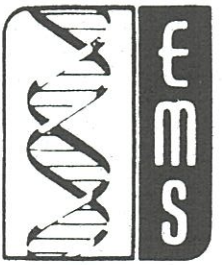
E. ZEIGER

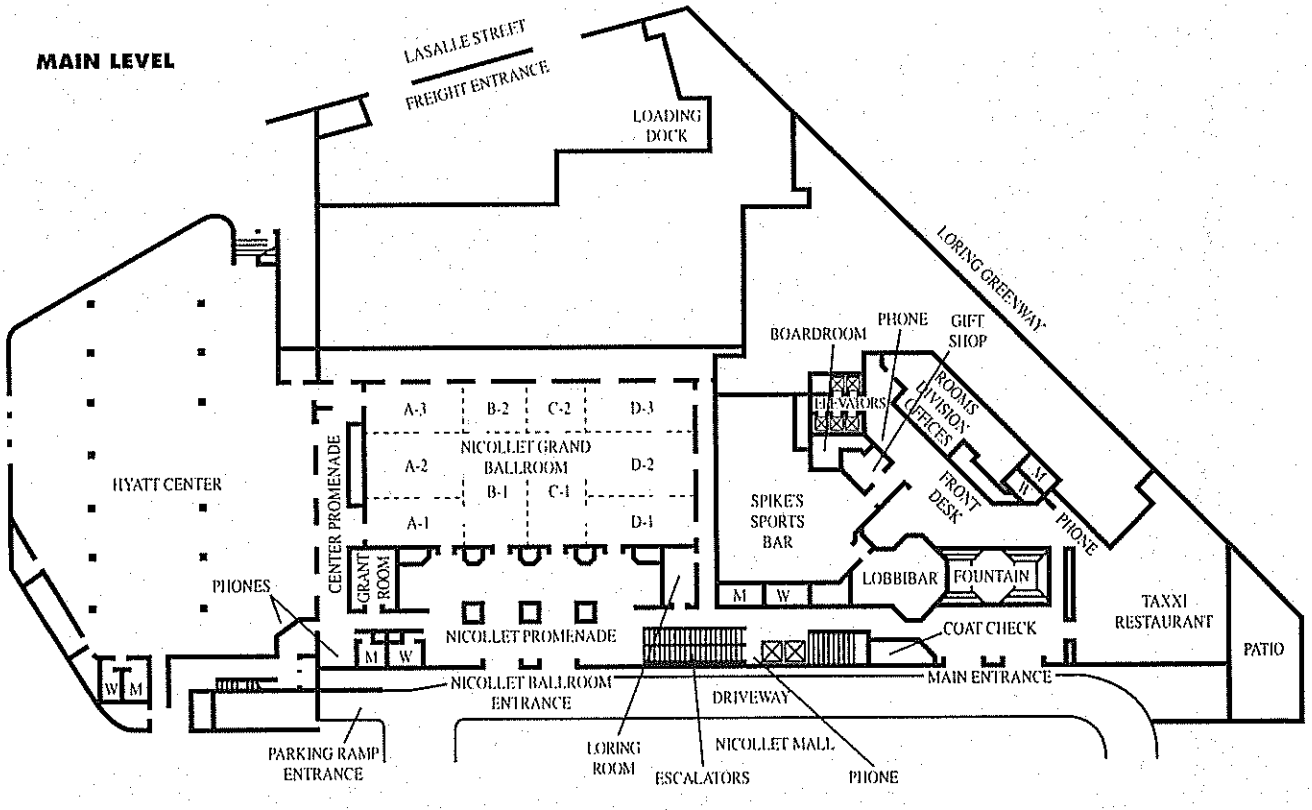
28TH ANNUAL MEETING

ENVIRONMENTAL MUTAGEN SOCIETY

PROGRAM



APRIL 20-24, 1997
HYATT REGENCY
MINNEAPOLIS, MN


MAIN LEVEL
LASALLE STREET
FREIGHT ENTRANCE
LOADING DOCK
LORING GREENWAY
BOARDROOM
PHONE
GIFT SHOP
ELEVATORS
ROOMS DIVISION OFFICES
FRONT DESK
M
W
PHONE
HYATT CENTER
A-3
B-2
C-2
D-3
A-2
NICOLLET GRAND BALLROOM
D-2
B-1
C-1
A-1
D-1
CENTER PROMENADE
GRAND ROOM
SPIKE'S SPORTS BAR
LOBBIBAR
FOUNTAIN
TAXXI RESTAURANT
PATIO
PHONES
M
W
NICOLLET PROMENADE
COAT CHECK
W
M
NICOLLET BALLROOM ENTRANCE
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ENVIRONMENTAL MUTAGEN SOCIETY

Twenty-Eighth Annual Meeting

April 20 - 24, 1997
Hyatt Regency Hotel
Minneapolis, MN

The Environmental Mutagen Society was founded in 1969 and is incorporated under the laws of the District of Columbia. Its purpose is to encourage the study of mutagens in the human environment—particularly as they may affect public health—and to engage in and sponsor research and the dissemination of information related to mutagens. Membership is open to all interested scientists.

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ON-SITE REGISTRATION FEES

Members	$315.00
Non-members	$375.00
Student members	$90.00
Student non-members	$110.00
Spouse non-members	$75.00

FUTURE MEETINGS

March 21-26, 1998
Disneyland Hotel
Anaheim, CA

March 27-April 1, 1999
Capitol Hilton
Washington, D.C.

MISCELLANEOUS INFORMATION

Please DO NOT FORGET to bring your PROGRAM BOOKLET or ABSTRACT ISSUE of the Journal to the meeting. Extra copies will cost $7.00.

All meeting rooms are located in the Hyatt Regency Minneapolis. Plenary Lectures and Concurrent Symposia are located in the Nicollet Ballroom. Concurrent Contributed Paper Sessions are in the Nicollet and Greenway Ballrooms. The Posters, Exhibits and Coffee Breaks are in the Exhibits Hall.

The Registration Desk will be located on the Promenade outside of the Nicollet Ballroom. Hours of operation are as follows: Saturday, 3:30-8:00 PM; Sunday, Monday, and Wednesday 7:30AM-5:00PM; Tuesday, 7:30AM-2:00PM; and Thursday, 7:30AM-3:00PM.

PLEASE remember to check the MESSAGE BOARD in the registration area for changes in the program or room assignments, and special announcements. You may leave messages for other attendees on the message board, but if you wish to post any other material, please check at the Registration Desk first.

The Hyatt Regency Minneapolis is located on Nicollet Mall, 1300 Nicollet Mall, Minneapolis, MN 55403. Phone: 612 370 1234. FAX: 612 370 1463.

Smoking is not permitted in the meeting rooms or Exhibits Hall.

Council Meetings are scheduled for:

Saturday, April 19, 4:00-8:00 PM Lake Superior Room
Thursday, April 24, 4:00-8:00 PM Mirage Room

The Speaker Prep Room, the Grant Room, is immediately adjacent to the Registration Desk and will be available for speakers to check their slides in advance.

The Press Room will be located in the Prior Lake Room.

A World Wide Web Workshop (WWWW) is scheduled for Sunday through Tuesday. Please check the Registration Desk upon check-in for sign-up sheets. The workshop will take place in Lake of the Isles.

A Hospitality Room for Spouses will be set up in the Lake Calhoun Room on the 5th level, for Monday, 8:00 AM - 12:00 PM.

Posters will be located in the Exhibits Hall. Set-up schedule is as follows:

POSTERS	SET-UP	AUTHORS PRESENT	TAKE DOWN BY
Session I A/B	Sunday 7:00 AM– 1:00 PM	A: Odd Numbered Posters: Sunday 3:30-5:30 PM B: Even Numbered Posters: Monday, 3:30-5:30 PM	Monday 5:30 PM
Session II A/B	Monday 5:30 PM Tuesday 7:00 PM	A: Odd Numbered Posters: Tuesday 9:00-11:30 AM B: Even Numbered Posters: Wednesday 3:30-5:30 PM	Wednesday 5:30 PM

PATRONS AND SUSTAINING MEMBERS

The EMS Council may elect a corporation to be a Patron or Sustaining Member as a result of demonstrated and substantiated acts benefiting the Society and its purposes. The following is a list of corporations making contributions or joining the Society as Patrons or Sustaining Members. This listing contains 1996 members as well as 1997 members.

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  Symposium I
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  Symposium IV
- RJ REYNOLDS TOBACCO CO.
  Co-Sponsor Workshop IV

Saturday, April 19

REGISTRATION
3:30 PM - 8:00 PM

Nicollet Promenade

EMS COUNCIL
4:00 PM - 8:00 PM

Lake Superior Room

STUDENT RECEPTION
8:00 PM - 10:30 PM

Skyway A/B Room

CAREER DEVELOPMENT

Presiding:
Eva M. McGhee
University of California, San Francisco

Malcolm J. Lippert
Harvard School of Public Health

Targeting Job Applications In Science

Sunday, April 20

STUDENT BREAKFAST
7:00 AM - 9:00 AM

Mirage Room

YOUNG INVESTIGATORS WORKSHOP

Presiding:
Eva M. McGhee
University of California, San Francisco

EMM EDITORS MEETING
7:00 AM - 8:00 AM

Skyway A/B Room

Sunday, April 20

WORKSHOP I
8:00 AM - 3:30 PM

Greenway A-D

STRUCTURE ACTIVITY RELATIONSHIPS: GENETIC TOXICOLOGY AND GOVERNMENT REGULATION

Presiding:
Daniel Benz, US Food and Drug Administration/CFSAN

Sponsor: Crysalis PreClinical Services-North America

In this era of "reinventing government," regulatory managers are looking for new approaches, including those using computer-based technology to make chemical safety determinations more rapidly and also more accurately. The purpose of this workshop is to find out if the field of structure activity relationship (SAR) analysis is now sufficiently mature that, if used properly, it can be utilized routinely with confidence as a source of decision support information to aid government reviewers not only to make faster and better regulatory decisions, but also to reduce the amount of animal testing necessary to provide information for judgments to be made. The program for this workshop will begin with a very basic introduction to the field of SAR. Following this, a general explanation of the methodology, successes and limitations of five very different SAR approaches will be presented. Then two speakers will tell to what degree different U.S. federal agencies are already using or plan to use SAR to support their regulatory decisions. Finally, the floor will be opened to a discussion by all participants and the audience about how government regulators ought to be using SAR to support their chemical safety decisions.

8:00	**Welcome** D Benz, FDA/CFSAN
8:10	**An Introduction to and Overview of SAR** A Richard, Environmental Protection Agency/HERL
8:50	**Structure-Based Toxicity Assessment: Rational Guidelines for Acceptance** V Gombar, HDI
9:30	**Coffee Break**

Sunday, April 20

10:00	**Expert Systems for Predicting Metabolism and Toxicity** H Rosenkranz, University of Pittsburgh G Klopman, Case Western Reserve University
10:40	**DEREK a Computer System for Toxicity Prediction** N Greene, LHASA UK
11:20	**An Intelligent Toxicology Prediction System** F Henry, Columbia Cascade, Inc.
12:00	**Lunch**
1:00	**Computer Modeling Studies of Enzyme Interactions** R Bohacek, Ariad Pharmaceuticals, Inc.
1:40	**Use of SAR in Health and Ecological Hazard Assessment at EPA** P Wagner, Environmental Protection Agency/OPPT
2:20	**FDA's Use of QSAR Decision Support Information** E Matthews, US Food and Drug Administration/CDER
3:00	**General Discussion: Is This Methodology Ready for Routine Use in Government Regulatory Decision Making?** D Benz, US Food and Drug Administration/CFSAN
3:30	**Coffee Break**

Sunday, April 20

WORKSHOP II
8:00 AM - 12:00 PM

Greenway H-J

SOURCES, EFFECTS, AND POTENTIAL HAZARDS OF GENOTOXIC COMPLEX MIXTURES IN THE ENVIRONMENT

Presiding:
David DeMarini, US Environmental Protection Agency,
Environmental Carcinogenesis Division
Paul White, US Environmental Protection Agency,
Atlantic Ecology Division

Most genotoxic substances encountered by humans and other organisms are contained in complex mixtures, such as urban air, chlorinated drinking water, industrial and municipal wastes, and combustion emissions. Although the methods required to assess the genotoxicity of complex mixtures are not fundamentally different from those used to evaluate single compounds, complex mixture research requires additional considerations. These include methods for sampling, extracting, and concentrating environmental samples, in addition to bioassay-directed chemical analysis to identify the biologically relevant chemical fractions and single compounds within mixtures. Subsequent research efforts can apply standard analytical techniques to investigate mechanisms of action, isolate putative toxicants, and evaluate environmental hazards. This workshop explores recent studies that, collectively, describe the sources, effects, and potential hazards of these mutagenic complex mixtures.

The workshop will examine the sources of mutagenic complex mixtures and will emphasize the relative contributions of municipal and industrial waste waters. A summary of the genotoxic effects of these mixtures will include descriptions of the DNA adducts and idiopathic lesions found in exposed aquatic organisms as well as the types of mutations induced by these mixtures and their chemical fractions. Finally, the workshop will characterize the potential hazards of mutagenic complex mixtures both to small populations of feral biota as well as to humans. The workshop will conclude with a directed discussion in which various issues and problems will be presented for discussion by the workshop participants.

8:00 **Overview of Workshop**
PA White, US Environmental Protection Agency,
Atlantic Ecology Division

Sunday, April 20

8:10	**Sources: Genotoxicity of Industrial Wastes and Effluents** LD Claxton, US Environmental Protection Agency, Environmental Carcinogenesis Division
8:35	**Sources: Genotoxicity of Municipal Wastes in Surface Waters** PA White, US Environmental Protection Agency, Atlantic Ecology Division
9:05	**Effects: Genotoxic Effects of Mutagens in Fish** U Varanasi, National Marine Fisheries Service, National Oceanic and Atmospheric Administration
9:35	**Coffee Break**
10:00	**Effects: Mutation Spectra of Complex Environmental Mixtures** DM DeMarini, US Environmental Protection Agency, Environmental Carcinogenesis Division
10:30	**Hazards: Heritable Mutations in Birds in Industrialized Areas** Carol L. Yauk, McMaster University, Hamilton
11:00	**Hazards: Mutation Accumulation and Extinction of Small Populations** M Lynch, University of Oregon, Department of Biology
11:30	**Hazards: Risk Assessment of Complex Mixtures** R Schoeny, US Environmental Protection Agency, National Center for Environmental Assessment
12:00	**Lunch**

Sunday, April 20

WORKSHOP III

1:00 -3:30 PM

Greenway H-J

THE USE OF MECHANISTIC DATA IN CANCER RISK ASSESSMENT

Presiding:
Rosalie Elespuru, US Food and Drug Administration

Carcinogenicity predictions, classifications and risk assessments are an integral part of public health evaluations of drugs, food additives, environmental chemicals and more. Over the last decade, significant gains in technology and information have improved our ability to study the mechanistic basis of chemically induced carcinogenesis. New methodologies using molecular approaches, in vitro systems, and transgenic animals have emerged. Federal agencies are proposing new risk assessment guidelines to allow the incorporation of new technologies and mechanistic approaches. This workshop assembles members from government, academia and industry to explore the issues involved in mechanistic approaches to qualitative and quantitative cancer risk assessment.

1:00	**EPA's 1996 Proposed Revisions to Guidelines for Carcinogen Risk Assessment: Use of Non-Tumor Data in Cancer Dose-Response Assessment** V Dellarco, US Environmental Protection Agency
1:30	**Human Exposure Assessment Using Carcinogen-Derived Biomarkers** S Hecht, University of Minnesota
2:00	**The Use of Cytogenetic Data for Estimating Low Dose Cancer Responses** RJ Preston, CIIT
2:30	**Genotoxicity and Anti-Genotoxicity Assessments in Target Tissues and Their Use in the Prediction of Cancer Development** BL Pool-Zobel, German Federal Research Center for Nutrition
3:00	**Roundtable Discussion**
3:30	**Coffee Break/Poster Session in Exhibits Hall**

Sunday, April 20

WORKSHOP IV
1:00PM -3:30 PM

Greenway F-G

INTEGRATION OF GENOTOXICITY EVALUATION INTO GENERAL TOXICOLOGY STUDIES

Presiding:
Bhaskar Gollapudi, Dow Chemical Company
Gopala Krishna, Parke-Davis Pharmaceutical Research

Co-Sponsors: R. J. Reynolds Tobacco Co.
The Dow Chemical Company

General principles of toxicology that govern the toxicity profile of a chemical are largely applicable in determining the genotoxic risk of the material. Factors such as the dose/route of administration, metabolism, pharmacokinetics, saturation of defense mechanisms, etc. also play critical roles in genetic toxicology assays. In vivo genotoxicity assays are often conducted by employing acute high-doses and in some instances, routes of exposure that are inappropriate for risk assessment. However, excellent opportunities do exist for integration of genetic tox end point in sub-chronic rodent toxicity studies which usually employ doses/routes of exposure that are useful in evaluating the risk. Such an approach will play a significant role in reducing animal usage, obtaining comprehensive data and interpreting the genotoxicity data in conjunction with other toxicological parameters. The workshop will provide a forum for the discussion of scientific, practical and regulatory issues on this subject.

1:00 **Introduction**
BB Gollapudi, Dow Chemical Company

1:15 **Evaluation of Genotoxic Risk in Conjunction with Toxicology Studies: Is Current In Vivo Technology Sufficient?**

Sunday, April 20

J MacGregor, SRI International

1:45 **In Vivo Studies on the Formation and Repair of DNA Adducts**
J Swenberg, University of North Carolina, Chapel Hill

2:15 **Blood Micronucleus Assay in Rodents**
M Hayashi, National Institute of Health Sciences, Tokyo, Japan

2:45 **Genotoxicity Assessment in Sub-chronic Studies: Practical Considerations**
G Krishna, Parke-Davis Pharmaceutical Research

3:15 **Genetic/General Toxicology: Regulatory Perspective**
K Dearfield, US Environmental Protection Agency

3:30 **Coffee Break/Poster Session in Exhibits Hall**

EXHIBITS

OPEN
3:30 PM - 5:30 PM

Exhibits Hall

Sunday, April 20 and Monday, April 21
Poster Session I
3:30 PM - 5:30 PM
Exhibits Hall

A: 3:30 PM - 5:30 PM Sunday - **ODD NUMBER POSTERS**
B: 3:30 PM - 5:30 PM Monday - **EVEN NUMBER POSTERS**

Note: Poster boards will be available from Sunday morning from 7:00 AM; all posters in Session I should remain on display until after the poster session on Monday evening.

GERM CELL STUDIES

1
Studies of mice heterozygous and homozygous for a reciprocal translocation T(7;17) 3BKM
DK Benova; Nat Cen Radiobio & Rad Protect, Sofia, Bulgaria

2
Evaluation of the reliability of the mouse epididymal sperm aneuploidy (ESA) 3-chromosome FISH assay
E Panico, X Lowe, C Sanders, J Bishop and A Wyrobek; Lawrence Livermore Nat Lab,Livermore, CA; and NIEHS, RTP, NC

3
Mechanisms of the chloral hydrate induced spermatid micronuclei: germ cells or supporting cells?
X Lowe, A Tcheong, B Collins, J Allen, J Bishop and AJ Wyrobek; Lawrence Livermore Nat Lab, Livermore, CA; US EPA, RTP, NC; and NIEHS, RTP, NC

4
Mice transgenic for rooster protamine demonstrate partial protection from methyl methanesulfonate induced chromatin damage
JA Bjordahl, LK Jost and DP Evenson; SD State U, Brookings, SD

5
Preimplantation paternal effects of acrylamide treatment on development and micronuclei formation in mice
N Titenko-Holland, T Ahlborn, X Lowe, N Shang, MT Smith and AJ Wyrobek; UC Berkeley, Berkeley, CA; and BBR Program L-452, LLNL, Livermore, CA

6
Mouse HSP70-2 associates with the synaptonemal complex and is essential for meiosis
J Allen, D Dix, B Collins, A Merrick, C Mori, P Poorman-Allen and M Eddy; USEPA, NIEHS and Glaxo Wellcome Inc, RTP, NC

7
Aneuploidy in rat epididymal sperm after treatment with carbendazim, detected with fluorescence in situ hybridization (FISH)
JM DeStoppelaar, J van Benthem, HW Verharen, X Lowe, AJ Wyrobek, JB Bishop and B Hoebee; Nat Inst Pub Health & the Env, Bilthoven, Netherlands; NIEHS, RTP, NC; and LLNL, Livermore, CA

8
Absence of mutagenicity in a flow cytometry procedure used for the separation of sperm based on DNA content
TE Lawlor, MS Mecchi, K Keyvanfar and ML Norton; Corning Hazleton Inc, Vienna, VA: and Genetics & IVF Inst, Fairfax, VA

MOLECULAR STUDIES

9
The effects of farnesylcysteine methyl-transferase (FCMT) activity on RAS activation in human stomach cancer tissues
HY Oh, ES Han, OS Heo, SJ Sohn, JH Park, SH Kim, SY Hong and KW Ha (intro by MY Heo); Tox Res Inst, KFDA, Seoul, Korea; and Sung Gyun Kwan U,Suwon, Korea

10
Detection of brachypodism inversions in mice using unidirectional primer PCR
SJ Lentz, G Ficsor, M Varricchio and B Tu; Western Michigan University, Kalamazoo,MI

11
Human chromosome 11 replication in the AL hybrid
H Franz, J Robinson and C Waldren; Colorado State U, Ft Collins, CO

12
Multiplex PCR for the analysis of deletion mutation in the rat lymphocyte HPRT assay
T Chen, RA Mittelstaedt and RH Heflich; NCTR, Jefferson, AR

13
Characterization of phenyl-b-D-galactoside selectable *lacI* mutants in an EBV-*lacI* shuttle vector in human cells
B Viswanath, WD Sedwick and ML Veigl; Case Western Reserve U, Cleveland, OH

14
Factors that influence the expression of the A human retrotransposon LIHS
JF Morales and JP Murnane; UCSF, San Francisco, CA

15
Expression of DNA repair genes in unfertilized eggs and 2-cell embryos of mice
X Lowe, E Panico, F Marchetti and AJ Wyrobek; Lawrence Livermore Nat Lab, Livermore, CA

16
Chromosomal instability does not correlate with mismatch repair deficiencies
MI Kaplan and WF Morgan; UCSF, San Francisco, CA

17
Detection of genomic instability in lung cancer tissues by random amplified polymorphic DNA analysis
T Ong, B Song, Z-L Wu and W-Z Whong; NIOSH, Morgantown, WV

18
Evaluation of six newly developed Salmonella strains for molecular analysis of mutation induced by complex environmental mixtures
TJ Hughes, P Matthews and LD Claxton; USEPA, RTP, NC

19
Induction of UV photoproducts and DNA damage by solar simulator UV irradiation
A Wolfreys, P Clingen and L Henderson; Unilever Res, Bedford, UK; and U of Sussex, Brighton, UK

20
Analysis of p53 in mouse lymphoma cells
LS Clark, DW Hart, PJ Vojta, K Harrington-Brock, KR Tindall and MM Moore; UNC, Chapel Hill, NC; NIEHS and USEPA, RTP, NC

21
DNA damage responses in human cells containing wild type or mutant p53
S Venkatachalam and AA Wani; Baylor College of Medicine, Houston, TX; and Ohio State U,Columbus, OH

22
Base-pair mutation caused by four nitro-group containing aromatic amines in *Salmonella typhimurium* TA100, TA104, TA4001 and TA4006
S-C Chen, TY Wong and K-T Chung; U Memphis, Memphis, TN

23
Chromosome aberrations and apoptosis in human cells with normal or mutant p53
S Greenwood, M Armstrong, C Bradt, T Johnson, C Hilliard, R Hill and S Galloway; Merck Res Labs, West Point, PA

24
Effects of DNA template and sequence context on the function of human DNA polymerase B
J Singh, ET Snow; NYU Med Cen, Nelson Inst Env Med, Tuxedo, NY

IN VITRO STUDIES

25
Induction and repair of DNA damage in mutant V79 Chinese Hamster cells studied with the Comet Assay
R Helbig and G Speit; U Ulm, Ulm, Germany

26
Detecting genotoxic activity against high molecular weight DNA using the alkaline single cell gel (SCG) assay
M Vasquez and RR Tice; Integrated Lab Systems, RTP, NC

27
Comparative analysis of apoptosis versus necrosis using the single cell gel (SCG) assay
M Vasquez and RR Tice; Integrated Lab Systems, RTP, NC

28
DNA damage in leukocytes, buccal cells and nasal epithelial cells of individuals exposed to air pollution in Mexico City
M Valverde, MC Lopez, TI Fortoul, P Ostrosky-Wegman and E Rojas; Inst. Invest. Biomedicas and Dept de Biologia Celular y Tisular, UNAM, Mexico

29
Evaluation of DNA damage using Comet Assay in human leukocytes of alcoholic and geriatric patients
MA Altamirano-Lozano, R Retana-Ugalde, VM Mendoza-Nunez and B Molina-Alvarez; Fac de Estudios Superiores-Zaragoza,UNAM; and Inst Nacional de Pediatria, Mexico

30
Human sperm DNA susceptibility to in situ denaturation is correlated to occurrence of DNA strand breaks measured by single cell micro-gel electrophoresis (Comet Assay)
R Aravindan, L Jost, D Evenson; South Dakota State U, Brookings, SD

31
Effects of agar in *Salmonella typhimurium* and *E. coli WP2* uvrA (pKM101) mutation assays
JB Majeska, HE Holden and D Studwell; Boehringer Ingelheim Pharm, Ridgefield, CT

32
Evaluation of positive controls for the In Vitro UDS Assay using hepatocytes from induced and uninduced male Cynomolgus monkeys
CM Hamilton, JE Dabbs, GD Cunningham, LA Vernetti, RD Snyder and JC Mirsalis; SRI International, Menlo Park, CA; and Abbott Laboratories, Abbott Park, IL

33
Solvent effects on S9 activation in the *Salmonella/E. coli* preincubation mutagenicity assay
VO Wagner III, ML Klug, KE Burnett, SC Twardzik, AR Pannell II, and EW Walton; Microbiological Associates, Rockville, MD

34
On the ability of the XPRT assay with AS52 cells to pick up clastogens and aneuploidy inducers
L Mueller, P Kasper, H Madle and G Kaufmann; Fed Inst Drugs & Med Devices, Berlin, Germany

35
Detecting polyploidy in regulatory in vitro cytogenetics assays
C Bourner, A Wolfreys and L Henderson; Unilever Res, Bedford, UK

36
pH and clastogenicity - lack of effect in cultured human lymphocytes
JD Kitching, C Mason and E Jones (intro by K Adams); Huntington Life Sciences Ltd, Huntington, Cambridgeshire; and Eye, Suffolk

37
Association of chromosome aberrations with cytotoxicity
C Hilliard, M Armstrong, R Hill, C Bradt and S Galloway; Merck Res Labs, West Point, PA

38
Calibration of the comet assay, flow cytometry and forward mutation in a CHO cell line
ED Wagner, AL Rayburn, D Anderson, J Tan and MJ Plewa; U Illinois, Urbana, IL; and BIBRA Toxicology Int, Carshalton, UK

ANIMAL MODELS

39
Evaluation of chromium picolinate in the rat *in vivo* chromosomal aberration assay
H Esber and V Moreno (intro by KS Loveday); GTC Mason Labs, Worcester, MA; and Nutrition 21, San Diego, CA

40
Flow cytometric analysis of micronuclei in rodent bone marrow
DK Torous, SD Dertinger, CR Tometsko; Litron Labs, Rochester, NY

41
Comparative sensitivity of three species of small mammals to bone marrow micronucleus induction
JR Meier, P Wemsing and J Torsella; USEPA, Cincinnati, OH; and SoBran, Inc, Cincinnati, OH

42
Application of the single cell gell assay and bone marrow micronucleus assay in *Peromyscus leucopus* (White-footed Mouse)
LW Chang, JR Meier; Ecolog Exposure Res Div, USEPA, Cincinnati, OH

43
The chromosome damaging potential of the intercalating agent 9-aminoacridine in the rat micronucleus assay
CV Williams and CA Moore (intro by JC Topham); Zeneca Pharmaceuticals, Macclesfield, UK

44
CI solvent yellow 14 shows activity in the bone marrow micronucleus assay in both the rat and mouse
BM Elliott, K Griffiths, JM Mackay and JD Wade; Central Tox Lab, Zeneca Ltd, UK; and Zeneca Specialties, Blackley, UK

45
Cadium chloride strongly enhances cyclophosphamide-induced chromosome aberrations in mouse bone marrow cells
VL Pandurangarao, S Blazina, R Bherje, A Sandor, T Nyirenda, S Dent and G Ficsor; Western Michigan University, Kalamazoo, MI

46
In vivo application of the cytokinesis blocked micronucleus technique in the rat
JM DeStoppelaar, H Hokse, HW Verharen, GR Mohn, B Hoebee, J van Benthem; Nat Inst Pub Health & the Envir, Bilthoven, The Netherlands

47
Comparative mutagenesis after ENU treatment in spleen, testis and brain from mice transgenic for the AM3 PHIX174 vector at various post injection intervals
HV Malling, RR Newbold and RP Weaver; NIEHS,RTP, NC

48

A mutational analysis of the *lacI* gene

JG DeBoer and BW Glickman; U Victoria, Victoria, BC, Canada

49

Dose response of benzo(a)pyrene-induced mutagenesis using the BigBlue® transgenic mouse assay

G Kotturi, J Holcroft, J de Boer, K Sojonsky, C Hamilton and B Glickman; U Victoria, Victoria, BC, Canada; and Axys Analytical Services, Inc, Sidney, BC, Canada

50

The importance of DNA unwinding time in the in vivo Skin Comet Assay

JE Yendle, H Tinwell, JM Mackay, BM Elliott and J Ashby; Cen Toxicology Lab, Zeneca, Alderley Park, UK

51

Transplacental transfer of N-ethyl-N-nitrosourea (ENU) to developing embryos of Big Blue™transgenic mice causes mutations in the liver and brain

AR Pellegrin, DL Smith, RR Tice and BS Shane; LSU, Baton Rouge, LA; and Integrated Laboratory Services, RTP, NC

52

Effects of 7H-dibenzo[c,g]carbazole and two derivatives on mutation frequency in liver and skin of Muta™Mouse

D Brault, F Tombolan, D Renault, F Perin and V Thybaud; Centre Universitaire, Orsay, France; and Rhone-Poulenc Rorer, Vitry sur Seine, France

53

Benzo[a]pyrene-induced lambda cII- mutations in Big Blue (B6C3F1) mice

JJ Monroe, JE Miller and T Skopek; Merck Res Labs, West Point, PA

54

Mutant frequencies in livers of female *lacI* transgenic "Big Blue" B6C3F1 Mice following chloroform inhalation

MV Templin, AA Constan, D Wolf, CS Sprankle, LJ Pluta, L Recio, BA Wong and BE Butterworth; CIIT, RTP, NC

55

Mutational spectra of the *lacI* transgene isolated from Big Blue® Mice exposed to three carcinogenic aromatic amines

F Staedtler, J Crespo-Perez, F Locher, G Sreenan and W Suter; Sandoz Pharma AG, Basel, Switzerland

56

Creating a mouse *tk+/- in vivo* model for mutagenicity studies

VN Dobrovolsky, DA Casciano and RH Heflich; NCTR, Jefferson, AR

57

Comparison of senescence patterns and cloning efficiency of splenocytes from p53 nullizygous and wild type mice

DM Zimmer and CS Aaron; Pharmacia & Upjohn, Inc, Kalamazoo, MI

58
High efficiency λ packaging of liver and lung DNA samples isolated using the Recoverease™ kit
RA Winegar and TV Nguyen; SRI International, Menlo Park, CA

59
A comparative approach to 7,12-dimethylbenz[a]anthracene effects: metabolism and mutagenesis in mice and fish
K Gallagher, J Cline, JL Gundersen and JG Burkhart; NIEHS, RTP, NC; and USEPA, Narragansett, RI

60
Liver tumors induced in B6C3F1 mice by benz[a]anthracene and two of its halogenated derivatives contain K-*ras* oncogene mutations
Q Xia, P Yi, D Zhan, LS von Tungeln, RH Heflich, PP Fu; NCTR

61
Lymphocyte HPRT mutations in mice treated as neonates with ENU, DMN or PHIP
SB Dass, RH Heflich and DA Casciano; NCTR, Jefferson, AR

62
Comparison of mutational spectra in *HPRT* exon 3 of T-cells from B6C3F1 mice and F344 rats exposed by inhalation to 1,3-butadiene
Q Meng and VE Walker; NY State Dept of Health, Albany, NY

63
Spectra of mutations in *HPRT* exon 3 of T-cells from F344 rats and *lacI* transgenic and nontransgenic B6C3F1 mice exposed by inhalation to ethylene oxide
VE Walker, Q Meng, NL Clement; NY State Dept of Health, Albany, NY

64
Chromosome painting analysis of radiation-induced aberrant cell clones in the mouse
MD Spruill, JD Tucker and J Nath; WVU, Morgantown, WV; and BBRP, LLNL, Livermore, CA

65
The cytogenetic effects of daily in vivo exposures to low doses of gamma radiation in mice
KJ Sorensen and JD Tucker; LLNL, Livermore, CA

66
Determination of gene mutations and cytogenetic damage in B6C3F1 Big Blue® mice treated with benzo(a)pyrene (BP), *N*-Ethyl-*N*-Nitrosourea (ENU), and *N*-Nitrosodimethylamine (NDMA)
BB Gollapudi and KM Jackson; Dow Chemical Co, Midland, MI

67
Development of a pSPORT1 plasmid-based transgenic mouse mutation test system
HX Li, JX Li, H Yang, YP Hu, XP Wang, GR Hao and JL Fu; 2nd Military Medical Univ, Shanghai, PRC

68
Under recovery of aneugen-induced micronucleated polychromatic erythrocytes (MN-PCE) following cellulose column fractionation of mouse bone marrow
SJ Lick and BB Gollapudi; Dow Chemical Co, Midland, MI

HUMAN STUDIES

69
Monitoring for DNA damage in human populations using the alkaline single cell gel (SCG) assay - lessons learned
PW Andrews, M Vasquez, RR Tice, A DeRoos, MJ Schell and MF Vine; Integrated Lab Systems, RTP, NC; and UNC-Chapel Hill, NC

70
Searching for causes of human genetic disease
R Elespuru; FDA, Rockville, MD

71
Selection for p53 mutations
S Rodin, GP Holmquist and A Rodin; City of Hope-Biology, Duarte, CA

72
The effect of transcription level on spontaneous mutation rate in human cells
MJ Lippert and HL Liber; Harvard School Public Health, Boston, MA

73
Hypermutable phenotype frequency in the human population
VL Wilson, X Yin, KR Wade, CM Jackson, B Thompson and WR Lee; LSU, Baton Rouge, LA

74
Cytogenetic comparison of three control populations as measured by chromosome painting
MJ Ramsey, DO Nelson, L Long-Simpson, V Garry and JD Tucker; LLNL, Livermore, CA; and U of Minnesota, Minneapolis, MN

75
The development and application of an advanced immunophenotyping method: determinations of relative drug sensitivity to DNA damage via comet assay in heterogeneous populations of normal cells and metastatic breast cancer cells from bone marrow (BM)
GHS Strauss and RR Tice; Duke U Med Ctr, Durham, NC; and Integrated Laboratory Systems, RTP, NC

76
Elevated frequencies of *HPRT* mutant lymphocytes in newborns of women who smoke marijuana
MM Ammenheuser, DA Hastings, AB Berenson, CR Singleton and EB Whorton, Jr; UTMB, Galveston, TX

77
***hprt* mutant frequency and spectrum in T-lymphocytes of small cell lung cancer patients receiving etoposide chemotherapy**
L Karnaukhova, J Moffat, H Martins and B Glickman; U Victoria and Victoria Clinic, Victoria, BC, Canada

78
Development of improved visualization techniques for the micronucleus assay in exfoliated buccal cells of humans
SL Nguyen; Illinois State U, Normal, IL

79
Mutagenic effect of methanol in gas station operators from Sao Paulo, Brazil
GJF Gattas, LA Cardoso, MM Faria, VL Zaher, E Doppenschmitt, CAB Pereira and PH Saldanha (into by WW Au); Legal Med, Ethics & Occ Med-FMUSP; Inst Math Stat-USP; and Bio Dept-USP, Sao Paulo, Brazil

80
Biomarkers in humans exposed to polycyclic aromatic hydrocarbons
B Binkova, J Topinka, G Mrackova, D Gajdosova, P Vidova, L Dobias, V Peterka, I Kalina, RJ Sram; Med Acad Sci, Prague, Czech Repub; Special Inst Hygiene; Epidem and Med Faculty Safarik U, Kosice, Slovakia

81
Hyperhaploid and tetraploid sperm detected in men who ingested ultra-high doses of diazepam
A Baumgartner, AE Czeizel, I-D Adler, X Lowe, TE Schmid and AJ Wyrobek; LLNL, Livermore, CA; GSF-Inst Saugetiergenetik, Neuherberg, Germany; and Nat Inst Hygiene, Budapest, Hungary

CHEMICAL STUDIES

82
Evaluation of the TOPKAT Version 3.0 Structure-Activity-Relationship mutagenicity model database using select compounds previously tested in the Ames Assay
MA Mehesy, WB Mattes and JC Kapeghian; Ciba Pharmaceuticals, Summit, NJ

83
Genetic activity profiles (GAP) for Windows™
HF Stack, MA Jackson, PHN Lohman, WJA Lohman and MD Waters; Integrated Lab Systems, RTP, NC; U of Leiden, Leiden, The Netherlands; and US EPA, RPT, NC

84
Photogenotoxicity studies of Clinafloxacin, a quinolone antiinfective agent
J Theiss, T Festerling, M Dokmanovich, J Samoy, M Bush, S Bulera and V Ciaravino; Parke-Davis Pharm Res, Div Warner Lambert Co, Ann Arbor, MI

85
Chemopreventive effect of quercetin and its glycosides against oxidative DNA damage and cytotoxicity
YJ Kim and MY Heo; Kangwon National U, Chunchon, S Korea

86
Oral administration of DMVC in TG.AC mice induces V-HA-*RAS* transgene expression in forestomach papillomas
S Graves, RE Cannon, JW Spalding, EM Furedi-Machacek, RR Tice and RW Tennant; North Carolina State U, Raleigh, NC; NIEHS, RTP, NC; and Integrated Lab Systems, RTP, NC

87
The sulfured aminoacid taurine increased dimethilnitrosamine's genotoxicity in somatic cells of *Drosophila melanogaster*
MG Ordaz-Tellez and P Ramos-Morales; UNAM Fac de Ciencias

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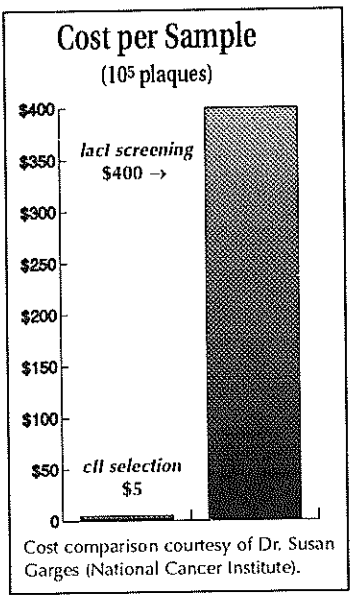

Cost comparison courtesy of Dr. Susan Garges (National Cancer Institute).

1. Jakubczak, J.L. *et al.* (1996) *Proc. Natl. Acad. Sci. USA* **93**, 9073. Reprints available from Epicentre.

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Sunday, April 20

KEYNOTE ADDRESS

5:30 PM - 6:30 PM

Nicollet A/B

Sponsor: Merck Research Laboratories

Mutability and Infectious Disease

Dr. Joshua Lederberg
Rockefeller University
New York, NY

EMS AWARDS

6:30 PM - 7:30 PM

Nicollet A/B

RECEPTION

7:30 PM - 11:00 PM

Nicollet C/D
Sponsor: Microbiological Associates

Monday, April 21

COMMITTEE BREAKFASTS
7:00 AM-8:00 AM

Future Directions
Lake Itasca

Membership
Cedar Lake

Electronics
Lake Harriet

IAEMS
Lake Nokomis

Education
Lake of the Woods

Hollaender
Lake Minnehaha

Communications
Lake Minnetonka

Monday, April 21
SYMPOSIUM I
8:00 AM - 11:00 AM
Nicollet A/B

EMERGING PATHOGENS

Presiding:
Tom Cebula, US Food and Drug Administration,
Division of Molecular and Biological Research & Evaluation

Sponsor: Pharmacia & Upjohn, Inc.

Over the past two decades, we have witnessed the emergence of new pathogens and the facility of several seemingly innocuous microorganisms to evolve into pathogens. Recent foodborne outbreaks of human disease caused by organisms such as *Escherichia coli* O157:H7, *Salmonella enteritidis*, and *Listeria monocytogenes* have focused the public's attention to the conundrum called "emerging pathogens." The emergence of resistance to a battery of clinically useful antibiotics and the ability of microbes to develop strategies to persist in conditions of stress such as nutrient deprivation, low pH, high salt, refrigeration and food processing temperatures (i.e., traditional barriers for food safety) have heightened public awareness and interest in these organisms. Moreover, the proficiency of microbes to acquire virulence factors and ways to evade our immune response have underscored the immediacy and seriousness of this public health problem.

Dr. Joshua Lederberg will begin framing the complexities of emerging pathogens in his Keynote Address, "Mutability and Infectious Disease," and Dr. John Mekalanos will continue as he describes bacterial virulence and the mechanisms by which microorganisms become pathogenic. These talks shall provide critical foundation as the Symposium proceeds into a discussion of bacterial evolution and the effects of methyl-directed mismatch repair (MMR). Dr. J. Eugene LeClerc will share data showing that mutators, which occur among pathogenic *E. coli* and *Salmonella enterica* at an incidence much higher than expected, are due to defects in MMR, and Dr. Paul Sniegowski will discuss the emergence of mutators, also defective in MMR, in long-term continuous cultures (10,000 generations) of *E. coli* B. The consequences of MMR-defective strains among natural populations, such as horizontal transfer, homeologous recombination, and bacterial evolution will be considered. Dr. Miro Radman will lead this provocative discussion and be asked to summarize the proceedings and to share his thoughts and insights on this subject.

Monday, April 21

8:00	**Introduction** T Cebula, US Food and Drug Administration
8:10	**Bacterial Virulence** J Mekalanos, Harvard University
8:50	**Mutators Among Pathogenic *Escherichia coli* and *Salmonella enterica*** JE LeClerc, US Food and Drug Administration
9:30	**Coffee Break/Exhibits Hall**
10:00	**Evolution of High Mutation Rates in Experimental Populations of *Escherichia coli*** P Sniegowski, Michigan State University
10:40	**Discussion** M Radman

EMS BUSINESS MEETING
11:00 AM-12:00 PM

Nicollet A/B

EXHIBITOR WORKSHOPS

12:00 PM - 1:00 PM

LITRON LABS and STRATAGENE

Skyway A&B

EPICENTER TECHNOLOGIES

Mirage Room

Monday, April 21

SYMPOSIUM II
1:00 PM - 3:30 PM

Greenway A/E

GERM CELL EFFECTS

Presiding:
Susan Lewis, Research Triangle Institute
Center for Life Science and Toxicology

Two main topics will be considered by the speakers in this symposium. The first topic is the re-evaluation of the spontaneous germinal mutation rate, taking into account its origin in a number of different stages of germ cell development. Determining the proportion of newly arisen mutations vs. those preexisting in previous generations is an important consideration when determining human risk for genetic disorders. Human databases on exposed populations and control cohorts exist for analysis, and these are enhanced by studies in experimental organisms, particularly Drosophila and the mouse. In considering both spontaneous and induced germinal mutations, it is important to keep in mind that germinal mutations can occur at any point in the life cycle and are not limited to stem cells in the mature gonad. Thus, mutations occurring in the germ line during embryonic and fetal development, as well as postgonial mutations in the gonad, can also contribute to control frequencies. Consideration of these matters should add complexity and interest to the evaluation of spontaneous mutation.

The second topic involves the use of new technology such as biomolecules for germinal mutation studies. Classically, mutational endpoints have exploited a number of morphological, biochemical, and cytogenetic endpoints. The new methods feature the direct examination of DNA to detect heritable damage. Recently, a number of investigators have been studying the impact of mutagenic agents on the rate of change of variable microsatellites from one generation to another. Results from different laboratories using this new system will be compared and evaluated.

Monday, April 21

1:00 **Developmental Biology of the Mammalian Germ Cell**
SE Lewis, Research Triangle Institute, Center for Life Science and Toxicology

1:30 **Spontaneous Germ Line Mutations**
WR Lee, Louisiana State University, Institute for Mutagenesis

2:00 **The Doubling Dose of Ionizing Radiation in Drosophila, Man, and Mouse**
JV Neel, The University of Michigan Medical School, Department of Human Genetics

2:30 **Radiation-Induced Mutation at Minisatellite Loci in Mammals**
YE Dubrova, Department of Genetics, University of Leicester, UK

3:00 **From Minisatellites and Genes: When do Germinal Mutations Occur?**
H Mohrenweiser, Lawrence Livermore National Laboratory

3:30 **Coffee Break/Poster Session in Exhibits Hall**

Monday, April 21

SYMPOSIUM III

1:00 PM - 3:30 PM

Greenway F/J

PHOTOACTIVATION OF XENOBIOTICS TO MUTAGENS

Presiding:
Peggy J. Guzzie, Pfizer, Inc., Groton, CT

Sponsor: American Industrial Health Council and Pfizer, Inc.

Several xenobiotics with little or no direct mutagenic potential have been shown to absorb UV light and become photomutagenic or produce photomutagenic free radicals. These compounds include drugs such as psoralens, coumarins, chlorpromazine, some fluoroquinolone antibiotics as well as some dermally applied sunscreens such as p-aminobenzoic acid (PABA). A few of these compounds have also been shown to be photocarcinogenic in vivo. There has been some recent considerations for screening compounds that are photoreactive for photomutagenicity. Over the last few years, a couple of laboratories have developed test systems for assessing photomutagenic potential. Although there has been some attempt to establish guidelines for photomutagenicity testing (COLIPA) there are still an array of solar simulators and protocols in use and no concerted attempt has been made to validate test systems across classes of compounds or between laboratories. In addition, little is known about factors that could modulate the response such as excessive cytotoxicity or inhibition of UV repair enzymes in vitro, or the effects of erythema and inflammation in vivo.

This symposium will introduce the basic concepts of photochemistry and photobiology, and discuss some potential mechanisms involved in photomutagencity. A few of the test systems that have been developed for assessing photomutagencity and photocarcinogenicity will be described and a regulatory perspective will be presented.

Monday, April 21

1:00	**Photochemical Aspects of Photomutagenesis** C Chignell, NIEHS
1:30	**Psoralen Photochemistry and Its Relationship to Photomutagenicity** FP Gasparro, Thomas Jefferson University, Department of Dermatology & Cutaneous Biology
2:00	**Development and Use of Bacterial Gene Mutation and in vitro Chromosomal Aberration Methods to Detect Photomutagens** D Kirkland, Hazleton Europe Ltd.
2:30	**Photomutagenesis and Photocarcinogenesis: In Search of Biomarkers** D Forbes, Argus Research Labs
3:00	**Photomutagenicity Testing as a Fundamental Element to Assess the Photocarcinogenic Potential of Pharmaceuticals** L Müller, BfArM, Germany
3:30	**Coffee Break/Poster Session in Exhibits Hall**

Monday, April 21

POSTER SESSION IB

3:30 PM - 5:30 PM

Exhibits Hall

Sponsor: FMC Corporation

SPECIAL PUBLIC LECTURE

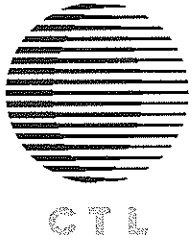
7:00 PM

Nicollet A/B

THE SEARCH FOR OUR GENES: Progress and Promise

Anthony V. Carrano
Lawrence Livermore National Laboratory

Presiding: Dr. R. J. Albertini



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Dr J M Mackay
Manager, Genetic Toxicology
44 1625 512826
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James.Mackay@APVXC1.ZENECA.COM

Tuesday, April 22

SPECIAL INTEREST BREAKFASTS
7:00 AM-8:00 AM

DNA Repair
Lake Minnetonka

Risk Assessment
Cedar Lake Room

Transgenics
Lake Nokomis

Tuesday, April 22

SPECIAL LECTURE

8:00 AM-9:00 AM

Nicollet A/B

SPECTRUM OF SPONTANEOUS FRAMESHIFT MUTATIONS IN HUMANS: A Genomic Approach

Dr. Lynn Ripley
Department of Microbiology and Molecular Biology
UMDNJ, Newark, NJ

Tuesday, April 22 and Wednesday, April 23
Poster Session II
EXHIBITS HALL

A: 9:00 AM - 11:30 AM Tuesday - ODD NUMBER POSTERS

B: 3:30 PM - 5:30 PM Wednesday - EVEN NUMBER POSTERS

Note: Poster boards will be available on Tuesday morning; all posters for Session II should remain on display until after the poster session on Wednesday.

ENVIRONMENTAL STUDIES

1

Induction of genotoxic and mutagenic effects by laser pyrolysis products

U Plappert, B Stocker, R Helbig and TM Fliedner (intro by G Speit); U Ulm, Ulm, Germany

2

Comparison of mutational spectra from cosmonauts and Russian twins: occcupation versus life style and environment

M Khaidakov, J Curry and BW Glickman; U Victoria, Victoria, BC, Canada

3

Mutagenicity and antimutagenicity studies of airborne particles from Guangzhou

L Qian, Y He, J Chen, X Chen and H Yang(intro by Y Cai); Guangzhou Normal U, Guangzhou, PRChina

4

Evidence for oxidative metabolism in the genotoxicity of 2-nitronaphthalene and 2-nitrodibenzopyranone

JC Sasaki, J Arey, DA Eastmond, KK Parks and AJ Grosovsky; UC-Riverside, Riverside, CA

5

Assessment of uranium exposure in a community near former uranium mining and milling

MA McConnell, VMS Ramanujam, N Alcock and WW Au; UTMB, Galveston, TX

6

Toxicity testing of trinitrotoluene-contaminated soil composts

ME Honeycutt, VA McFarland and AS Jarvis; TNRCC TARA, Austin, TX; and USAEWES, Vicksburg, MS

7

Toxicity of Corexit 9527 and Nigerian crude oil *In Vivo* and *In Vitro*

S George, G Nelson, L Brooks, S Warren, B Eischen and M Kohan; US EPA, RTP, NC

8
Asbestos and ceramic fibers cause apoptosis in Syrian Hamster embryo fibroblasts
D Schiffmann and E Dopp; U Rostock, Rostock, Germany

9
Micronucleus assay and mitotic activity - the methods for determination of recent vinyl chloride monomer exposure
A Fucic, V Garaj-Vrhovac; Inst Med Res Occup Health, Zagreb, Croatia

10
Genotoxicity of contaminated soil and well water detected by plant bioassays.
TH Ma and MS Kong; Western IL U, Macomb, IL

11
A research about the water environment of GuiLin by Tradescandia Assay
YG Jiang, ZD Yu, GZ Liu, RZ Chen and GY Peng; GuiLin Env Monitoring Station, GuiLin, PRC; and GuiLin Inst of Botany, GuiLin, PRC

12
In vivo and in vitro genotoxicities of organotin pesticides
LY Wei, JS Chao and CC Hong; Nat Sci Council, Taipei, Taiwan, ROC

13
Comparative studies on genotoxic effects of environmental chemicals using plant, animal, and human test systems
BS Gill, GL Cabrera, GMG Martinez, DMG Rodriguez and LML Cabrera; U Queretaro,Queretaro, Mexico

14
Biological monitoring of environmental hazards to health associated with waste disposal sites
GL Cabrera, DMG Rodriguez, SA Perez, AB Maruri and MG Guerrero; U Queretaro, Queretaro, Mexico

15
Tradescantia bioassay methods in China
Y Cai and S Miao; Guangzhou Teachers' College, Guangzhou, PRC

16
Induction of Cytochrome P-450 Isozyme 2A5 in parasite-infected mice
R Montero, G Gentile, T Murphy, J McMannis and J Gentile; UNAM, Mexico, Mexico; and Hope College, Holland, MI

17
Results of genetic examination of population living in radiative polluted regions of Siberia
NN Ilyinskikh, EN Ilyinskikh and LN Ilyinskikh; Siberian Med Univ, Tomsk, Russia

18
Micronucleus test of erythrocytes and lymphocytes in the blood of the people living in the radiation pollution zone as a result of the accident at the Siberian Chemical Plant on April 6, 1993
NN Ilyinskikh, II Ivanchuk and EN Ilyinskikh; Siberian Med Univ, Tomsk, Russia

19
Genotoxic effects of isothiocyanates
F Kassie, S Musk, BL Pool-Zobel and S Knasmuller; Inst of Tumor Bio/ Cancer Res, Vienna, Austria; Inst of Food Research, Norwich, UK;and State Inst for Nutrition, Karlsruhe, Germany

CHEMICAL STUDIES

20
Mutagenicity of 9-aminoacridine to L5178Y TK +/- cells
P Clay, CV Williams, JM Mackay and BM Elliott; Central Tox Lab and Safety of Medicines, Macclesfield, UK

21
Genomic instability induced by chemical mutagens and cancer chemotherapeutic agents
EM McGhee and WF Morgan; UCSF, San Francisco, CA

22
Mutational spectra at the thymidine kinase locus of spontaneously-arising and mitomycin C (MMC)-induced mutants in two closely related human lymphoblast cell lines
Y-Y Chuang and HL Liber; Harvard School Public Health, Boston, MA

23
Search for biomarkers of animal exposure to cadmium
C Ikediobi, J Liu, L Latinwo and N Ugochukwu; Florida A&M U, Tallahassee, FL

24
The mutagenicity and carcinogenicity of CI-1010, a nitroimidazole anticancer agent
M Kropko, S Wold, J Theiss, M Breider and M Graziano; Warner Lambert Co, Ann Arbor, MI

25
The mutagenic spectrum of cinnamaldehyde *in vitro* and *in vivo*
KR Kim, KH Cho and J-C Ryu; Korea Inst Sci & Tech; and Seoul Woman's U, Seoul, Korea

26
Bropirimine fails to induce mutations in the presence of human S9 under conditions known to produce an epoxide metabolite
JK Mayo, K Pant, A Thilagar, LC Wienkers and CS Aaron; Pharmacia & Upjohn, Inc, Kalamazoo, MI; and SITEK Res Labs, Rockville, MD

27
Bropirimine fails to induce chromosomal aberrations in human lymphocytes in vitro in the presence of human S9 metabolic activation
RL Yu, CS Aaron, JK Mayo and RL Voorman; Pharmacia & Upjohn, Inc, Kalamazoo, MI

28
Use of urine metabolite profiles in mice to understand mutation and cancer susceptibility in humans from exposure to heterocyclic amines in foods
JS Felton, DM Eades, MA Malfatti and MG Knize; LLNL, Livermore, CA

29
Thalidomide is not mutagenic to L5178Y TK +/- mouse lymphoma cells
P Clay, J Ashby, JM Mackay and BM Elliott; Central Tox Lab, Zeneca, Macclesfield, UK

30
Characterization of DNA adducts derived from the environmental mutagen cyclopenta[cd]pyrene
JJ Hayward, R Sangaiah, A Gold, LM Ball; UNC-Chapel Hill, NC

31
Vitamin C and B-Carotene modulates the endogenous antioxidant activity of Bleomycin-treated rats
LE Lyn-Cook, VG Desai, A Aidoo, R Feuers and DA Casciano; NCTR, Jefferson, AR

32
Oxymetholone: A non-genotoxic carcinogen?
D Studwell, HE Holden and JB Majeska; Boehringer Ingelheim Pharm, Ridgefield, CT

33
Antimutagenic effects of Ascorbic Acid, Chlorophyllin, and (+)-Catechin on selected antitumor agents
J Zwiesler, S Rahimi, K Te, GJ Gentile, R Montero, LR Ferguson and JM Gentile; Hope College, Holland, MI; Inst Investiga Biomed, UNAM; and U Auckland Medical School, Auckland, NZ

34
The Genotoxicity of Molinate
KR Kim, O-S Kwon, KH Cho and J-C Ryu; Korea Inst Sci & Tech, Seoul, Korea; and Seoul Woman's U, Seoul, Korea

MOLECULAR STUDIES

35
Brine Shrimp Gene Expression Model for Investigation of Teratogenic Agents
LM Soler-Niedziela, CT Butts and H White; NC A&T State U, Greensboro, NC

36
Effect of alachlor treatment on the formation of 2,6-dinitrotoluene hepatic DNA adducts in Fisher 344 rats
MJ Kohan, SE George, LR Brooks and LC King; USEPA, RTP, NC

37
K-ras codon 12 mutations in primary lung tumors
HH Nelson, DC Christiani, JK Wiencke, J Wain and KT Kelsey; Harvard School Public Health, Boston, MA; Mass General Hospital, Boston MA; and UCSF, San Francisco CA

38
Development of genotypic selection methods combining allele-specific amplification and the muts/exonuclease approaches
BL Parsons and RH Heflich; NCTR, Jefferson, AR

39
Repair of benzo[A]pyrene diol epoxide-DNA adducts in the DHFR gene of a human embryonic kidney cell line
LJ Schild, CA Smith, PC Hanawalt and WM Baird; Purdue U, W Lafayette, IN and Stanford U, Stanford CA

40
Repair of dibenzo[a,l]pyrene diol epoxide-DNA adducts in CHO-B11 cells
BT Rotz, LJ Schild, CA Smith, PC Hanawalt, A Seidel, A Luch, KL Platt and WM Baird; Purdue U, W Lafayette, IN; Stanford U, Stanford CA; and U Mainz, Mainz, Germany

41
Differential removal of dibenz[a,h]anthracene-DNA adducts in MCF-7 human mammary carcinoma cells
KL Kudla and WM Baird; Purdue U, W Lafayette, IN

42
Evidence from xeroderma pigmentosum complementation group D (XP-D) cells, which repair pyrimidine 6-4 pyrimidones (6-4s) but not cyclobutane pyrimidine dimers (CPD), that both photoproducts are mutagenic
WG McGregor, B Tung, VM Maher and JJ McCormick; Michigan State U, E Lansing, MI

43
Strand and sequence specific polymerization of HIV-1 reverse transcriptase (HIV-1RT), and beta polymerase on benzo[A]pyrene-7,8-dihydrodiol -9,10-epoxide adducted DNA at the third position of N-ras codon 61
P Chary, CM Harris, TM Harris, and RS Lloyd; UTMB, Galveston, TX; and Vanderbilt U, Nashville TN

44
Investigation of a chromosome-specific aberration by fluorescence in situ hybridization with a probe made from the Chinese hamster ovary X chromosome by microdissection
DH Blakey, KC Huang, JM Bayley; Env Health Centre, Ottawa, Canada

45
Acrylamide mutagenicity and the molecular characteristics of acrylamide-induced *lacZ* mutations in transgenic mice
GR Douglas, J Jiao, JD Gingerich and LM Soper; Env Health Centre, Ottawa, Canada

46
Effect of aflatoxin B1-8,9-epoxide-DNA adducts on transcription of a *SUPF* gene fragment
JM Cahill, F-L Yu, LJ Lipinski and A Dipple; NCI-Frederick Canc Res Dev Cen, Frederick, MD

47
Sequence specific mutations induced by N-nitrosodimethylamine at two marker loci in human lymphoblastoid cells
KL Dobo, DA Eastmond and AJ Grosovsky; UC Riverside, Riverside, CA

48
Sample size estimation for mutational spectra analysis with a computer-based data simulation method
H Ma, J Rosenblatt and JB Ward Jr; UTMB, Galveston, TX

49
Identification of repeat sequences within the gpt integration site in AS52 cells
DW Hart and KR Tindall; NIEHS, RTP, NC

50
Mutational specificity at the *HPRT* locus in mismatch repair deficient cancer cell lines
WE Glaab and KR Tindall; U North Carolina, Chapel Hill, NC; and NIEHS, RTP, NC

51
Creation of a heterozygous endogenous mutation target in a human cell line with a DNA mismatch repair phenotype
A-H Ma, ML Veigl, WD Sedwick; Case Western Reserve U, Cleveland, OH

52
Characterization of competitive PCR for quantitation of gene amplification in mouse proto-oncogenes.
W-Z Whong, H-W Qian, B Song and T Ong; NIOSH, Morgantown, WV

53
Polyadenylation polymorphism in N-acetyltransferase 1 (NAT1) gene and risk for development of lung cancer
SZ Abdel-Rahman, RA El-Zein and WW Au; UTMB, Galveston, TX

IN VITRO STUDIES

54
The use of an internal standard in the single cell gel (SCG) assay
A Udumudi, M Vasquez, PW Andrews, RR Tice and GJ Hook; Integrated Lab Systems, RTP, NC; and CanTox, Inc., Missasuaga Ont, Canada

55
Molybdenum salts are genotoxic
N Titenko-Holland, J Shao, L Zhang, L Xi, Ngo H, N Shang and MT Smith; UC Berkeley, Berkeley, CA,

56
Transformation of human osteoblasts to anchorage-independent growth by sodium arsenite
Y Hu and T Rossman; Nelson Inst Env Med, Tuxedo, NY,

57
Arsenic is cytotoxic at micromolar concentration, but does not inhibit purified human DNA repair enzymes at less than millimolar concentrations
L Su, Y Hu, B Dunlop and ET Snow; NYU Med Cen, Tuxedo, NY

58
The neoplastic potential of rat tracheal epithelial cell lines induced by dibenzo(a,i)pyrene and 1-nitropyrene
M Xiang, A Hubbs, G Zhou, J Nath, T Ong; WVU & NIOSH, Morgantown WV

59
Induction of p53 protein expression by sodium arsenite
AM Salazar, P Ostrosky-Wegman, D Menendez, E Miranda, A Garcia-Carranca and E Rojas; UNAM, Mexico, DF, Mexico; UNAM, Hospital General de Mexico

60
Chemicals uniquely mutagenic in Salmonella typhimurium strain TA1535
MJ Prival and E Zeiger; USFDA, Washington, DC; and NIEHS, RTP, NC

61
Evaluation of commercially available smoke flavorings used on foods
KP Putnam, DW Bombick, JT Avalos and DJ Doolittle; R J Reynolds Tobacco Co, Winston-Salem, NC

62
Detection of malondialdehyde DNA adducts from salmonella TA104 cells incubated with malondialdehyde or chloral hydrate
P-Yi, Y-C Ni, D Zhan, PP Fu (Introd by A Aidoo); NCTR, Jefferson, AR

63
Chemical-induced alterations in the patterns of synthesis of nuclear stress proteins in cultures of primary hepatocytes from Fischer 344 rats
JG Shaddock, JL Pipkin, WG Hinson, DA Casciano; NCTR, Jefferson, AR

64
Role of 'classical nitroreductase' and o-acetyl-transferase in the mutagenicity of plant activated aromatic amines
YH Ju and MJ Plewa; U Illinois, Urbana, IL

65
Analysis of soybean processing by-products for antimutagenic activity
MJ Plewa, AL Rayburn, L Adams, K Repetny, L Kirchoff, S Connolly, R Stringham, and ED Wagner; U Illinois, Urbana, IL

66
Chemoprotective activity of a soybean processing by-product against induced DNA damage and free radical formation
G Mitiku, DL Madhavi, A Smirnov and MJ Plewa; U Illinois, Urbana-Champaign, Urbana, IL

67
Variability in S9 function caused by nicotinamide adenine dinucleotide phosphate (NADP) and D,L-isocitric acid (ICA) in the L5178Y TK+/- mouse lymphoma mutagenesis assay
JJ Clarke, BM Marx, CA Mumford, JD Reece and RHC San; Microbiological Associates, Rockville, MD,

68
Induction of drug resistance mutations by anti-cancer drug combinations
RD Anderson, D Gunnerson and J Bourisseau; Case Western Reserve U, Cleveland, OH; and Veterans Affairs Med Cen, Cleveland OH

69
A fluorescent host cell reactivation assay detects the effects of DNA repair inhibitors.
RD Anderson and B Jiang; Case Western Reserve U, Cleveland, OH; and Veterans Affairs Med Cen, Cleveland, OH

70
Induction of micronucleus formation in V79 cells by fractions of roofing asphalt fume condensate
H-W Qian, J Stewart, L Olsen, J Nath and T Ong; NIOSH Morgantown, WV, West Virginia U; and NIOSH, Cincinnati OH

71
Antimutagenicity of B-carotene to mutations induced by quinolones on S.typhimurium.
M Arriaga-Alba, F Barron Moreno, R Rivera-Sanchez, G Parra-Cervantes, R Flores-Paz and E Garcia-Jimenez; Av Inst Politecnico Nacional Mexico,D.F., Mexico

72
Frameshift mutagenicity of aromatic amines related to aminofluorene in a *lacZ* reversion assay in E. coli
GR Hoffmann, R Janel-Bintz and RPP Fuchs; Holy Cross College, Worcester, MA; and CNR, Strasbourg, France

73
Genotoxicity of lead, cadmium and arsenic in cultured mammalian cells (AL)
M McGraw, C Waldren, F Carvalho and D Gustafson; Colorado State U, Ft Collins, CO; and U Fed da Bahia, Brazil

HUMAN STUDIES

74
Exercise induced-DNA damage in humans is not accompanied by increased formation of 8OHDG or induction of micronuclei
A Hartmann, S Pfuhler, C Dennog, D Germadnik, A Pilger and G Speit; UCSF, San Francisco, CA; Universitat Ulm, Ulm, Germany; and Universitat Wein, Wien, Austria

75
Genetic Damage Induced by Benzo[a]pyrene Diol Epoxide and Risk of Lung Cancer
Q Wei, L Cheng, D Li, M Wang, J Gu, H Jiang, WK Hong; UT MD Anderson Can Cen, Houston, TX

76
Effect of cigarette smoking and genetic predisposition on DNA repair capacity as measured by the host cell reactivation assay.
LM Hallberg, R El-Zein and WW Au; UTMB, Galveston, TX

77
Inheritance of unfavorable metabolizing genes, increased chromosome aberrations and risk for lung cancer
R El-Zein, NC Froes, S Abdel-Rahman, JB Zwischenberger and WW Au; UTMB, Galveston, TX and Univ. Estadual Paulista, Paulista, Brzil

78
HPRT mutant lymphocyte frequencies in workers in a petrochemical plant
JB Ward Jr, DA Hastings, EB Whorton Jr and MM Ammenheuser; UTMB, Galveston, TX

79
Micronucleus (MN) frequency in nasal respiratory epithelium cells from young adults living in urban areas with different levels of air pollution
ME Gonsebatt, M del Valle, T Fourtoul, D Pinto, JM Ceballos, and G Garcia; UNAM, Mexico, Mexico; Facultad de Medicina; and CIR H Noguchi

80
Human urine mutagenicity study comparing smokers using cigarettes which primarily heat tobacco with their usual brand
JT Avalos, BR Bombick, SC McKarns, RA Davis, WT Morgan, SJ Penn and DJ Doolittle; R J Reynolds Tobacco Co, Winston-Salem, NC

81
Optimization of methodology for quantifying the mutagenicity of human urine
BR Bombick, C Fulp, S McKarns, CK Lee, JT Avalos, and DJ Doolittle; R J Reynolds Tobacco Co, Winston-Salem, NC

82
Microsatellite and minisatellite DNA instability in human lymphoblastoid single-cell clones (LCLCs)
DJ Tomkins, GV Kataeva, EK Macedo, D Keller, JS Quinn, BN White and JJA Holden; McMaster U, Hamilton, Ont, Canada; Queen's U, Kingston, Ont, Canada

83
Studies of the evolution of repair mechanisms through mutational spectra analysis
P Grigoriu de Buendia; Universidad de los Andes, Bogata, Columbia

84
The developmental basis of germ line mosaicism in drosophila and mouse
JB Drost and WR Lee; LSU, Baton Rouge, LA

Tuesday, April 22

SPECIAL LECTURE

11:30 AM - 12:30 PM

Nicollet A/B

HOLLAENDER LECTURE

The Role of Mutators in Adaptive Evolution

Dr. Miroslav Radman
Institut Jacques Monod, CNRS, Paris

Presiding: Dr. Ken Tindall

FREE AFTERNOON

Optional Acctivities:
Bus Excursions
"City Tour"
"Historical Minnesota"
"It's a Mall World"

Wednesday, April 23

SPECIAL INTEREST BREAKFASTS

7:00-8:00 AM

Germ Cells
Lake Nokomis

Aneuploidy
Lake Minnetonka

New Tests
Lake Minnehaha

Wednesday, April 23

SYMPOSIUM IV

8:00 AM - 11:30 AM

Nicollet A/B

BIOMARKERS: THEIR EMERGING ROLE IN PUBLIC HEALTH

Presiding:
Richard J. Albertini, University of Vermont

Sponsor: The Procter and Gamble Company

Many biomarkers are now available for assessing steps in the continuum from exposure to disease for environmentally mediated cancers. Different endpoints measure internal and/or target doses (biomarkers of exposure), genotoxic consequences (biomarkers of effect) or inter-individual differences in sensitivity (biomarkers of susceptibility). Although biomarkers originate in the laboratory, their final development, characterization and validation for public health applications are not laboratory exercises. Rather, these depend critically on well designed human field studies. This symposium will consider in detail the elements of such studies.

8:00	**Overview: The Current Armamentarium** RJ Albertini, University of Vermont, Genetic Toxicology Laboratory
8:45	**Transitional Epidemiological Studies: Bridging the Gap from Laboratory to Field** M Vine, Department of Epidemiology, University of North Carolina
9:30	**Coffee Break/Exhibit Hall**
10:00	**Exposure Assessment: Where Studies Often Fail Before They Begin** J Lynch, Former President, American Industrial Hygiene Society
10:45	**Biomarkers as Predictors of Outcome: When is a Biomarker a Surrogate for Disease?** A Schatzkin, NCI Division of Cancer Prevention and Control

Wednesday, April 23

SYMPOSIUM V

8:00 AM - 11:30 AM

Nicollet D

DNA REPAIR AND BIOLOGICAL EFFECTS

Presiding:
AA van Zeeland, Department of Radiation Genetics and Chemical Mutagenesis, Sylvius Laboratory, Leiden University

This symposium will consider recent advances in our understanding of mechanisms of DNA repair. Heterogeneity in nucleotide excision repair has been observed at three levels, i.e. at the level of the genome overall, at the level of expressed genes and at the nucleotide level. Furthermore, there seems to be an interaction between factors influencing cell cycle progression, apoptosis and nucleotide excision repair. The biological consequences of repair deficiencies will be considered in cellular as well as in animal systems. In addition the relationship between the molecular mechanism involved in repair of double-strand breaks and immunological processes will be discussed.

8:00 **Introduction, DNA Repair and Biological Consequences**
AA van Zeeland, Department of Radiation Genetics and Chemical Mutagenesis, Sylvius Laboratory, Leiden University

8:25 **Competition Between Transcription Coupled Repair and Global Genome Repair Depends on the Nature of DNA Damage**
LHF Mullenders, Department of Radiation Genetics and Chemical Mutagenesis, Sylvius Laboratory, Leiden University

9:00 **Mapping of UV- and Benzo(a)pyrene-Induced DNA Damage at the Nucleotide Level**
GP Pfeifer, Department of Biology, City of Hope

9:45 **Coffee Break/Exhibits Hall**

10:15 **The Role of p53 in DNA Repair and Apoptosis Following UV-Irradiation**
JM Ford, Department of Biological Sciences, Stanford University

10:50 **The Biochemical Role of Ku/DNA-Dependent Protein Kinase in Double-Strand Break Repair and V(D)J Recombination**
G Chu, Stanford University Medical Center

Wednesday, April 23

SPECIAL LECTURE

11:30 AM -12:30 PM

Nicollet A/B

MULTIPLEX FISH AND THE ANALYSIS OF INTRACELLULAR POINT MUTATIONS

Dr. David Ward
Department of Genetics
Yale University
New Haven CT

Presiding: Dr. Marilyn Aardema

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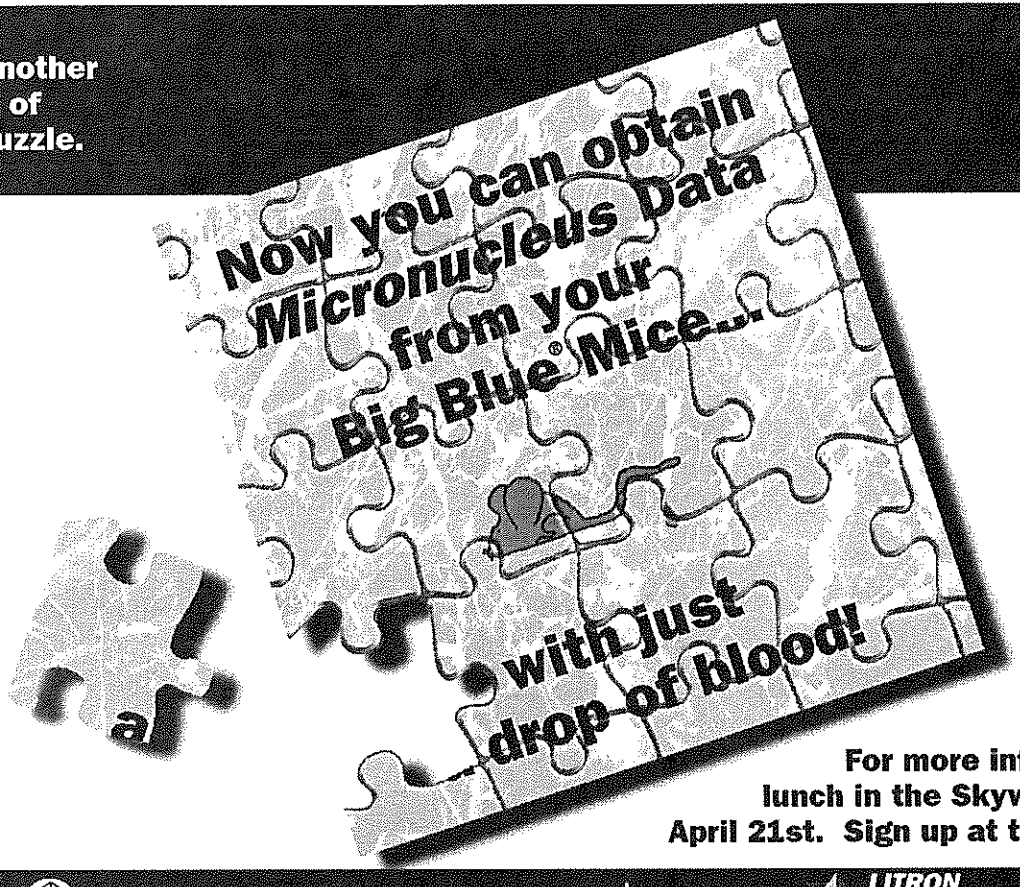
piece of
the puzzle.



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lunch in the Skyway Suite on Monday,
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Wednesday, April 23

CONTRIBUTED PAPERS I-IV

1:30PM–3:30PM

I. MUTATIONAL SPECTRA

Nicollet C

Conveners: Tom Skopek
Julie Swisler

1:30

Comparative mutational spectra of the nitrogen mustard, chlorambucil, and its half mustard analogue in Chinese hamster AS52 cells

LR Ferguson, BM Yahgi, PM Turner, PR Turner and WA Denny; Cancer Research Laboratory, Faculty of Medicine and Health Sciences, The University of Auckland, New Zealand

1:45

Transversions predominate the spectrum of a novel colon cancer mutator phenotype

JR Eshleman, PS Donover, SE Swinler, JD Lutterbaugh, WD Sedwick, SD Markowitz and ML Veigl; Case Western Reserve University and Ireland Cancer Center, Cleveland, OH

2:00

Analysis of human *hprt* mutant spectra

J Curry, L Karnaoukhova, M Khaidakov and BW Glickman; U Victoria, Victoria, BC, Canada

II. MOLECULAR ASPECTS BIOLOGICAL RESPONSE

Greenway HJ

Conveners: WB Mattes
EM Donner

1:30

Overexpression of colony stimulating factor and its receptor, *C-FMS*, in normal granulosa cells leads to increased cell proliferation and tumorigenesis

N Keshava and RR Tekmal; Emory U Sch of Med, Atlanta, GA

1:45

Regulated restriction endonuclease expression: a novel, radiomimetic model of DNA double strand break induction

EH Radany and AT Pu; UM Med Sch, Ann Arbor, MI

2:00

Effects of transcription and genomic context on the repair of UV-induced cyclobutane pyrimidine dimers in the CHO *APRT* gene

GM Adair, M-s Tang, A Pao, Y Zheng, DS Smith, M Zabelshansky and M Phillips; UT MD Anderson Canc Ctr, Smithville, TX

Wednesday, April 23

CONTRIBUTED PAPERS I-IV

1:30PM–3:30PM

III. GERM CELL STUDIES

Greenway DE

Conveners: J Drost
X Lowe

1:30

Mutation rate vs genetic damage rate: the influence of premeiotic clusters of mutation on our view of genetic damage

RC Woodruff, JN Thompson Jr and H Huai; Bowling Green State U, Bowling Green, OH

1:45

Chromosome aberrations and aneuploidy in sperm of Hodgkin's disease patients before and ~15 years after MOPP-chemotherapy analyzed by multi-color FISH

P Van Hummelen, M Meistrich, X Lowe and AJ Wyrobek; LLNL, Livermore, CA; and MD Anderson Cancer Ctr, Houston, TX

2:00

Effect of maternal folate levels on mutation rates during development

G Trentin and JA Heddle; York U, Toronto, ONT, Canada

IV. CYTOGENETICS

Greenway FG

Conveners: RL Yu
Eva McGhee

1:30

Inter-chromosomal heterogeneity in the formation of radiation induced chromosomal aberrations

AT Natarajan, S Vermeulen, JJW Boei, I Dominguez and M Grigorova; Leiden U Leiden, The Netherlands

1:45

Detection of chromosome damage in interphase nuclei in rat tissues by multi-color FISH using region-specific DNA probes

K Matsumoto and JD Tucker; LLNL, Livermore, CA

2:00

DNA damage and genomic instability

CL Limoli and WF Morgan; UCSF, San Francisco, CA

Wednesday, April 23

CONTRIBUTED PAPERS I-IV

1:30PM–3:30PM

I. MUTATIONAL SPECTRA

Nicollet C

2:15

Sequence analysis by hybridization; ten thousand mutants a year

BN Ford, J de Boer and BW Glickman; Center for Environmental Health, U Victoria, Victoria, BC, Canada

2:30

Abundant full-sized cDNA and RT-PCR reaction conditions can contribute to the suppression of exon-deleted cDNAs for the *hprt* gene of Chinese hamster ovary cells

CR Valentine and RH Heflich; NCTR, Jefferson, AR

2:45

Effect of antigenotoxic agents on methotrexate-induced chromosomal damage in vitro

C Keshava, N Keshava, W-Z Whong, T Ong and J Nath; WV U, Morgantown, WV; and NIOSH, Morgantown, WV

II. MOLECULAR ASPECTS BIOLOGICAL RESPONSE

Greenway HJ

2:15

Blockage of RNA polymerase as a trigger for p53

M Ljungman, F Zhang and F Chen; U MI Med Center, Ann Arbor, MI

2:30

Cloning and characterization of the human *XRCC9* gene, which corrects chromosomal instability and mutagen sensitivity in CHO UV40

LH Thompson, N Liu, JE Lamerdin, JD Tucker, Z-Q Zhou, CA Walter and D Busch; LLNL, Livermore, CA; UT-San Antonio, San Antonio, TX; and Armed Forces Inst of Pathology, Washington, DC

2:45

Cytogenetic and molecular markers of high LET radiations

JL Schwartz and AW Hsie; U Washington, Seattle, WA: and U of Texas Med Branch, Galveston, TX

Wednesday, April 23

CONTRIBUTED PAPERS I-IV

1:30PM–3:30PM

III. GERM CELL STUDIES

Greenway DE

2:15

A novel pattern of male germ cell mutagenicity induced by etoposide in mice

JB Bishop, F Marchetti, MD Shelby, WM Generoso, X Lowe and AJ Wyrobek; NIEHS, RTP, NC; LLNL, Livermore, CA; and ORNL, Oak Ridge, TN

2:30

Ethylnitrosourea induces a high frequency of dominant mutations that decrease body weight of mice

PB Selby, VS Earhart, CC Smalley, GD Raymer and EM Garrison; ORNL, Oak Ridge, TN; and ORISE, Oak Ridge, TN

2:45

Elevated frequencies of hyperhaploid sperm were detected in a man with a history of multiple aneuploid pregnancies

Y-J Chuu, X Lowe, S Kidd, K Weisiger, B Eskenazi and AJ Wyrobek; LLNL, Livermore, CA; and U of California, Berkeley, CA

IV. CYTOGENETICS

Greenway FG

2:15

Frequency and distribution of stable cytogenetic damage among human lymphocyte chromosomes

KL Johnson, JD Tucker, J Nath; LLNL, Livermore, CA; and West Virginia U, Morgantown, WV

2:30

Comparative analyses of cyclophosphamide-induced micronuclei in rat bone marrow using manual and flow methods

G Krishna, K Criswell, D Zielinski, G Urda and J Theiss; Parke-Davis: Div Warner-Lambert Co, Ann Arbor, MI

2:45

An evaluation of p53 gene expression, apoptosis, and micronucleus induction by cyclophosphamide in the rat bone marrow

G Krishna, G Urda, P Rowse, N Lalwani and J Theiss; Parke-Davis: Div Warner-Lambert Co, Ann Arbor, MI

Wednesday, April 23

CONTRIBUTED PAPERS I-IV

1:30PM–3:30PM

I. MUTATIONAL SPECTRA

Nicollet C

3:00

The CAT-TOX (D) assay: detection of Ames-negative carcinogens

SE Beard, MJ Lee, A Melick and P Gee; Xenometrix Inc, Boulder, CO

3:15

Validation of mutational spectra obtained with bacterial tester sets

N Ogwuru, C Lu and AM Cheh; American U, Washington, DC

II. MOLECULAR ASPECTS BIOLOGICAL RESPONSE

Greenway HJ

3:00

The urinary bladder carcinogen, P-cresidine, and the hematopoietic carcinogen, benzene, induce different patterns of LOH in heterozygous P53 deficient mice

G Lacks and JE French; Integrated Lab Systems, Durham, NC; and NIEHS, RTP, NC

3:15

Loss of P53 enhances induction of chromatid aberrations by errors of DNA base pairs but not of replication

EM Donner and RJ Preston; CIIT, RTP, NC

Wednesday, April 23

CONTRIBUTED PAPERS I-IV

1:30PM–3:30PM

III. GERM CELL STUDIES

Greenway DE

3:00

Paternally inherited chromosomal defects assessed in mouse two-cell embryo metaphases using multicolor FISH painting

F Marchetti, X Lowe, JB Bishop and AJ Wyrobek; LLNL, Livermore, CA; and NIEHS, RTP, NC

IV. CYTOGENETICS

Greenway FG

3:00

Cytogenic studies of mice chronically fed carcinogens

AE Director, MJ Ramsey, JD Tucker and J Nath; Armed Forces Radiobio Res Inst, Bethesda, MD; LLNL, Livermore, CA; West Virginia U, Morgantown, WV

3:15

Cytogenetic effects of butadiene metabolites on rodent and human lymphocytes

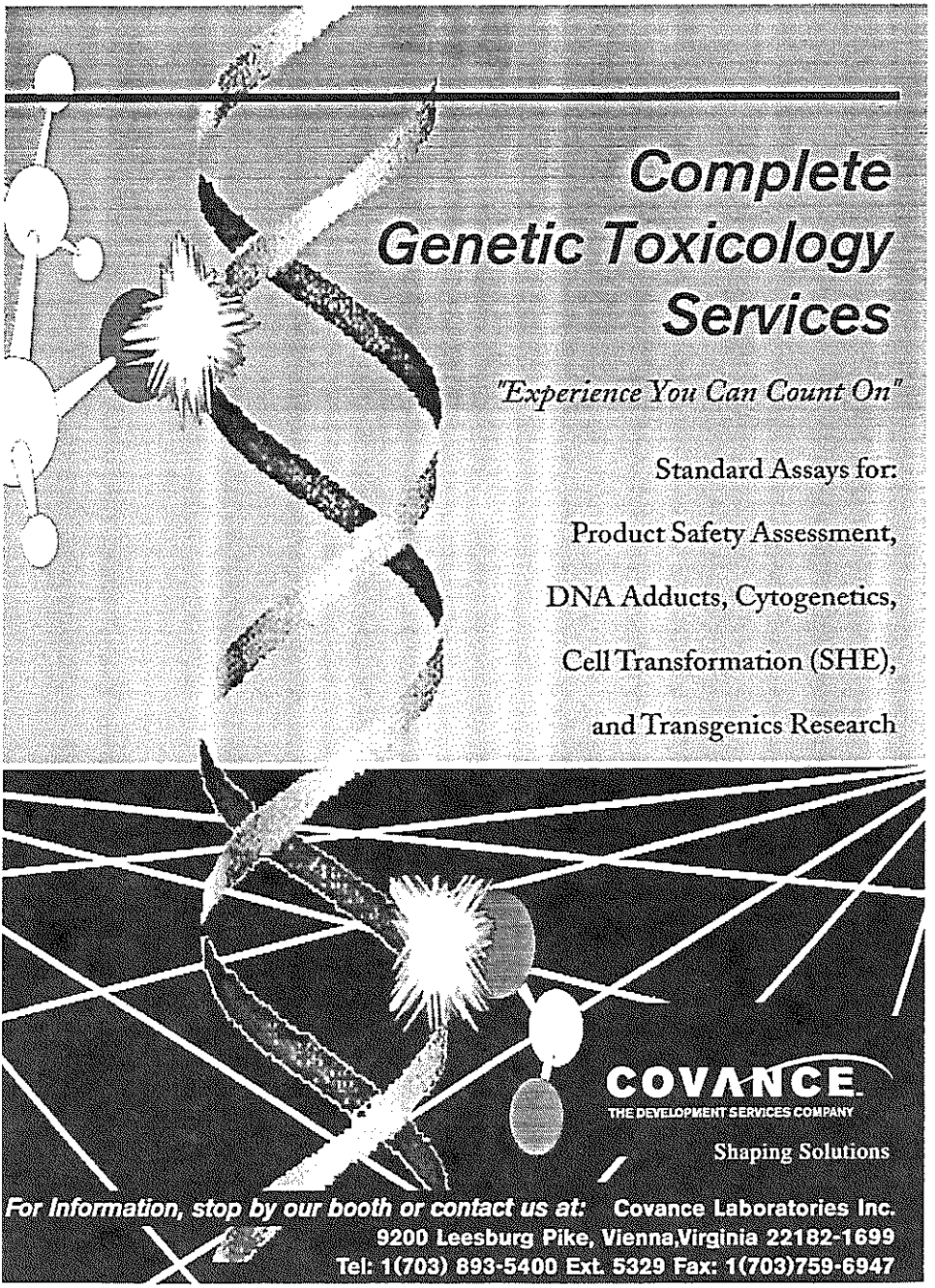
AD Kligerman, CL Doerr, VS Milholland and AH Tennant; USEPA, RTP, NC

Wednesday, April 23

POSTER SESSION IIB
3:30 PM - 5:30 PM
EXHIBITS HALL

SPECIAL EVENT
6:00 PM -11:00 PM

Minnesota Zoo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Thursday, April 24

SYMPOSIUM VI
8:00 AM - 11:30 AM

Nicollet A/B

CELL CYCLE CHECKPOINTS, DNA DAMAGE AND GENOMIC INSTABILITY

Presiding:
William Kaufmann, University of North Carolina at Chapel Hill
Jeffrey Schwartz, University of Washington, Seattle

Cell cycle checkpoints represent positions of control in the cell cycle that serve to enable complete and accurate replication and segregation of the genome during cell division. Interest in checkpoints is derived in part from demonstrations that mutations in checkpoint control genes can initiate human carcinogenesis (e.g. *p53, ATM*). This symposium will explore several facets of cell cycle checkpoint function. The various forms of cellular stress that induce p53-dependent G1 checkpoint response will be discussed. The connections among DNA damage, G2 checkpoint response and induction of chromosomal aberrations will be described for normal humans, ataxia telangiectasia patients, and cancer patients. New information on genes that enable yeast cells to adapt to irreparable DNA double-strand breaks and escape G2 checkpoint arrest will be presented. A model will be described that integrates telomere erosion, lifespan control and G2 checkpoint dysfunction as determinants of genomic instability. This symposium will provide an overview of current knowledge of DNA damage and cell cycle checkpoint response, and examine the consequences of defects in checkpoint signalling.

8:00 **Checkpoints and Radiation-Induced Chromosome Damage**
D Scott, Paterson Institute for Cancer Research

8:45 **p53: Ensuring Genomic Stability Through Multiple Levels of Checkpoint Control**
G Wahl, The Salk Institute

Thursday, April 24

9:30	**Coffee Break/Exhibits Hall**
10:00	**G2 Checkpoint Function May Limit Chromosomal Instability in Human Fibroblasts** W Kaufmann, University of North Carolina at Chapel Hill
10:45	**The Isolation of Mutants that are Unable to Adapt to the *RAD9*-Dependent Checkpoint in *S. cerevisiae*** D Toczyski, Fred Hutchinson Cancer Research Center

Thursday, April 24

SYMPOSIUM VII
8:00 AM -11:30 AM

Nicollet D

GENETIC SUSCEPTIBILITY

Presiding:
William W. Au, UTMB Department PMCH

Sponsor: The Environmental Mutagen Society

Significant inter-individual variations in health outcome are well recognized, however, the mechanisms for the variations are not characterized yet. The symposium will feature speakers who will present the up-to-date knowledge on inherent differences in chemical metabolism and in DNA repair capacities as predisposing factors for environmental cancer outcome. State-of-the-art techniques for characterizing the inherent differences will also be presented. In addition, the usefulness of such information for risk assessment and for disease prevention will be addressed.

8:00	**DNA Repair Deficiency and Susceptibility to Environmental Carcinogenesis** SH Wilson, National Institute of Environmental Health Sciences and National Toxicology Program
8:45	**Involvement of Polymorphic Genes in Metabolism of Environmental Toxicants** FP Guengerich, Vanderbilt University
9:30	**Coffee Break/Exhibits Hall**
10:00	**Cancer Risk Assessment Based on Inheritance of Polymorphic Genes and Exposure to Environmental Toxicants** WW Au, UTMB Department PMCH
10:45	**Accounting for Genetic Susceptibility in Risk Assessment** R Setlow, Brookhaven National Laboratory
11:30	**Lunch**

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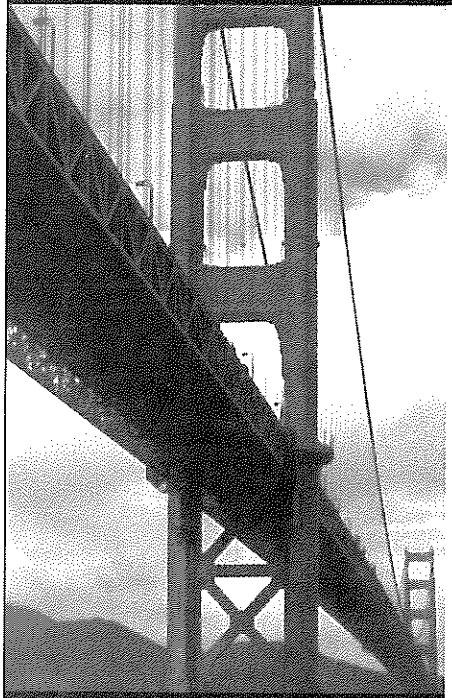

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Mouse lymphoma (L5178Y/$tk^{+/-}$)
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Thursday, April 24

CONTRIBUTED PAPERS V-VII

12:30 PM - 3:30 PM

V. DEVELOPMENTAL EFFECTS

Greenway DE

Conveners: Amal Abu-Shakra
JB Bishop

12:30
Session Introduction:
JB Bishop, NIEHS, RTP, NC

12:40
Investigations of deformed frogs in Minnesota

JC Helgen, MC Gernes and D Hoppe; MN Pollution Control Agency, St Paul, MN; U Minnesota, St Paul, MN

1:00
Recent species diversity of deformed anurans in Minnesota

DM Hoppe; U Minnesota-Morris, Morris, MN

1:20
Helminthological examination of deformed and normal northern leopard frogs, rana pipiens (ranidae) from Minnesota and South Dakota

SR Goldberg, CR Bursey, RG McKinnell and H Cheam; Whittier College, Whittier, CA; Pennsylvania State U; and U of Minnesota, Minneapolis, MN

VI. TRANSGENIC ANIMALS

Greenway FG

Conveners: D Zimmer
J Curry

12:30
Is the spectrum of spontaneous mutation of the *lacI* transgene in Big Blue® mice subject to A+T mutational pressure?

SS Sommer, KA Hill, AH Nishino and VL Buettner; Mayo Clinic/Foundation Rochester, MN; and Dept of Neurology, Mayo Clinic; and City of Hope, Duarte, CA

12:45
Evaluation of the TG.AC transgenic mouse model for accelerated carcinogenicity detection

HE Holden, RE Stoll, JK Spalding and RW Tennant; Boehringer Ingelheim Pharm Ridgefield, CT; and NIEHS, RTP, NC

1:00
Mutational spectra from aged and calorie-restricted *lacI* transgenic mice

GR Stuart, Y Oda, J deBoer and BW Glickman; U Victoria, Victoria, BC, Canada; and Osaka Pref Inst of Pub Health, Osaka, Japan

1:15
Dose-action analyses of 313 nanometer radiation effects on the epidermal cells of transgenic mice

JA Higgins, DA Dansereau, C Trempus, RW Tennant and RC von Borstel; U Alberta Edmonton, ALB, Canada; and NIEHS, RTP, NC

VII. STUDIES WITH HUMAN SUBJECTS

Greenway HJ

Conveners: Patricia Ostrosky-Wegman
J Pluth

12:30

Immunomodulation by xenobiotics

P Ostrosky-Wegman, L Vega, G Elizondo, D Menendez, T Fortoul and R Saavedra; UNAM Mexico, DF, Mexico

12:45

Predicting mutagenicity in U.S. drinking waters using a Finnish model

K Schenck-Patterson, B Lykins Jr and L Wymer; USEPA, Cincinnati, OH; and Lockheed Env Sys and Tech Co

1:00

Cytogenetic analyses of Chernobyl clean-up workers

JD Tucker, DO Nelson, MR Ramsey, P Pleshanov, I Vorobtsova and R Jensen; LLNL, Livermore, CA; and Ministry of Health of Russia, Moscow

1:15

Low dose chronic treatment of human keratinocytes with inorganic arsenic causes hyperproliferation and altered protein phosphorylation

ML Steinberg, L Su and ET Snow; NYU Med Ctr, Tuxedo, NY; and CCNY, New York

Thursday, April 24

CONTRIBUTED PAPERS V-VII

12:30 PM - 3:30 PM

V. DEVELOPMENTAL EFFECTS

Greenway DE

1:40

Chromosomal alterations induced by environmental mutagens: a possible cause for the deformed frogs recently reported in Minnesota and other northern and midwestern states

DL Carlson, AJ Reister and RG McKinnell; Augustana College, Sioux Falls, SD; and U Minnesota, St Paul, MN

2:00

Flow cytometric study of blood cells from normal and abnormal rana pipiens of Minnesota

RG McKinnell, DL Maher, KS Klos and CG Christ; U Minnesota, St Paul, MN

2:20

Early morphological changes associated with retinoic acid-induced limb and lower body duplications

X Wei, LA Hughes, KK Sulik, WM Generoso and JB Bishop;UNC-Chapel Hill, Chapel Hill, NC; ORNL, Oak Ridge, TN; and NIEHS, RTP, NC

VI. TRANSGENIC ANIMALS

Greenway FG

1:30

Construction of transgenic mice carrying a *lacI* target gene with reduced CpG content

T Skopek, DR Marino, KL Kort and JE Miller; Merck Res Lab, West Point, PA

1:45

Comparison of in vivo mutagenesis in the transgene *lacI* with the endogenous gene HPRT in Big Blue® rats exposed to DMBA

MG Manjanatha, A Aidoo, SD Shelton and DA Casciano; NCTR, Jefferson, AR

2:00

Towards validation of the Big Blue® transgenic mouse mutagenesis assay: the mutation spectrum of sectored mutant plaques

KA Hill, H Nishino, VL Buettner, A Halangoda, W Li, and SS Sommer; Mayo Clinic/Foundation, Rochester, MN; and Dept of Neurology, Mayo Clinic

2:15

The effects of p53 nullizygosity on mutation frequency and spectrum

VL Buettner, H Nishino, J Haavik, A Knoll, KA Hill and SS Sommer; Mayo Clinic Rochester, MN; and Dept of Neurology, Mayo Clinic

VII. STUDIES WITH HUMAN SUBJECTS

Greenway HJ

1:30

Multiendpoint analysis of somatic genetic damage in Chernobyl cleanup workers

IM Jones, JD Tucker, RG Langlois, DO Nelson, I Vorobstova, P Pleshanov, ML Mendelsohn; LLNL, Livermore, CA; Central Inst for Roentgenology; and Applied Ecology Research Lab, Moscow, Russia

1:45

Evaluation of genotoxic metals by single cell gel electrophoresis assay

E Rojas, M Valverde, M Sordo, M Altamirano-Lozano and P Ostrosky-Wegman; UNAM, Mexico, DF, Mexico

2:00

Contribution of genetic polymorphisms in xenobiotic metabolizing enzymes to population variability in the level of in vivo somatic mutation at the glycophorin A (GPA) locus

BJ Henry, G Fregoso, R Branch, M Romkes and WL Bigbee; U Pittsburgh, Pittsburgh, PA

2:15

Elevated somatic mutations at the glycophorin A (GPA) locus are associated with PAH exposure in Finnish iron foundry workers

WL Bigbee, CP Dickey, LA Mooney and FP Perera; U Pittsburgh, Pittsburgh, PA; and Columbia U

NOTES

VI. TRANSGENIC ANIMALS

Greenway FG

NOTES

2:30

Further studies of the effect of chronic exposures in vivo

L Cosentino and JA Heddle; York U, North York, Ont, Canada

VII. STUDIES WITH HUMAN SUBJECTS

Greenway HJ

2:30

The effect of Vitamin C supplementation on biomarkers of oxygen radical generated damage in human volunteers with "low" or "high" cholesterol levels

D Anderson, BJ Phillips, TW Yu, AJ Edwards, R Ayesh and KR Butterworth; BIBRA International, Surrey, UK

2:45

The single cell gel (SCG) assay: optimal freezing methods for maintaining DNA integrity prior to analysis for DNa damage

A Udumudi and R Tice; Integrated Lab Systems, RTP, NC

3:00

Detection of chromosomal alterations in the sperm of pesticide-exposed workers using fluorescence in situ hybridization (FISH)

DS Rupa, DA Eastmond and PP Reddy; U California, Riverside, CA; and Osmania U

3:15

Determination of the relationship between genotypes and chromosomal aberration frequencies in a normal population

J Pluth, M Ramsey and J Tucker; LLNL, Livermore, CA

NOTES

Thursday, April 24

MEETING ADJOURNMENT

3:30 PM

EMS COUNCIL

4:00 PM - 8:00 PM

Mirage Room

EXHIBITS

EXHIBITS HALL

Sunday, April 20 - Tuesday, April 22

There will be a variety of interesting and informative exhibits in the Exhibits Hall. Exhibitors will present information about the latest in laboratory instrumentation, supplies, computer capabilities, publications, and a broad range of research and testing services. The exhibits will be open Sunday from 3:30 PM to 5:30 PM; Monday, from 7:30 AM to 6:30 PM; and Tuesday from 7:30 AM to 12:00 NOON. Company representatives will be available to answer your questions and discuss products and services with you. Coffee will be available in the Exhibits Hall during breaks and poster sessions. Support of the exhibits is appreciated by the EMS. ALL MEETING PARTICIPANTS ARE CORDIALLY INVITED TO THE EXHIBITS.

EXHIBITORS

Covance Laboratories, Inc.
Chrysalis International Corporation
Elsevier Science
EMS Membership/Information
Epicentre Technologies
Integrated Laboratory Systems
Loats Associates, Inc.
Microbiological Associates
Oncor, Inc.
SITEK Research Labs
SRI International
Stratagene
Taconic
Xenometrix, Inc.

Covance Laboratories, Inc,
9200 Leesburg Pike, Vienna, VA 22182
703-893-5400 ext. 5329; FAX 703-759-5782
Covance's Genetic and Cellular Toxicology Units (in Vienna, VA and Harrogate, UK) provide a complete complement of *in vivo* and *in vitro* genotoxicity assays to meet regulatory requirements world-wide and for research projects. Special capabilities include the ability to determine DNA adducts by 32P-postlabelling or direct binding; MutaMouse *in vivo* mutagenesis studies, soft agar or microwell mouse lymphoma mutation assays with colony sizing; and Syrian hamster embryo (SHE) *in vitro* cell transformation assays. Testing and research opportunities may be discussed at our booth.

Crysalis International Corporation
100 Discovery Drive, Scott Technology Park, Olyphant, PA 18447
800/300-8114
Crysalis (formerly Pharmakon) is a leading contract research organizaton provid-

ing compound development services to the Pharmaceutical, Biotechnology and Chemical Industries. Our goal is to provide a seamless approach to compound development that will facilitate overall project execution, enhance the decision-making process and provide direct and easy access to the expertise they need to rapidly and successfully bring their compound to market.

Elsevier Science
655 Avenue of the Americas, New York, NY 10010
212/633-3765
On display at the Elsevier booth will be the newly launched online version of the journal DNA Repair, and the new section of Mutation Research entitled Mutation Research Genomics. Other online products as well as traditional paper journals will be present too.

Environmental Mutagen Society
Liz von Halle, Membership Director, 113 Wendover Circle, Oak Ridge, TN 37830
423/483-5805
EMS Business Office, 11250 Roger Bacon Drive, Suite 8, Reston, VA 22090
703/437-4377
Stop by the Society's booth to update your directory listing, renew your membership, buy a T-shirt and a video, and pick up the latest brochures.

Epicentre Technologies
1402 Emil Street, Madison, WI 53713
608/258-3080
Epicentre's new MutaPlax cII-Select Kit incorporates a recently developed positive selection system that dramatically reduces the cost and increases the accuracy of in vivo mutagenesis assays using the standard transgenic rodents or cell lines. Also available is information on other new products for mutation detection and genetic analysis.

Integrated Laboratory Systems
PO Box 13501, Research Triangle Park, NC 27709
919/544-4589
Integrated Laboratory Systems provides comprehensive environmental, toxicological, and health effects research and testing services to pharmaceutical, governmental, and academic clients in the areas of genetic toxicology, general toxicology, histopathology, and environmental services.

Loats Associates, Inc.
2 N. Court Street, Westminster, MD 21157
410/876-8055
Provides systems for automation of genetic toxicity assay scoring, including: Micronucleus Assay, Metaphase Finding, Colony Counting (Mouse Lymphoma, Ames), and Comet (SCGE) Assay. Systems significantly increase laboratory productivity and reduce man-power requirements for scoring and assay analysis. Customized assay protocols and reports are incorporated, and QA documentation is included to support regulatory submissions.

Microbiological Associates
9900 Blackwell Road, Rockville, MD 20850
301/738-1000
Microbiological Associates (MA) offers GLP-compliant toxicological testing services to clients worldwide. MA's unique "consultative" approach, in-depth knowledge of US and international regulations, and full range of genetic, *in vitro*,

and *in vivo* testing protocols, assures complete and confidential support for regulatory submissions and non-regulatory safety assessments.

SITEK Research Laboratories
15235 Shady Grove Road, Rockville, MD 20850
301/926-4900
SITEK Research Laboratories, established in 1984, provides high quality genetic toxicology, general toxicology, in vitro toxicology, analytical chemistry, metabolism and pharmacokinetic testing services. Our laboratories located in Rockville, Maryland are state-of-the -art. We are fully a compliant GLP laboratory having JMAFF certification and AAALAC accredited animal facilities. Our study reports are submitted to regulatory agencies worldwide and we have never had a study rejected. Let us assist you with your research and testing requirements.

SRI International
333 Ravenswood Avenue, Menlo Park, CA 94025
800/982-8655
The Toxicology and Metabolism Laboratory within SRI's Biopharmaceutical Development Division performs the highest quality, reliable, and cost effective toxicology testing services available. Years of experience in mutagenicity testing, mammalian toxicology, pharmacokinetics, comparative metabolism, carcinogenesis and immunotoxicology combined with personal client service have helped many companies bridge the gap between discovery and development.

Stratagene
11011 North Torrey Pines Road, La Jolla, CA 92037
619/535-5400
Stratagene offers innovative products for genetic and molecular toxicology including the patented Big Blue® Transgenic Rodent Mutation Assay, RT-PCR primers for DNA damage, apoptosis and genetic instability, and the VanGlows™ mouse chromosome paint probes for fluorescent in situ hybridization. In addition, Stratagene offers a complete line of products and instrumentation for molecular and cell biology.

Taconic
273 Hoover Avenue, Germantown, NY 12526
518/537-5200
Taconic Transgenic Models and Services features models specific to reduced latency mutagenicity and carcinogenicity studies. Models include the TSG-p53®Knock-out mouse, the TG.AC oncomouse, PIM transgenic mouse and the TSGp53®/Big Blue® transgenic mouse. Information about Taconic's Transgenic Exchange will also be available.

Xenometrix, Inc.
2425 North 55th Street, Boulder, CO 80301-5700
303/447-1773
Xenometrix develops and supplies diagnostic assays that provide timely and reliable information about the underlying molecular basis of toxicity, mutagenicity, or carcinogenicity of chemical compounds. These assays go beyond the toxicity testing methods currently employed, by providing mechanistic information about both genotoxic and non-genotoxic cellular stress or damage.

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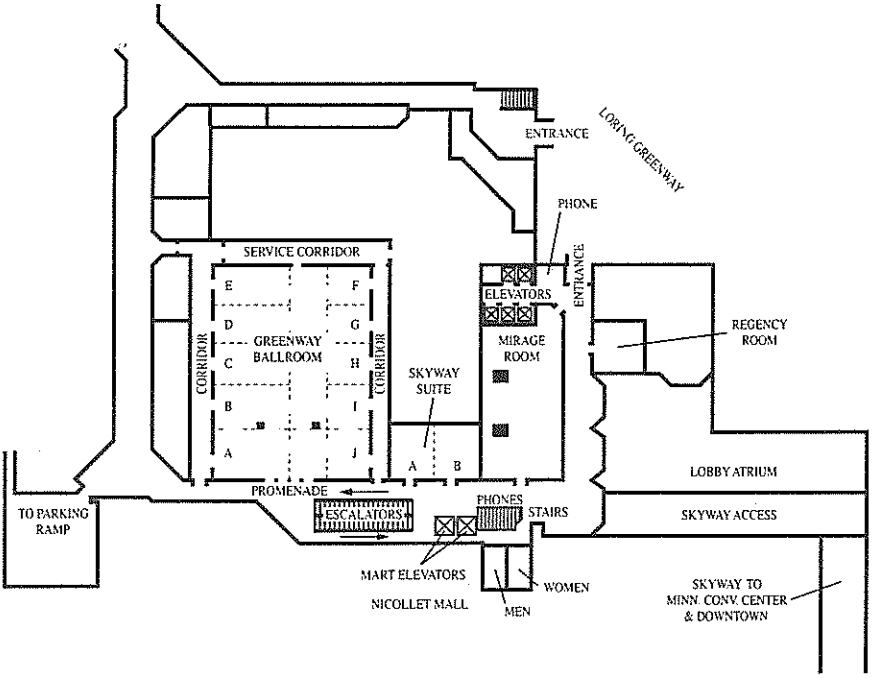

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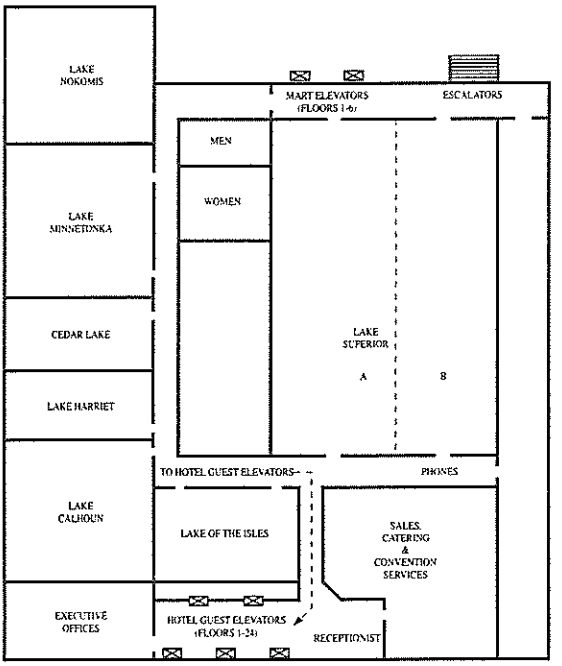

SATURDAY 19 April	SUNDAY 20 April	MONDAY 21 April	TUESDAY 22 April	WEDNESDAY 23 April	THURSDAY 24 April
REGISTRATION 3:30-8:00 PM *Nicollet Promenade*	**REGISTRATION** 7:30 AM-5:00 PM *Nicollet Promenade*	**REGISTRATION** 7:30 AM-5:00 PM *Nicollet Promenade*	**REGISTRATION** 7:30 AM-2:00 PM *Nicollet Promenade*	**REGISTRATION** 7:30 AM-5:00 PM *Nicollet Promenade*	**REGISTRATION** 7:30 AM-3:00 PM *Nicollet Promenade*
EMS COUNCIL MEETING 4:00-8:00PM *Lake Superior Room*	**WEB WORKSHOP** 7:30 AM-5:00 PM *Lake of the Isles* **STUDENT BREAKFAST** 7:00-9:00 AM *Mirage Room* **EMM EDITORS' MTG** 7:00-8:00 AM *Skyway Room* **WORKSHOPS** 8:00 AM- 3:30 PM I. Structure Activity Relationships *Greenway A-D* 8:00 AM-12:00 PM II. Complex Mixtures *Greenway H-I* 1:00-3:30 PM III. Mechanistic Data in Cancer Risk Assessment *Greenway H-I* IV. Integration of Genetox Eval in Toxicology Studies *Greenway F-G* **POSTER SESSION IA** 3:30-5:30 PM *Exhibits Hall*	**WEB WORKSHOP** 7:30 AM-5:00 PM *Lake of the Isles* **COMMITTEE BREAKFASTS** 7:00-8:00 AM **Future Directions** *Lake Itasca* **Membership** *Cedar Lake* **Electronics** *Lake Harriet* **IAEMS** *Lake Nokomis* **Education** *Lake of the Woods* **Hollaender** *Lake Minnehaha* **Communications** *Lake Minnetonka* **SYMPOSIUM I** 8:00-11:00AM Emerging Pathogens *Nicollet A/B* **BUSINESS MEETING** 11:00 AM - 12:00 PM *Nicollet A/B* **EXHIBITORS LUNCH WORKSHOPS** 12:00-1:00 PM *Skyway A/B & Mirage Room* **SYMPOSIA** 1:00-3:30 PM II. Germ Cell Effects *Greenway B/E* III. Photoactivation of Xenobiotics *Greenway F/J*	**WEB WORKSHOP** 7:30 AM-2:00 PM *Lake of the Isles* **SPECIAL INTEREST BREAKFASTS** 7:00-8:00 AM **DNA Repair** *Lake Minnetonka* **Risk Assessment** *Cedar Lake* **Transgenics** *Lake Nokomis* **PLENARY LECTURE** 8:00-9:00 AM *Nicollet A/B* **POSTER SESSION IIA** 9:00-11:30 AM *Exhibits Hall* **PLENARY LECTURE** 11:30 AM-12:30 PM *Nicollet A/B* **FREE AFTERNOON**	**SPECIAL INTEREST BREAKFASTS** 7:00-8:00 AM **Germ Cells** *Lake Nokomis* **Aneuploidy** *Lake Minnetonka* **New Tests** *Lake Minnehaha* **SYMPOSIA** 8:00-11:30 AM IV. Biomarkers: Role in Public Health *Nicollet A/B* *V. DNA Repair & Biological Effects* *Nicollet D* **PLENARY LECTURE** 11:30 AM-12:30 PM *Nicollet A/B* **CONTRIBUTED PAPERS** 1:30-3:30 PM I. Mutational Spectra *Nicollet C* II. Molecular Aspects/ Biological Response *Greenway H/J* III. Germ Cell Studies *Greenway D/E* IV. Cytogenetics *Greenway F/G* **POSTER SESSION IIB** 3:30-5:30 PM *Exhibits Hall* **SPECIAL EVENT** 6:00-11:00 PM Minnesota Zoo	**SYMPOSIA** 8:00-11:30 AM VI. Cell Cycle Check Points, DNA Damage and Genomic Instability *Nicollet A/B* VII. Genetic Susceptibility *Nicollet D* **CONTRIBUTED PAPERS** 12:30-3:30 PM V. Developmental Effects *Greenway D/E* VI. Transgenic Animals *Greenway F/G* VII. Studies with Human Subjects *Greenway H/J* **COUNCIL MEETING** 4:00-8:00 PM *Mirage Room*
STUDENT RECEPTION 8:00-10:30PM *Skyway A/B Room*	**KEYNOTE ADDRESS** 5:30-6:30 PM *Nicollet A/B* **AWARDS** 6:30-7:30 PM *Nicollet A/B* **RECEPTION** 7:30-11:00 PM *Nicollet C/D*	**POSTER SESSION IB** 3:30-5:30 PM *Exhibits Hall* **PUBLIC LECTURE** 7:00-8:00 PM *Nicollet A/B*			