arkansas' Initiative to Secure the Nation's Vaccine Production Facility***James L. Bacon  
Chairman of the Governor's Task Force for  
Acquisition of the DoD Vaccine Production Facility***Invitation to Conference Participants to a Specially Arranged Tour of The Pine Bluff Arsenal: Pictures and Agenda**

**Wednesday Evening 20 NOV 2002 7:00 – 9:00 PM**SESSION IX. *(Cash Bar & Refreshments)***GENERAL POSTER SESSION**

*Chairs:* **AG Kanthasamy, PhD**  
**Lisa Opanashuk, PhD**  
**Andrew Scallet, PhD**

**7:00 – 9:00 Posters Attended and Discussed**

*Presentation of papers from poster and informal discussion are a highlight of this meeting. This is an excellent venue to discuss research details and form collaborations.*

*Free communications from poster on any topic of neuroscience and toxicology are welcome. Selection of Pre-Doctoral and Postdoctoral Awardees will be made at this time. Cash and Plaques will be presented to the 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> place winners on Thursday afternoon.*

**Pre-Doctoral Student Award Competition***Pre-Doctoral Award Committee*

Richard Seegal, PhD, *Chair*  
 Donato Di Monte, MD  
 Richard LoPachin, PhD  
 Virginia Moser, PhD

*Pre-Doctoral Students*

C. Filibrandt	<i>Mentor:</i> Thomas A. Gasiewicz, PhD
EK Gray	<i>Mentor:</i> Sherry Ferguson, PhD
S. Kaul	<i>Mentor:</i> AG Kanthasamy, PhD
M. Kitazawa	<i>Mentor:</i> AG Kanthasamy, PhD
J. Trivedi	<i>Mentor:</i> Manish Nivsarkar, PhD
MA Williamson	<i>Mentor:</i> Lisa Opanashuk, PhD
LKM Wright	<i>Mentor:</i> MG Paule, PhD
Y. Yang	<i>Mentor:</i> AG Kanthasamy, PhD
B. Zim	<i>Mentor:</i> Guenter W. Gross, PhD

**Post-Doctoral Student Award Competition***Post-Doctoral Award Committee*

Toshio Narahashi, PhD, *Chair*  
 Jean Harry, PhD  
 Eric K. Richfield, MD, PhD

*Post-Doctoral Students*

TK Garg, PhD	<i>Mentor:</i> Jason Y. Chang, PhD
RL Jakab, PhD	<i>Mentor:</i> John F. Bowyer, PhD
JR Richardson, PhD	<i>Mentor:</i> Gary W. Miller, PhD
D. Surcel, PhD	<i>Mentor:</i> M. Butan, PhD
Y. Xu, PhD	<i>Mentor:</i> Syed Ali, PhD

**Thursday Morning 21 NOV 2002 8:30 – 11:30 AM**

SESSION X.

**CONSEQUENCES OF EXPOSURE FROM PERSISTENT ORGANIC POLLUTANTS***Chair:* **Deborah C. Rice, PhD**

*In May 2001, representatives from over 100 countries convened in Stockholm to sign a treaty for the reduction of persistent organic pollutants (POPs). The initial list of 12 chemicals includes polychlorinated biphenyls (PCBs), dioxins, furans, hexachlorobenzene, and the pesticides aldrin, chlordane, DDT, dieldrin, endrin, heptachlor, mirex, and toxaphene. These chemicals bioconcentrate and bioaccumulate up the food chain, and are persistent in the environment. They are found in particularly high concentrations in animals and humans in circumpolar regions. This symposium will focus on the health effects associated with human exposure to these contaminants.*

8:30 – 8:50 **Global Cycling of Persistent Organic Pollutants (POPs) and Session Overview**  
 Deborah C. Rice, PhD  
*National Center for Environmental Assessment/EPA*

8:50 – 9:30 **Specific Behavioral Effects Associated with POPs in Children in a Community of Great Lakes Fish Eaters**  
 Paul W. Stewart, PhD  
*State University of New York, Oswego*

9:30 – 10:10 **Specific Behaviors of Prenatal PCB Exposure on Attention and Behavior in School Age Children**  
 Joseph. Jacobson, PhD  
*Wayne State University School of Medicine*

10:10 – 10:15 **Discussion**

10:15 – 10:30 **Break**

10:30 – 10:50 **Developmental Effects of PCBs and Methylmercury on Striatal Dopamine**  
 Richard F. Seegal, PhD  
*Wadsworth Center,  
 New York State Department of Health*

10:50 – 11:10 **Lead Induced Stress Responses in the Endoplasmic Reticulum (ER) of Glia**  
 Evelyn Tiffany-Castiglioni, PhD  
*Texas A&M University, College Station, TX*

11:10 – 11:30 **Maternal Exposure to Dioxin Causes Permanent or Semi-Permanent Dysfunction in the Frontal Cortex of Rat Offspring at Behavioral and Molecular Levels**  
 Masaki Takeyama, PhD  
*National Institute for Environmental Studies,  
 Onogawa, Tsukuba, Japan*

**Thursday Morning      21 NOV 2002      11:30 – 11:45 AM**

SESSION XI.

**PRESENTATION OF STUDENT AWARDS***Chair:* **Joan M. Cranmer, PhD****Announce Pre-Doctoral Award Winners**Richard F. Seegal, PhD, *Committee Chair***Announce Post-Doctoral Award Winners**Toshio Narahashi, PhD, *Committee Chair***Present Awards**Morris F. Cranmer, PhD - *Sponsor of Student Awards, Cranmer and Associates, Inc.*11:45 – 1:00 PM      **Break for Lunch**1:00 – 1:10 PM      **Board Buses for tours of the  
Pine Bluff Arsenal & NCTR****Thursday Afternoon      21 NOV 2002      1:00 – 5:15 PM**

SESSION XII.

**TOURS OF THE PINE BLUFF ARSENAL & NCTR****1:10 PM Sharp !    Buses Depart The Peabody Hotel****PINE BLUFF ARSENAL TOURS**

- ◆ **Clara Barton Red Cross Domestic Preparedness Center**  
*Mr. Dave Chapman and Mr. Don Cleveland*
- ◆ **Tour M291 Skin Decontamination Kit Mfg. Facility (FDA Approved Device)**  
*Dr. David Smith*
- ◆ **Windshield Tour Chemical Demilitarization Facility**

**NCTR TOURS - Organized by William Slikker, PhD**

- ◆ **Division of Neurotoxicology**
- ◆ **Genomics and Proteomics Centers**
- ◆ **Nonhuman Primate Center**

4:25 PM      **Buses Depart NCTR for The Peabody Hotel.**5:15 PM      **Buses arrive The Peabody Hotel****Thursday Evening      21 NOV 2002      6:30 PM . . .****Social Evening & Closing of  
the Conference**

6:00 PM

**Cash Bar and Camaraderie**

7:00 PM

**Hosted Dinner in the Pinnacle***Top floor of The Peabody Hotel*