

# CONGRESS ON IN VITRO BIOLOGY

## 1995 Meeting of the Society for In Vitro Biology

May 20–24 • Denver, CO

### *Interplay of Cells With Their Environment*

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#### FRIDAY, MAY 19

8:00 am-5:00 pm

SIVB EXECUTIVE BOARD

TBA

#### SATURDAY, MAY 20

9 am-8 pm

REGISTRATION

South Convention Lobby

1:00-2:00 pm

PROGRAM COMMITTEE MEETING

Denver Room

2:00-3:30 pm

SIVB COUNCIL MEETING

Silver Room

3:00-6:00 pm

POSTER SET UP

Exhibit Hall

4:00-6:00 pm

HISTORY SOCIETY

Grand Ballroom D&E

*Conveners: Len Schiff and James Henderson*

History: Development of Methods for Studying Tissue Organization in Culture  
J. LEIGHTON

History of the CHO Cell  
R.G. HAM

Development of Mosquito Cell Culture  
J. MITSUHASI

**SATURDAY, MAY 20**

4:30-6:00 pm

**CELLULAR TOXICOLOGY COMMITTEE  
BUSINESS MEETING/RECEPTION**

**Century-Spruce Rooms**

7:00-9:00 pm

**OPENING RECEPTION**

**Grand Ballroom A-C**

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Numbers preceding names refer to abstracts.  
Capitalization identifies speaker.

46th Annual Meeting of the Society for In Vitro Biology

**Key Letters Preceding Session Title**

I = Invertebrate Cells	V = Vertebrate Cells
P = Plant Cells	W = Workshop
PS = Plenary Session	JS = Joint Symposium
T = Cellular Toxicology	

**SUNDAY, MAY 21**

7:00 am-7:30 pm

**REGISTRATION**

**South Convention Lobby**

**INTERPLAY OF CELLS WITH THEIR ENVIRONMENT**

*Convener:* Howard L. Hosick, Washington State University

*Co-sponsored by Collaborative Biomedical Products/Becton Dickinson Labware*

8:00-10:00 am

**PLENARY SESSION**

**Grand Ballroom**

*(See abstracts on page 1A)*

- 8:00 PS-1 The Cellular Immune Response of Insects: *In Vitro* Approaches to the Study of Antiviral and Antiparasitic Defense Mechanisms  
MICHAEL STRAND, University of Wisconsin
- 8:30 PS-2 Control of Cell Growth and Differentiation By Extracellular Matrix  
DONALD E. INGBER, Children's Hospital/Harvard Medical School
- 9:00 PS-3 Do Plants Take Aspirin?  
ILYA RASKIN, Rutgers University/Cook College
- 9:30 PS-4 Developing Valid *In Vitro* Alternatives for Toxicology and Pharmacology  
E. ELMORE

10:00-10:30 am

**COFFEE BREAK**

**Exhibit Hall**

10:00 am-6:00 pm

**EXHIBITS AND POSTERS**

**Exhibit Hall**

Even Numbered Poster Authors Will  
Be Present 12:30-1:30 pm  
Odd Numbered Poster Authors Will  
Be Present 4:30-5:30 pm  
*(See list of Posters on pages xxv-A-xxxiv-A)*

**EXTRACELLULAR MATRIX AND CELL BEHAVIOR (V)**

*Convener:* Brigitta Tadmor, Collaborative Biomedical Products/Becton Dickinson Labware

*Keynote Speaker:* Stephen R. Farmer, Boston University School of Medicine

*Sponsored by Collaborative Biomedical Products/Becton Dickinson Labware*

10:30 am-12:30 pm

**SYMPOSIUM**

**Majestic Ballroom**

*(See abstracts on page 6A)*

- 10:30 Introduction (B. Tadmor)
- 10:35 V-1 Cell-Extracellular Matrix Interactions and Control of Tissue-Specific Transcription Factors  
S.R. FARMER
- 11:05 V-2 To Be Announced  
H. REDDI
- 11:35 V-3 Dynamic Reciprocity Revisited: A Continuous, Bidirectional Flow of Information Between Cells and the Extracellular Matrix Regulates Mammary Epithelial Cell Function  
C.D. ROSKELLEY and M.J. Bissell

SUNDAY, MAY 21

**APPLICATIONS OF MODELS OF HEPATOTOXICITY (T)**

*Convener:* Jack Lipman, Hoffmann-La Roche  
*Keynote Speaker:* D. Acosta, Jr., University of Texas  
*Sponsored by Industrial In Vitro Toxicology Group*

10:30 am-12:30 pm

**SYMPOSIUM**

**Columbine Room**

*(See abstracts on page 12A)*

- 10:30 Introduction (J. Lipman)  
10:35 T-1 An *In Vitro* Approach to the Study of Hepatotoxic Agents with a Primary Culture System of Rat Liver Cells  
D. ACOSTA, JR.  
11:05 T-2 To Be Announced  
C. RUEGG  
11:35 T-3 Cultured Human Hepatocytes *In Vitro* Models for Examining Drug Toxicity and Metabolism  
R. ULRICH

**INTERPLAY OF PLANT CELLS WITH THEIR ENVIRONMENT:  
THE ROLE OF STRESS-INDUCED PROTEINS (P)**

*Conveners:* Ron Newton, Texas A&M University; John Finer, Ohio State University

The growth and development of plants are constantly under the influence of the environment. Much research in the last several years has concluded that the response to the environment involves the regulated expression of a number of genes, producing a variety of proteins. Hormones play a pivotal role in some responses, and it is clear that signal transduction pathways which control the expression of genes overlap in response to a variety of different environmental cues. Promoter analysis indicates sequence-specific regions that are responsive to various external signals. In addition, current research is focused on the isolation and characterization of trans-acting factors that participate in environmentally-induced transcriptional activation, as well as the role of post-transcriptional and post-translational regulatory mechanisms. This session will focus on recent developments in the understanding of signal transduction, and the transcriptional and translational responses of the genetic machinery of cells to environmental stresses.

10:30 am-12:30 pm

**SYMPOSIUM**

**Grand Ballroom A-C**

*(See abstracts on pages 17A-18A)*

- 10:30 P-1 Osmotically-induced Plant Defense Genes: Structure and Function  
R.A. BRESSAN  
10:55 P-2 Desiccation-induced Protein Synthesis: A Role in Cellular Repair?  
M.J. OLIVER  
11:20 P-3 Regulation of Environmental Stress- and Abscisic Acid-induced Genes  
T.-H.D. HO  
11:45 P-4 Role of the Tobacco Anionic Peroxidase in Growth and Development  
L.M. LAGRIMINI  
12:10 P-5 Molecular Aspects of Crassulacean Acid Metabolism: An Adaptation to Environmental Stress  
J.C. CUSHMAN, H.J. Schaeffer, N.R. Forsthoefel

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- 3:30 P-1013 Micropropagation of Birch (*Betula pendula* Roth.) cv. Purple Rain from Shoot Tip and Bud Explants  
K. PRUSKI and M. Younus
- 3:45 P-1014 Genetic Stability of Micropropagated Strawberries  
M.B. KUMAR
- 4:00 P-1015 Antiauxin Effects on Morphogenesis in Cultures of the Endangered Cactus *Aztekium ritteri*  
I. REYES, J.F. Hubstenberger, G.C. Phillips
- 4:15 P-1016 Effect of Kinetin and BA on the *In Vitro* Culture of Potato Nodal Explants  
M.A. BUSTAMANTE and S. Pérez

5:30-6:30 pm

POSTER PRESENTATION

Exhibit Hall

Odd Numbered Poster Authors Present  
(See list of Posters on pages xxv-A-xxxiv-A)

5:30-6:30 pm

STUDENT SOCIAL  
Students Are Encouraged to Attend

Terrace Room

**SUCCESSFUL STRATEGIES FOR GOOD LABORATORY (GLP)  
AND GOOD MANUFACTURING (GMP) PRACTICE (T)**

*Conveners:* Sandra L. Schneider, University of Texas Health Science Center;  
Jess Stengel, Clonetics Corp.

*Co-sponsored by the Baker Company, Eagleson Institute, and Clonetics Corporation*

*Hosted by the Laboratory Materials and Biosafety Committee, Toxicology Committee,  
Cell Standardization Committee, and Vertebrate Division Committee*

The primary objective of this workshop is to provide instruction in the principles, methods, and application of Good Laboratory Practice (GLP) and Current Good Manufacturing Practice (cGMP). The workshop will emphasize both basic and advanced concepts of both GLP, cGMP, and ISO 9000 with regard to internationally recognized standards. Requirements and application of GLP regulations as imposed by the Food and Drug Administration (FDA), Environmental Protection Agency (EPA), and Organization for Economic Cooperation Development (OECD) will be reviewed. The application of cGMP in the pharmaceutical and biotechnology industries will include issues related to methodology, manufacturing practice and validation, quality control (QC) and quality assurance (QA), and training of personnel. Participants should: improve their knowledge and understanding of the requirements for GLP; have gained an understanding of cGMP regulations; and have a working knowledge of the similarities and differences between cGMP and ISO 9000. Discussion section will provide an opportunity for participants to seek advice on establishing and/or enhancing specific Quality Assurance Programs.

7:00-9:00 pm

WORKSHOP

Columbine Room

- 7:00 Introduction to Good Laboratory Practice: "A New Song - An Old Tune" (S.L. Schneider)
- 7:05 W-1 Strategies for Successful Compliance with the Good Laboratory Practice (GLP) Regulations  
D.S. GOLDMAN
- 7:35 Introduction to Good Manufacturing Practice: "The Leadership Role of the Biotechnology Corporation" (J. Stengel)
- 7:40 W-2 Application of cGMP Disciplines in Non-regulated Biotech Environments  
J.L. WEST

## SUNDAY, MAY 21

- 8:10 W-3 ISO-9001: The International Challenge  
G. KNEBEL  
8:30 Open Discussion

### **MICROPROPAGATION: INTERPLAY WITH THE MICROBIAL ENVIRONMENT (P)**

*Conveners:* Barbara Reed, USDA/ARS; Paul Read, University of Nebraska

*Co-sponsored by Sigma Chemical Company*

The presence of bacterial and fungal contaminants in plant tissue culture continues to cause problems for both commercial and research laboratories. Improved methods of indexing, identification, and treatment are being developed and are now available for use. This workshop will present information on the options available for indexing plant tissue cultures, techniques for preliminary identification and determination of proper treatment of infected cultures, and antibiotics available for treating plant tissue cultures. Discussion periods will follow each presentation for contributions from the audience.

7:00-9:00 pm	WORKSHOP	Grand Ballroom D&E
7:00	W-4	Techniques for Preliminary Bacterial Identification and Determination of Suitable Treatment for Infected <i>In Vitro</i> Cultured Plants P.M. BUCKLEY
7:30	W-5	Indexing Explants and Cultures to Maintain Clean Stock M.E. KANE
8:00	W-6	The Use of Antibiotics in Plant Tissue Culture G. SECKINGER

### **TRANSGENIC VEGETABLES IN THE PRODUCT DEVELOPMENT PIPELINE (P)**

*Conveners:* Paul Zankowski, Harris Moran Seed Company; Ebe Firoozabady, DNAP

During the past year, genetically engineered tomatoes have been marketed to consumers as the first transgenic plant product. The development of transgenic vegetable products is ongoing along several fronts. These vegetables have improved characteristics for disease resistance, insect resistance, delayed ripening, nutrition, and other properties. The goal of this workshop is to provide a brief summary of transgenic vegetables in the product development pipeline and what the consumer can expect from these products. Representatives from some of the major players in this area will present information and speculation as to the products that might be available in the next few years from transgenic vegetables.

7:00-9:00 pm	WORKSHOP	Grand Ballroom A-C
		Introduction (P. Zankowski and E. Firoozabady)
W-7		Commercialization of Ethylene Regulated Fresh Market Tomato J. BEDBROOK, W. Howie, K. Lee, A. Morgan, P. Dunsumuir
W-8		Development of Virus Resistant Cucurbits Through Coat Protein Gene Expression H.D. Quemada, D.M. Tricoli, K.J. Carney, J.F. REYNOLDS, R.Z. Deng, P.F. Russell, J.R. McMaster, M.L. Boeshore, D.W. Groff, K. Hadden, B. Moraghan
W-9		Benefits of Transgenes on the Processing Quality of Tomato E. GREEN
W-10		The Next Generation of High Quality, Genetically Improved Tomatoes J.V. OAKES, C.M. McGuire, C.K. Shewmaker, J.A. Sheehy, R.A. Sanders, W.R. Hiatt, R.E. Sheehy
W-11		Commercialization of Beetle Resistant Potatoes M. HINCHEE
W-12		Enhancing Disease Resistance in Vegetable Crops J.M. JAYNES

SUNDAY, MAY 21

**THE INTERACTION OF INVERTEBRATE CELLS WITH  
TOXINS AND THEIR ENVIRONMENT (I)**

*Convener:* James Vaughn, USDA/ARS

Meaningful *in vitro* studies on the effects of toxins and other environmental stress factors depend on the ability to culture cells from a variety of tissues and animals. Until recently, the limited sources of cultured invertebrate cells has restricted toxicology studies. The papers in this symposium not only report interesting results in *in vitro* studies, but show the considerable progress in the culture of the range of tissues from invertebrates that are needed if the *in vitro* studies are to relate to the whole animal.

10:30 am-12:30 pm

**SYMPOSIUM**

Vail Room

(See abstracts on pages 21A-22A)

- 10:30 Introduction (J. Vaughn)  
10:35 I-1 Factors Influencing Cellular Interactions in the Developing Antennal Lobe of the Moth, *Manduca Sexta*.  
L.A. OLAND  
11:05 I-2 Effect of the CryIA Group of *Bacillus thuringiensis* Toxins on Midgut Epithelial Cells and Insect Cell Lines from Lepidopteran Larvae  
D. BAINES, J.-L. Schwartz, S. MacIntosh, O. Thastrup  
11:35 I-3 Mechanisms of Radiation Resistance in Lepidopteran Insect Cells  
T.M. KOVAL  
12:05 I-4 A Rotenone-Resistant Cell Line and Its Specific Characteristics  
J. MITSUHASHI and Y. Yanagimoto  
12:35 I-5 Environmental Effects on Oyster Hemocytes in Primary Culture  
W.S. FISHER  
1:05 I-6 Use of Sponge Cell Cultures as Environmental Indicators of Pollution  
S.A. POMPONI, R. Willoughby, M.E. Kaighn, H. Zhong

12:30-1:30 pm

**POSTER PRESENTATION**

Exhibit Hall

Even Numbered Poster Authors Present  
(See list of Posters on pages xxv-A-xxxiv-A)

**INTERCELLULAR EVENTS IN SIGNAL TRANSDUCTION  
AND GENE CONTROL (V)**

*Convener:* Sandra L. Schneider, University of Texas Health Science Center  
*Keynote Speaker:* Dean Edwards, University of Colorado Health Science Center

Regulation of cellular survival and differentiation of discrete and overlapping cell populations involve the mechanisms of signal transduction. Initiation of signaling events that lead to cellular differentiation are either through receptor-induced tyrosine phosphorylation or alterations of specific protein conformation. This Symposium will present a review of the steroid hormones and associated intracellular receptors that represent a major signal transduction pathway by which extracellular molecules regulate gene expression. The model systems to be discussed include the human progesterone nuclear receptor (PR) in breast cancer cells and tissue specificity of this steroid response; specific activated kinases required for mitogenic signaling of IL-3 receptor in hematopoietic cells; and the identification of oncogene signaling cell specific factors that control selective gene expression.

2:30-4:30 pm

**SYMPOSIUM**

Majestic Ballroom

(See abstracts on pages 31A-39A)

- 2:30 Introduction (S.L. Schneider)

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- 2:35 V-4 Steroid Receptor Signaling Mechanisms  
D.P. EDWARDS
- 3:05 V-5 Coupling of Multiple Signal Transduction Pathways with Steroid Hormone Response Mechanisms: Implications for the Nuclear Receptor Family and Tissue Specificity of Hormone Response  
S.K. NORDEEN
- 3:35 V-6 Signal Transduction by the Receptor for Interleukin-3  
S.M. ANDERSON
- 4:05 V-7 Oncogene Signaling: Identification of Cell-Specific Factors Controlling Selective Gene Expression  
A. GUTIERREZ-HARTMANN, A.P. Bradford, K.E. Conrad, B. Wasyluk

### ORGAN-SPECIFIC CELLULAR MODELS (V)

*Moderator:* Steve Benson, California State University, Hayward

- | 2:30-4:30 pm | CONTRIBUTED PAPERS   | Vail Room |
|--------------|--|-----------|
| 2:30         | V-1001 Extracellular Matrix Modulation of the Cellular and Molecular Aspects of Myogenesis<br>G. Bahador, A. Davalos, S. BENSON  |           |
| 2:50         | V-1002 Expression of Type VI Collagen During Glioblastoma Cell Invasion in Brain Tissue Cultures<br>J. Han and J.C. DANIEL   |           |
| 3:10         | V-1003 Application of a Composite Skin Graft to Nude Mice: Dynamic Interaction Between Cells of the Epidermis and the Dermal Graft<br>E.S. GRIFFEY and S.A. Livesey                          |           |
| 3:30         | V-1004 A Novel Three-Dimensional Liver Culture System With Applications to Transplantation and Extracorporeal Liver Assistance<br>B. SIBANDA, J. Gee, J. San Román, V. Kamali, B.A. Naughton |           |
| 3:50         | V-1005 A Method for the Primary Culture of Epithelial and Stromal Cells from Normal Rat Dorsal Prostate and from Rat Prostate Carcinomas<br>M.S. CONDON and M.C. Bosland                     |           |
| 4:10         | V-1006 Nitric Oxide Production in Lymphatic Endothelial Cells <i>In Vitro</i><br>L.V. LEAK, E.E. Just  |           |

### IN VITRO-IN VIVO CORRELATIONS IN TOXICOLOGY AND TRANSPORT (T)

*Conveners:* Ken Audus, The University of Kansas; Hank Lane, Corning Costar Corp.

*Sponsored by Corning CoStar Corporation*

The topics of discussion in this symposium are all centered on the development of *in vitro-in vivo* correlations in toxicology and transport with an emphasis on the appropriate roles of *in vitro* models in the study of biological systems. Following a general discussion outlining the problems in developing *in vitro-in vivo* correlations in biological systems, subsequent presentations will be introduced which focus on the status of specific ongoing studies in academic and industrial laboratories. These discussions will highlight work on *in vitro* models developed for the blood-brain barrier, gastrointestinal epithelium, and the liver. The contents of the presentations under these subjects will include applications of the *in vitro* models to the study of permeability, transport, toxicological, and metabolic features in the context of corresponding *in vivo* observations.

- | 2:30-4:30 pm | SYMPOSIUM                        | Columbine Room |
|--------------|----------------------------------|----------------|
|              | (See abstracts on pages 12A-13A) |                |
| 2:30         | Introduction (K. Audus)          |                |



## SUNDAY, MAY 21

- 2:35 T-4 Cell and Tissue Systems *In Vitro*: The Next Best Thing to Being *In Vivo*?  
K.L. AUDUS
- 3:05 T-5 P450 Induction and Bile-Acid Transport in Cultures of Sandwiched Rat Hepatocytes  
E.L. LECLUYSE, P.L. Bullock, A. Parkinson
- 3:35 T-6 *In Vitro-In Vivo* Blood-Brain Barrier Permeability Correlations of Receptor Selective,  
Opioid Peptides  
T.P. DAVIS, V.J. Hruby, T.J. Abbruscato
- 4:05 T-7 Drug Transport Studies in the Intestinal Epithelial Cell Line CaCo-2: Correlation with  
Absorption *In Vivo*  
C.A. BAILEY

### TRANSFORMATION AND TRANSGENIC PLANTS (P)

Moderator: Dennis Gray, University of Florida

2:30-4:30 pm **CONTRIBUTED PAPERS** **Grand Ballroom A-C**  
(See abstracts on pages 49A-50A)

- 2:30 P-1001 Germline Transformation of Maize Following Particle Bombardment of Meristems  
M. ROSS, K. Lowe, B. Bowen, D. Tomes, G. Hoerster, L. Church, L. Tagliani, D. Bond,  
D. Pierce, W. Gordon-Kamm
- 2:45 P-1002 Microprojectile DNA Delivery to Orchardgrass Leaf Cells  
P.D. DENCHEV, D. Songstad, B.V. Conger
- 3:00 P-1003 Transformed Progeny via Particle Bombardment of Embryogenic *Cucumis melo* 'Eden  
Gem' Cotyledons  
D.J. GRAY, E. Hiebert, C.M. Lin, K.T. Kelley, M.E. Compton, V.P. Gaba
- 3:15 P-1004 Stable Genetic Transformation of Grapevine: Efficiency of Insertion of a Marker Gene  
in a  $R_0$  Population  
L. MARTINELLI and G. Mandolino
- 3:30 P-1005 Production of Fertile Transgenic Peanut Plants Using *Agrobacterium tumefaciens*, and  
the Expression and Inheritance of Foreign Genes in Transgenic Peanut Plants  
M. CHENG, A. Xing, Z. Li, R.L. Jarret, J.W. Demski
- 3:45 P-1006 Genetic Engineering of Peanut (*Arachis hypogaea* L.)  
K.K. SHARMA and J.P. Moss
- 4:00 P-1007 Accumulation of the 10 kD and 15 kD Zeins in Transgenic Plants  
S. BAGGA, F. Rodriguez, N. Klypina, J.D. Kemp, C. Sengupta-Gopalan
- 4:15 P-1008 Cloning and Expression of Rice Tungro Spherical Virus Proteins and Introducing  
Genes into Rice Tissue  
Y. YAN, T.M. Burns, J.W. Davies, R. Hull

### MICROCULTURE RESEARCH STRATEGIES (P)

Moderator: Valerie Pence, Cincinnati Zoo & Botanical Garden

2:30-4:30 pm **CONTRIBUTED PAPERS** **Grand Ballroom D&E**  
(See abstracts on pages 51A-52A)

- 2:30 P-1009 *In Vitro* Plant Regeneration and Advanced Micropropagation Methods for Pineapple  
E. FIROOZABADY, J. Nicholas, N. Gutterson
- 2:45 P-1010 Laser-Assisted *In Vitro* Biology  
J. CONIA and L. Keenan
- 3:00 P-1011 *In Vitro* Collection (IVC)—Effects of Technique and Media on Sterility and Growth of  
Cultures  
V.C. PENCE and B.L. Plair
- 3:15 P-1012 Regeneration of Whole Plants of *Arachis hypogaea* L. from the Shoot Apex  
M.E. HEATLEY and R.H. Smith

SUNDAY, MAY 21

**CELL DEATH (APOPTOSIS) IN CULTURED CELLS (I/V)**

*Convener:* Marcia Loeb, USDA/ARS

*Sponsored by Boehringer Mannheim*

**7:00-9:00 pm**

**JOINT WORKSHOP**

**Majestic Ballroom**

- 7:00 Introduction (M. Loeb)
- 7:05 W-13 Apoptosis in an Insect Cell Line: Analogies and Contrasts with Vertebrate Apoptosis  
R.J. CLEM, J.M. Hardwick, L.K. Miller
- 7:40 W-14 Nonradioactive Methods for Measuring Cell Death in Cell Populations and Individual Cells  
A. IMIOLEK

MONDAY, MAY 22

7:00 am-6:00 pm

REGISTRATION

South Convention Lobby

**DEADLINE—MONDAY, 12:00 NOON**  
**Banquet vouchers MUST be exchanged for**  
**banquet ticket if you plan to attend.**

### ENVIRONMENTAL VARIABLES IN CELLULAR AGING (V)

*Convener:* Thomas Maciag, Holland Labs/American Red Cross

This Symposium will highlight studies being carried out in four different research areas, all of which focus on the elucidation of molecular mechanisms responsible for cellular senescence. The biology of telomere shortening is a fundamental event during cellular senescence. Dr. Chius will present the latest information about the function of the telomere complex in this event. Dr. Passaniti has made a novel observation that B16 melanoma and EHS carcinomas grow poorly as tumors in old mice. He has developed relevant *in vitro* correlates using apoptosis to study this age-dependent phenomena. Dr. Campisi has made numerous contributions to understand human fibroblast senescence. Her recent work has focused on transcriptional controls in the senescent phenotype and the use of cDNA cloning to isolate senescence-induced genes. Genomic cloning strategies have been used to identify chromosomes which are involved in the regulation of cellular senescence. Dr. Hensler will describe the isolation and identification of these regulatory genes.

8:00-10:00 am

SYMPOSIUM

Majestic Ballroom

*(See abstracts on pages 7A-8A)*

- |      |      |  |
|------|------|--|
| 8:00 |      | Introduction (T. Maciag)   |
| 8:05 | V-8  | Telomerase Activity is Expressed in Cycling But Not in Quiescent Hematopoietic Progenitors from Adult Human Bone Marrow<br>C.-P. CHIU, V. Dragowski, N.W. Kim, T.E. Thomas, P.M. Lansdorp, C.B. Harley |
| 8:35 | V-9  | Endothelial Cell Differentiation, Angiogenesis, and the Inhibition of Tumor Growth With Aging<br>A. PASSANITI, R. Pili, C. Yang  |
| 9:05 | V-10 | Transcription Events in Cellular Senescence<br>J. CAMPISI  |
| 9:35 | V-11 | Molecular Genetic Studies of Human Cellular Senescence<br>P.J. HENSLER and O.M. Pereira-Smith  |

### NOVEL INSIGHTS INTO CHEMICAL NEUROTOXICITY (T)

*Convener:* Bellina Veronesi, U.S. EPA

*Keynote Speaker:* Bellina Veronesi, U.S. EPA

*Sponsored by Collaborative Biomedical Products/Becton Dickinson Labware*

Pesticides outrank all classes of neurotoxicants in terms of economic importance and environmental risk. Organophosphorous (OP) insecticides are of special concern due to their widespread use. The major biochemical targets of OPs are acetylcholinesterase and neurotoxic esterase, enzymes whose inhibitions can produce lethality or paralysis, respectively. Additionally, OPs at very low doses, can bind to the acetylcholine receptor itself, producing intracellular ionic changes and second messenger events. One of the most perplexing features of OP neurotoxicity is the highly variable biochemical, neuropathological and functional response among species or even strains of the same species that have been exposed to OPs. This phenomenon, known as *interspecies selectivity*, has handicapped rigorous mechanistic investigations into pesticide neurotoxicity. In the Symposium entitled "Novel Insights Into Chemical Neurotoxicity," this phenomenon will be examined in culture using various cellular and subcellular endpoints. Even in culture, mouse and human neuroblastoma cell lines respond differently to test OPs both cytotoxicity and

## MONDAY, MAY 22

neurotoxically. The experiments presented will collectively explain interspecies selectivity in terms of species differences in inherent cellular metabolism and target enzyme activities, electrophysiological differences at the receptor level and finally second messenger events subsequent to receptor binding. Other studies will describe how mouse and human neuroblastoma cell lines have been used to differentiate between neuropathy-causing OPs and those that only produce lethality. A final speaker will extend the concept of interspecies selectivity to the broader, more human risk relevant area of *selective vulnerability*. Her studies examine the response of different cell types to chemical toxicants. She will also discuss how these differences affect the design of mechanistic studies *in vitro* and technical aspects of using different cell types, including primary neurons, as culture models.

8:00-10:00 am

### SYMPOSIUM

Columbine Room

(See abstracts on pages 13A-14A)

- 8:00 Introduction (B. Veronesi)  
8:05 T-8 New Insights Into *Interspecies Selectivity* Using Cell Culture Models of Pesticide Neurotoxicity  
B. VERONESI  
8:35 T-9 Technical Aspects of Using Primary Cultures of Nervous Tissue to Investigate Chemical Neurotoxicity  
H.D. DURHAM  
9:05 T-10 Patch Clam Technology in Neurotoxicological Evaluation  
G. CHRISTOPH  
9:35 T-11 *In Vitro* Screens for Esterase-Inhibiting Neurotoxicants  
M. EHRICH

### INTERPLAY OF PLANT CELLS WITH THEIR ENVIRONMENT: ENVIRONMENTAL STRESS (P)

Moderator: Dan Brown, Agriculture Canada

8:00-10:00 am

### CONTRIBUTED PAPERS

Grand Ballroom A-C

(See abstracts on pages 53A-54A)

- 8:00 P-1017 Water Deficit Stress-Induced Gene Identification and Transformation in *Pinus*  
M.A.D. Dias, P. Veeraragavan, J.H. Gould, R.J. NEWTON  
8:20 P-1018 Induction of Desiccation Tolerance by ABA and ABA-Analogs in Microspore-Embryos of Canola  
X. Peng, D.C.W. BROWN, S.R. Abrams, E. Watson, J.A. Webb  
8:40 P-1019 The Effects of Various Stresses on Protein Synthesis and mRNA in Soybean Cultures  
P.S. KAHLON, S.M. Bhatti, and L. Qian  
9:00 P-1020 Methyl Jasmonate Induces Cathepsin D Inhibitor in Potato and Tomato Leaves  
T.-H. ANNIE LIU and D.J. Hannapel  
9:20 P-1021 Selection for Resistance to Inhibitors of Polyamine Biosynthetic Enzymes and for Adaptation to High Temperatures in Cotton Cell Cultures  
R. Saavedra, G.D. Kuehn, G.C. PHILLIPS  
9:40 Wrap-up (D. Brown)

### REGENERATION AND SELECTION METHODOLOGIES (P)

Moderator: D.E. Wedge, Clemson University

8:00-10:00 am

### CONTRIBUTED PAPERS

Grand Ballroom D&E

(See abstracts on pages 54A-56A)

- 8:00 P-1022 Callus Induction and Regeneration from Suspension Culture of Garlic, *Allium sativum*  
J.M. MYERS and P.W. Simon

## MONDAY, MAY 22

- 8:15 P-1023 Comparison of Different Methods of Regeneration for Soybean (*Glycine max* L.) from Mature Seeds and Immature Cotyledons  
C.M. BAKER and C.D. Carter
- 8:30 P-1024 Utilization of Carbohydrates During Organogenesis of *Nicotiana tabacum* L. var. Burley 21  
N. AHUJA and N.D. Camper
- 8:45 P-1025 The Effect of Induction with 2,4-D versus NAA on the Origin, Histology and Normalcy of Pecan Somatic Embryos  
A.A.P.M. Rodriguez and H.Y. WETZSTEIN
- 9:00 P-1026 Responses of *Sassafras albidum* (Nutt.) Nees Explants to IAA and 2,4-D in MS-Culture Media  
C.E. BRODERICK
- 9:15 P-1027 Embryogenic Mango Suspension Cultures Challenged with Culture Filtrate of *Colletotrichum gloeosporioides* Show Enhanced Release of Extracellular Antifungal Proteins  
S. JAYASANKAR and R.E. Litz
- 9:30 P-1028 An *In Vitro* Detection System for *Cornus florida* Calli Resistant to Toxic Metabolites of *Discula destructiva*  
D.E. WEDGE, W.V. Baird, F.H. Tainter
- 9:45 P-1029 Organogenesis and Expression of the Biosynthetic Pathways of Lipid Compounds in *Linum usitatissimum* and *Euphorbia characias*  
A. Cunha and M. FERNANDES-FERREIRA

10:00 am-6:00 pm

EXHIBITS AND POSTERS

Exhibit Hall

Even Numbered Poster Authors Will  
Be Present 12:30-1:30 pm  
(See list of Posters on pages xxv-A-xxxiv-A)

10:00-10:30 am

COFFEE BREAK

Exhibit Hall

### TISSUE CULTURE SYSTEMS FOR INVESTIGATING INFECTIOUS AGENTS (I/V)

Convener: Gertrude Buehring, University of California-Berkeley

Sponsored by Clonetics Corporation

Despite the great armament of antibiotics and vaccines, infectious diseases remain the leading cause of morbidity and mortality worldwide. For many of the unconquered diseases, our understanding of the causative agent's biology must be vastly expanded before effective strategies for control can be generated. Tissue culture has played a central role in the development of viral vaccines. In addition to its function in mass propagation of microorganisms, tissue culture is increasingly being exploited to study host-parasite relationships, and is often superior to animal models because of the ability to control variables. The speakers in this session will present ingenious *in vitro* models for studying the life cycle and/or pathogenesis of particular infectious agents representing viruses, bacteria, protozoans, and helminths.

10:30 am-12:30 pm

JOINT SYMPOSIUM

Majestic Ballroom

(See abstracts on page 2A)

- 10:30 Introduction (G. Buehring)
- 10:35 JS-1 Replication of Human Papillomavirus in Differentiating Epithelium *In Vitro*  
C. MEYERS and L.A. Laimins
- 11:05 JS-2 Epithelial/Endothelial Bilayer Tissue Culture Model for the Study of Bacterial Pathogenesis  
F.D. QUINN, K.A. Birkness, J.H. Bartlett, E.H. White

## MONDAY, MAY 22

- 11:35 JS-3 Axenic Culture of Malarial Parasites  
W. TRAGER
- 12:05 JS-4 Culture Methods for the River Blindness Parasite, *Onchocerca volvulus*.  
M.S. CUPP, T. Lehman, E.W. Cupp

### PCR METHODS IN TOXICOLOGY (T)

*Convener:* Oliver Flint, Bristol Myers Squibb

*Sponsored by Roche Molecular Systems*

Genetic variability and gene expression can now be readily evaluated by PCR (polymerase chain reaction). The cytochrome P450 family of xenobiotic metabolizing enzymes was originally characterized by studies of reaction kinetics, metabolic specificity and immunoassay. PCR has provided a new and very precise tool for identifying cytochrome P450 genes and, by using the reverse transcriptase enzyme, the expression of P450 mRNA. More traditional methods, such as the use of fluorescent probes, were able to identify broad classes of P450 enzyme. PCR, in contrast, permits the precise identification of individual genes both in intact tissues and in cultured cells, expanding our knowledge of the maintenance of the differentiated state under *in vitro* conditions.

10:30 am-12:30 pm

#### SYMPOSIUM

Columbine Room

*(See abstracts on pages 14A-15A)*

- 10:30 Introduction (O. Flint)
- 10:35 T-12 Xenobiotic-mediated Induction of Cytochrome P450 Gene Expression in Primary and Transformed Rat Hepatocyte Cultures: Differences in Expression and Induction Potential as Ascertained by RT-PCR.  
J.S. SIDHU, F.M. Farin, C.J. Omiecinski
- 11:05 T-13 Detection of Human Extrahepatic Cytochrome P450 (CYP) Expression Using RT-PCR.  
F.M. FARIN, M.R. Andersen, C.J. Omiecinski
- 11:35 T-14 Human Genetic Diversity in Carcinogen Metabolism: Probing Molecular Variation by Polymerase Chain Reaction  
D.A. BELL, A. Hirvonen, M. Watson

### IN VITRO FOREST TREE STRATEGIES (P)

*Conveners:* David Ellis, University of Wisconsin; Neville Arnold, Agriculture Canada

The *in vitro* manipulation of forest trees has presented some unique challenges to researchers. These challenges have contributed to an increased understanding of limitations with woody plant tissue culture, as well as the development of tissue culture systems to overcome some of these limitations. Somatic embryogenesis is an example of one of these systems, which has been important not only for propagation, but also for molecular and biochemical studies. Although somatic embryogenesis offers many advantages, the inability to propagate most mature trees remains a large obstacle. An understanding of the physiological, biochemical, and molecular changes associated with the phase shift from juvenile to mature tissues has yielded considerable information useful for the propagation of mature genotypes. These studies have been focused on perennial crops yet have yielded information applicable to the *in vitro* manipulation of all plants.

10:30 am-12:30 pm

#### SYMPOSIUM

Grand Ballroom A-C

*(See abstracts on pages 18A-19A)*

- 10:30 P-6 Strategies for Dealing With Limitations of Somatic Embryogenesis in Hardwood Trees  
S.A. MERKLE

TUESDAY, MAY 23

7:00 am-6:00 pm

REGISTRATION

South Convention Lobby

**METHODS AND MARKERS FOR EUKARYOTIC TRANSFORMATION  
AND THE FATE OF DNA (P/T/V)**

*Conveners:* Ray Shillito, Ciba Corporation; John Harbell, Microbiological Associates, Inc.

*Co-sponsored by Ciba Corporation and ICI Seeds, Inc.*

Transgenic technology has become a vital part of the study of genes, and their expression and interaction in all higher eukaryotic organisms. Techniques have been developed for introducing genes and monitoring their activity. However, there has been little interaction between those working in different organisms. Cross fertilization of ideas and insights will lead to new approaches to transformation. This session will therefore bring together information on transformation methods, marker technology, and behavior of inserted DNA sequences in different eukaryotes, and promote discussion between those working on related issues in different organisms.

8:00-10:00 am

**JOINT SYMPOSIUM**  
(See abstracts on pages 3A-4A)

Grand Ballroom A-C

- 8:00 JS-5 Real Time Analysis of Transcription Using *In Vivo* Reporter Gene Technology  
S.A. KAY
- 8:30 JS-6 Particle Bombardment Technology for Gene Transfer into Plant and Mammalian  
Systems  
N.-S. YANG
- 9:00 JS-7 Factors Affecting Stable Transformation via Micro-projectile Bombardment Using  
Immature Corn Embryos  
A.D. BAILEY, E. Brambila, S.G. DeWald
- 9:20 JS-8 DNA Transformation Using Electrically Charged Tungsten Microelectrodes  
T.J. HARRINGTON and E. Aamodt
- 9:40 JS-9 Factors Enhancing *Agrobacterium*-Mediated Transformation of Peanut (*Arachis  
hypogaea* L.)  
M. EGNIN, A. Mora, C.S. Prakash

10:00 am-5:00 pm

**EXHIBITS AND POSTERS**

Exhibit Hall

Odd Numbered Poster Authors Will  
Be Present 12:30-1:30 pm  
(See list of Posters on pages xxv-A-xxxiv-A)

10:00-10:30 am

**COFFEE BREAK**

Exhibit Hall

**FROM NORMAL TO NEOPLASTIC: CANCER DEVELOPMENT *IN VITRO* (V)**

*Convener:* Alda Vidrich, Cedars Sinai Medical Center

Neoplastic transformation is a multistage process involving events that can be temporally distinguished as well as the accumulation of multiple changes in gene expression. A number of cell culture systems have been particularly instrumental in the elucidation of mechanisms leading to the evolution of the transformed cell. This Symposium reviews our current understanding of the biological, biochemical, and genetic changes that contribute to the development of the malignant cell. This knowledge now provides an opportunity to identify agents that may disrupt the process of carcinogenesis.

## TUESDAY, MAY 23

10:30 am-12:30 pm

**SYMPOSIUM**  
(See abstracts on page 11A)

**Majestic Ballroom**

- 10:30 Introduction (A. Vidrich)  
10:35 V-21 Neoplastic Transformation of Human Fibroblasts in Culture—A Multi-stepped Process  
J.J. MCCORMICK and V.M. Maher  
11:05 V-22 Defects in Cell Cycle Control and Differentiation in Multistage Cancer of Mouse Epidermal Cells  
M. KULESZ-MARTIN  
11:35 V-23 Induction, Progression, and Prevention of Carcinogenesis in Cultured Respiratory Epithelial Cells  
V.E. STEELE

### **MEDIATORS OF INFLAMMATION AND IMMUNOTOXICOLOGY (T)**

*Convener:* Pat Dimond, PerSeptive Biosystems

*Keynote Speaker:* Michael I. Luster, NIEHS

Transgenic technology has become a vital part of the study of genes, and their expression and interaction in all higher eukaryotic organisms. Techniques have been developed for introducing genes and monitoring their activity. However, there has been little interaction between those working in different organisms. Cross fertilization of ideas and insights will lead to new approaches to transformation. This session will therefore bring together information on transformation methods, marker technology, and behavior of inserted DNA sequences in different eukaryotes, and promote discussion between those working on related issues in different organisms.

10:30 am-12:30 pm

**SYMPOSIUM**  
(See abstracts on pages 15A-16A)

**Columbine Room**

- 10:30 Introduction (P. Dimond)  
10:35 T-15 The Role of Cytokines in Chemical Toxicity  
M.I. LUSTER  
11:05 T-16 Air Pollutants and Alveolar Macrophage (AM) Function: Relevance of *In Vitro* Exposures to *In Vivo* Effects  
M.J.K. SELGRADE  
11:35 T-17 Direct Effects of 2,3,7,8-Tetrachloro-dibenzo-*p*-dioxin (TCDD) on B-lymphocyte Function: Mechanistic Studies and Comparative Studies Between Mouse and Man  
M.P. HOLSAPPLE  
12:05 T-18 The Role of Interleukin-10 in the Induction of Immune Suppression by UV Exposure  
S.E. ULLRICH

### **TRANSFORMATION CHALLENGES FOR RECALCITRANT CROPS: RECENT BREAKTHROUGHS (P)**

*Convener:* Maud Hinchee, Monsanto Co.

*Co-sponsored by Monsanto Company*

This workshop explores some recent developments in plant transformation. The focus will be on the development of transformation systems as well as on relatively new transformation methods. The techniques to develop a routine transformation system in three problematic plant species will be discussed. In addition, two relatively recent developments in transformation methods will also be described. The intent of this workshop is to elucidate the thought processes and experimental strategies necessary to develop new transformation technology.



MONDAY, MAY 22

- 10:55 P-7 Somatic Embryogenesis in *Picea abies*: Morphological and Biochemical Characterization of Various Developmental Stages  
S. VON ARNOLD, H. Mo, U. Egertsdotter
- 11:20 P-8 Cellular, Biochemical and Molecular Bases of Stable Maturation-Related Characteristics  
W.P. HACKETT
- 11:45 P-9 Immature Embryo Culture of *Quercus alba*  
K.S. GRUMBINE and N.D. Camper
- 12:00 P-10 Lower Oxygen and Somatic Embryogenesis of Loblolly Pine (*Pinus taeda* L.)  
F.H. HUANG and X.Y. Li
- 12:15 P-11 Imaging of Fluorescent-stained Somatic and Zygotic Pine Embryos with Laser Scanning Confocal Microscopy  
R. NAGMANI, A. Kakani, A.M. Diner, G. Brown, V. Sapra, G.C. Sharma

12:30-1:30 pm

POSTER PRESENTATION

Exhibit Hall

Even Numbered Poster Authors Present  
(See list of Posters on pages xxv-A-xxxiv-A)

**THREE DIMENSIONAL TISSUE CULTURE IN NASA BIOREACTOR SYSTEMS (V)**

*Conveners:* Neal R. Pellis, NASA-Johnson Space Center;  
J. Milburn Jessup, M.D. Anderson Cancer Center

*Sponsored by NASA-Johnson Space Center*

The *in vitro* manipulation of forest trees has presented some unique challenges to researchers. These challenges have contributed to an increased understanding of limitations with woody plant tissue culture, as well as the development of tissue culture systems to overcome some of these limitations. Somatic embryogenesis is an example of one of these systems, which has been important not only for propagation, but also for molecular and biochemical studies. Although somatic embryogenesis offers many advantages, the inability to propagate most mature trees remains a large obstacle. An understanding of the physiological, biochemical, and molecular changes associated with the phase shift from juvenile to mature tissues has yielded considerable information useful for the propagation of mature genotypes. These studies have been focused on perennial crops, yet have yielded information applicable to the *in vitro* manipulation of all plants.

2:30-4:30 pm

SYMPOSIUM

Majestic Ballroom

(See abstracts on pages 8A-10A)

- 2:30 Introduction (N.R. Pellis)
- 2:35 V-12 Low Shear Stress of NASA Rotating Wall Vessel (RWV) Increases CO<sub>2</sub> and Acid Production While Supporting Differentiation in Three-Dimensional Cultures  
J.M. JESSUP, A. Nachman, R.D. Ford
- 2:50 V-13 Microgravity-Suppressed Peripheral Blood Mononuclear Cell (PBMC) Locomotion Is Restored by Iron-Transferrin Supplementation  
R.R. PIZZINI and N.R. Pellis
- 3:05 V-14 Three Dimensional Multicellular Systems *In Vitro*: NASA Bioreactor and Other Techniques  
L. MARGOLIS, W. Fitzgerald, N. Amichai, B. Baibakov, S. Glushakova, J. Zimmerberg
- 3:20 V-15 Simulated Microgravity Enhances Extracellular Matrix Protein Expression in Cultured PC12 Pheochromocytoma Cells  
J. LIU, D.L. Galvan, B.R. Unsworth, P.I. Lelkes

## MONDAY, MAY 22

- 3:35 V-16 Human Renal Epithelial Cells in Culture Differentiate Under Simulated Microgravity  
T.G. HAMMOND, D.L. Galvin, T.J. Goodwin, P.I. Lelkes
- 3:50 V-17 Microgravity Enhances Tissue-Specific Neuroendocrine Differentiation in Cocultures  
of Rat Adrenal Medullary Parenchymal and Endothelial Cells  
D.L. GALVAN, B.R. Unsworth, T.J. Goodwin, J. Liu, P.I. Lelkes
- 4:05 V-18 Brief Exposure to Simulated Microgravity Affects Tyrosine Phosphorylation in PC12  
Pheochromocytoma Cells  
D.L. GALVAN, B.R. Unsworth, T.J. Goodwin, P.I. Lelkes
- 4:20 V-19 Increased Cytotoxicity of Bleomycin When Used In Conjunction With Electroporation  
R. HELLER, M. Jaroszeski, R. Perrott, J. Becker, H. Arango, P. Satyaswaroop, R.  
Gilbert
- 4:35 V-20 To Be Announced  
KERBEL

### CELLULAR AND MOLECULAR TOXICOLOGY (T)

*Moderator:* Marque Todd, Xenometrix, Inc.

2:30-4:30 pm

#### CONTRIBUTED PAPERS

Columbine Room

*(See abstracts on pages 40A-41A)*

- 2:30 T-1001 Detecting the Transcriptional Responses to Genotoxins in Mammalian Cells With and  
Without Exogenous Bioactivation  
M.D. TODD, P. Gee, S.B. Farr
- 2:50 T-1002 Atypical Cytochrome P-450 Induction Profiles at the mRNA and Enzyme Level in  
Glomerular Mesangial Cells  
A.R. PARRISH, R.C. Bowes III, M.A. Steinberg, K.L. Willett, W. Zhao, S.H. Safe, K.S.  
Ramos
- 3:10 T-1003 The Cytotoxicity of 4-(Methyl-nitrosamino)-1-(3-pyridyl)-1-butanone on Pancreatic  
Duct Cell Cultures  
M.K. REDDY
- 3:30 T-1004 Retinol Stimulation of Clara Cell-Antigen Expression in an Epithelial Stem-Cell Line  
(M3E3/C3) of Syrian Hamster Lung  
M. EMURA, A. Ochiai, G. Singh, I. Hilger, S.L. Katyal, D.L. Dungworth
- 3:50 T-1005 A New Assay for Toxicity of Alloplastic Materials in the Urinary Tract: Preliminary  
Results With Bladder Catheters  
J.V. Harney, C.E. MOTHERSILL, D.M. Murphy

### THE DISCOVERY AND PRODUCTION OF PHARMACEUTICALS FROM PLANT TISSUE CULTURES (P)

*Convener:* Michael Horn, Mycogen Plant Sciences

It has long been known that plant cell cultures are capable of synthesizing secondary compounds of pharmaceutical and commercial value. The process of putting plant cells into culture induces the expression of numerous isozymes which are rarely, if ever, found together in any organ of the plant at any point in its life cycle. Hence, new secondary compounds are frequently synthesized by plant cell cultures, albeit usually in quite low amounts. Moreover, culturing plant cells as heterotrophic, photoautotrophic, embryogenic, and 'organized' induces a myriad of changes in the isozymal complement with the expected result being new secondary compounds found in each 'culture form'.

The detection, characterization, and testing of these novel compounds are of potentially great importance as the biodiversity of the Earth's flora continues to decline. This session will focus on what is known about secondary compounds in cultured plant cells including synthesis, biotransformation, and commercialization. First, Dr. Masanaru Misawa will give an overview of the state of the art in this area. Then, Dr. David Ellis will give a lecture on the history of Taxol and the production of this valuable anti-

## MONDAY, MAY 22

cancer compound *in vitro*. Subsequent talks will focus on the production of ginkgolides from cultures of *Ginkgo biloba*, and the effect of different gases in the culture headspace on Taxol production.

**2:30-4:30 pm** **SYMPOSIUM** **Grand Ballroom A-C**  
(See abstracts on pages 19A-20A)

- 2:30 P-12 Plant Cell Culture: An Alternative for Production of Pharmaceuticals  
M. MISAWA
- 3:10 P-13 Taxol—The Science and History of an Anti-Cancer Compound from U.S. Forests  
D. ELLIS
- 3:50 P-14 Taxol Productivity of Suspension Cultures of *Taxus cuspidata* Exposed to Defined  
Headspace Gas Concentrations  
N. MIRJALILI and J.C. Linden
- 4:05 P-15 Use of Rotating Wall Vessel (RWV) for Study of Plant Cell Culture  
X. SUN and J.C. Linden
- 4:20 P-16 *In Vitro* Culture of Ginkgo  
N.D. CAMPER, D.E. Wedge, R.J. Keese, A. Depew

### CELL COMMUNICATION IN INVERTEBRATES (I)

Convener: Kathleen Horwath, SUNY at Binghamton

**2:30-4:30 pm** **SYMPOSIUM** **Vail Room**  
(See abstracts on pages 22A-23A)

- 2:30 Introduction (K. Horwath)
- 2:35 I-7 A Single Second Messenger Mediating Opposing Growth Cone Behaviors  
S.B. KATER, T.B. Kuhn, A. Shibata, M.V. Wright, C.V. Williams
- 3:05 I-8 Analysis of Neurogenic Signalling in Cultured Cell Lines from *Drosophila melanogaster*  
M.A.T. MUSKAVITCH, T.R. Parody, S.B. Shepard, M. Vaskova
- 3:35 I-9 ZOHE Induced Neuronal Differentiation *In Vitro* (Insects)  
R. LEVINE
- 4:05 I-10 Molecular Analysis of Ecdysone Action in Insect Cells  
S.R. PALLI, T. Ladd, B. Cook, S.S. Sohi, A. Retnakaran

**5:00-6:00 pm** **HAPPY HOUR** **Exhibit Hall**

### HOW TO INTRODUCE ELEMENTARY SCHOOL STUDENTS TO *IN VITRO* BIOLOGY

Convener: Helene N. Guttman, Agricultural Research Service/USDA

Dannette Ward of Monsanto Co., St. Louis, will conduct the workshop. Dr. Ward has many years of experience doing "show and tell" demonstrations about *in vitro* biology for elementary school students and their teachers. She will share with us general principles for addressing this type of audience, and the type of materials that should be brought to the school for a successful demonstration that *captures* and *holds* the interest of this audience. She will do a model demonstration for us and have available at the meeting handouts that she provides to the teachers so that they can continue with further *inexpensive* teaching modules for the students.

One role of scientists and their professional societies is to assist in transmitting the excitement of science to youngsters since they represent our future. We expect this workshop to be the first of a series; however, a measure of its success will be two-fold: attend the workshop, *and*, then, visit an elementary school and show the students and teachers what you have learned.

**7:00-9:00 pm** **EDUCATION COURSE** **Silver Room**

## TUESDAY, MAY 23

10:30 am-12:30 pm

### WORKSHOP

Grand Ballroom A-C

(See abstracts on pages 27A-28A)

- Introduction (M. Hinchee)
- W-15 Transformation of Grape (*Vitis vinifera* L.)  
R. SCORZA, J.M. Cordts, D.J. Gray, D.W. Ramming, R.L. Emershad
- W-16 Pea Transformation  
A. MORGAN
- W-17 High Efficiency Transformation of Regeneration of Transgenic Sweetpotato Plants  
C.S. PRAKASH, Q. Zheng, A. Porobo Dessai
- W-18 Plastid Transformation: A New Tool for Basic Science and for Biotechnological Applications  
P. MALIGA
- W-19 *Agrobacterium*-mediated Gene Transfer to Rice (*Oryza sativa* L.)  
J.R. ROUT, M.P. Gordon, W.J. Lucas, E.W. Nester

### INSECT CELLS IN CULTURE (I)

Moderator: Cynthia Goodman, USDA/ARS

10:30 am-12:30 pm

### CONTRIBUTED PAPERS

Vail Room

(See abstracts on pages 85A-86A)

- 10:30 I-1001 Insect Midgut Cells in Culture: A Typical Stem Cell System  
M.J. LOEB and R.S. Hakim
- 10:50 I-1002 Characteristics of Midgut-Derived Insect Cell Lines  
C.L. GOODMAN and A.H. McIntosh
- 11:10 I-1003 Baculovirus AcMNPV Induces Apoptosis in an Insect Midgut Cell Line  
S.R. PALLI, G.F. Caputo, A.J. Brownright, S.S. Sohi
- 11:30 I-1004 Interaction Between Cell Adhesion and Apoptosis Pathways and its Role in the Cellular Immune Response in Insects  
L.L. PECH and M.R. Strand
- 11:50 I-1005 Identification of Insect Cell Lines by DAF  
A.H. MCINTOSH, J.J. Grasela, R.L. Matteri

12:30-1:30 pm

### POSTER PRESENTATION

Exhibit Hall

Odd Numbered Poster Authors Present  
(See list of Posters on pages xxv-A-xxxiv-A)

### BIOTECHNOLOGY—GROWTH OF CELLS IN BIOREACTORS (V/T)

Convener: Kathy Allen, IDEC Pharmaceuticals Corp.

Sponsored by PerSeptive Biosystems, Inc.

The use of cultured cells to manufacture pharmaceutical products is a complex and highly-regulated process that requires expertise in numerous areas of cell culture research including heterohybridoma culture, genetic engineering, cell line characterization, media adaptation, and many others. A variety of cells are used for production, including plasmid-transfected CHO cells, baculovirus-transfected insect cells, and *E. coli*. The cells are genetically altered by transfection to include the gene DNA sequences of the desired product. The transfected cells used for producing the proteins or antibodies can be cultured in various types of bioreactors, from the low-volume hollow-fiber bioreactors of 25-mL to large-scale production in stirred tanks holding 10,000 L. Cellular metabolism is maintained by manipulating culture medium components and environmental culture conditions to optimize cell growth and product expression.

## TUESDAY, MAY 23

In this Symposium, an overview of the entire process, as well as specific phases, of developing a cell line engineered to perform a desired function are described.

2:30-5:30 pm

### JOINT SYMPOSIUM (See abstracts on pages 4A-5A)

Grand Ballroom A-C

- 2:30 Introduction (K. Allen)  
2:35 JS-10 Biotechnology Products from Animal Cells  
A.S. LUBINIECKI  
3:20 JS-11 Genetics and Molecular Biology of Gene Transfer, Amplification and Expression in Recombinant Chinese Hamster Ovary Cells  
F.M. WURM  
3:55 JS-12 Genetic and Phenotypic Traits Observed During Development, Implementation and Monitoring of Large-Scale Mammalian Cell Culture Manufacturing Processes  
S.R. ADAMSON  
4:30 JS-13 Monitoring Monoclonal Antibody Production  
W.G. ROBEY, J. Brackett, K. Cousineau, G. Gall, B. Peterson, A. Annapragada, H. Wang

### TRANSFORMATION CHALLENGES FOR RECALCITRANT CROPS: FOCUS ON SOYBEAN (P)

*Convener:* Ted Klein, Dupont Agricultural Products

*Co-sponsored by Dupont Agricultural Products, American Soybean Association*

The production of transgenic soybean was first reported in 1988. Although progress in the transformation of this species has occurred since then, there is still a need for a generally applicable and efficient gene transfer system. This workshop will provide a forum for discussion of recent progress in this field.

2:30-4:30 pm

### WORKSHOP (See abstracts on pages 28A-29A)

Majestic Ballroom

- W-20 The Components of Variation Associated with *Agrobacterium*-Mediated Transformation of Soybean  
T.E. CLEMENTE, B.J. La Valle, D.A. Kasten, K.K. Seehra, D.L. Broyles, P.E. Hunter, R.J. Rozman, D.C. Ward, A.R. Howe, M.A. Hinchee  
W-21 Possible Factors Affecting Fertility of Soybean Plants from Transgenic Embryogenic Cultures  
W.A. PARROTT, C.N. Stewart, M. Anis  
W-22 Establishment of a Regional Soybean Tissue Culture and Genetic Engineering Center  
R.D. DINKINS, R.S. Torisky, R. Di, G.B. Collins  
W-23 Cotyledonary Node Explants of Northern-Adapted Soybeans as Targets for *Agrobacterium*-Mediated Transformation  
P.A. DONALDSON, D.H. Simmonds, H. Voldeng  
W-24 Transformation and Transformation-competence in Embryogenic Tissue of Soybean  
J.J. FINER, E.R. Santarem, H.N. Trick

5:00-6:00 pm

**SIVB BUSINESS MEETING**  
*All Members Are Urged to Attend*

Silver Room

**TUESDAY, MAY 23**

**ATTENTION POSTER PRESENTERS**  
**All Posters Must Be Removed from Exhibit Hall**  
**By 5:00 pm Tuesday, May 23**

**AWARDS BANQUET • 7:00 pm**  
*Seating is Limited*  
*Admittance to Banquet by Advance*  
*Ticket Holders Only*

**WEDNESDAY, MAY 24**

7:00 am-12:00 pm

**REGISTRATION**

**South Convention Lobby**

**CANCER BIOLOGY IN VITRO (V)**

*Moderator:* Carmel Mothersill, Dublin Institute of Technology

8:00-10:30 am

**CONTRIBUTED PAPERS**  
*(See abstracts on pages 32A-33A)*

**Denver Room**

- 8:00 V-1007 Long-term Alteration in the Expression of Cell Cycle Control and Signal Transduction Genes Following Exposure of Human Urothelial cultures to Gamma Radiation  
C. MOTHERSILL, J. Harney, F. Lyng, C. Seymour, K. Parsons, D. Murphy
- 8:20 V-1008 Effects of Vitamin D and its Analogs on Breast Carcinoma Cells  
R.R. MEHTA, R.G. Mehta, T.K. Das Gupta
- 8:40 V-1009 Experimental Down-Regulation of c-myc Oncogene-Induced Transformation in Mammary Epithelial Cells: Effect of Brassinin Derivatives  
N.T. TELANG, S. Inoue, R.G. Mehta, R.M. Moriarty, H.L. Bradlow, M.P. Osborne
- 9:00 V-1011 The Development of a Model of Cancer Initiation and Progression Using Conditionally Immortalised Colonic Mucosal Cells  
R.H. WHITEHEAD, J. Weinstock, J.L. Joseph

**BIOTECHNOLOGY: MODELS & METHODS (T)**

*Moderator:* Patricia Chulada, NIEHS

8:15-10:30 am

**CONTRIBUTED PAPERS**  
*(See abstracts on pages 41A-42A)*

**Silver Room**

- 8:15 T-1006 Selective Inhibition of Murine Prostaglandin Synthase 1 or 2 by NSAIDs Using Mammalian Cell Lines Retrovirally Infected With Murine Prostaglandin Synthase cDNAs  
P.C. CHULADA and R. Langenbach
- 8:35 T-1007 Stripping and reconstitution of HLA Class I Associated Peptide for Generation of Antigen-specific CD8 + T-lymphocytes  
M.V. PESHWA and W.C.A. van Schooten
- 8:55 T-1008 Development of a Fluorescence Based Amino Acid Analysis System Suitable for Analysis of Tissue Culture Media and Cell Culture Broth  
C. VAN WANDELEN, S.A. Cohen, J.T. Kubiak
- 9:15 T-1009 Serum-Free Production of Rotaviruses  
S. GOULD, D. DiStefano, D. Robinson
- 9:35 T-1010 Identification and Characterization of the Extracellular Matrix Molecule Restrictin  
J.J. HEMPERLY, R.L. Ackley, R.A. Reid
- 9:55 T-1011 Hematotoxic Effects of Chemotherapeutic Drugs Assessed Using Three-Dimensional Bone Marrow Cultures  
J. SAN ROMÁN, V. Kamali, B. Sibanda, J.M. Gee, B.A. Naughton

**LIQUID MEDIUM IN PLANT IN VITRO CULTURE (P)**

*Conveners:* Indra Vasil, University of Florida; Robert Levin, Osmotek Ltd.

*Sponsored by Life Technologies*

This workshop will address the use of cluster cultures, mechanical separation of cluster culture, problems of contamination, filter sterilization of media, and use of rafts.

WEDNESDAY, MAY 24

8:00-10:30 am

WORKSHOP

Grand Ballroom A-C

(See abstracts on page 30A)

- W-25 Introduction (I. Vasil/R. Levin)  
Improvement of Regeneration of Nontransgenic and Transgenic Plant Tissues Using a Concentrate Liquid Medium  
J.-J. LIN, R.M. Fike, N. Assad-Garcia
- W-26 Advantages of Microporous Membranes for Plant Tissue Culture on Liquid Media  
J.W. ADELBERG and R.E. Young
- W-27 Plant Micropropagation in Bioreactor Cultures  
M. ZIV
- W-28 Liquid Culture as a Route for High Efficiency Micropropagation  
A.A. WATAD, V. Gaba, Y. Alper, R. Levin

**MATRIGEL® MATRIX-BASED CULTURE SYSTEMS FOR PRIMARY HEPATOCYTES**

*Conveners:* Brigitta Tadmor, Collaborative Biomedical Products/Becton Dickinson Labware

*Sponsored by Collaborative Biomedical Products/Becton Dickinson Labware*

In order to study cellular processes in physiologically relevant manner, the microenvironment *in vitro* must replicate certain characteristics of the microenvironment *in vivo*. Maintaining a cell's biological function *in vitro* often requires culture conditions that allow for cellular interactions with extracellular matrix, soluble factors (e.g., cytokines or hormones) and homo- or hetero-typic interactions between cells. Hence, the construction of an *in vitro* system for the culture of cells, particularly primary cells, requires optimization of its key components, such as extracellular matrix and cytokines.

During the first part of this workshop, the impact of culture conditions on cell morphology and cell function will be illustrated on the example of hepatocytes and other epithelial cells. During the second and third part, MATRIGEL® Matrix-based systems for the culture of differentiated hepatocytes will be discussed. Methodology to determine cell morphology (e.g., TEM and SEM) and cell function (e.g., expression of specific cytochromes and liver-specific transcription factors) will be presented.

8:00-10:30 am

WORKSHOP

Grand Ballroom D&E

(Abstracts will be distributed at the workshop)

TOM COLLINS, Collaborative Biomedical Products/Becton Dickinson Labware  
PAULA FLUHERLY, Collaborative Biomedical Products/Becton Dickinson Labware  
STEPHEN FARMER, Boston University School of Medicine



## TOXICOLOGY POSTERS

### CELLULAR MODELS IN TOXICOLOGY: MECHANISMS

- T-1026 Effects of External Ligands on Interaction of CdCl<sub>2</sub> with Cell Lines of Different Tissue Origins  
J.T. JONES, D.E. Carter, H.E. Laird II
- T-1027 *In Vitro* Endoreduplication of Chromosomes by Organomercurials in CHO Cells  
A. WILSON, L. Carleton, E. Alauddin, T.S. Kochhar
- T-1028 Phosgene-induced Calcium Changes in Pulmonary Artery Endothelial Cells  
R.J. Werrlein, S.D. Kirby, J. MADREN-WHALLEY
- T-1029 2,2' Dichlorodiethyl Sulfide (Sulfur Mustard, SM) Causes Cleavage of Human Lymphocyte DNA Poly (ADP-Ribose) Polymerase Inhibitors (PADPRPI) Alter the DNA Patterns  
H.L. MEIER and C.B. Millard
- T-1030 DNA Damage Caused by Influenza Virus-Single Cell Electrophoresis Assay  
M.V. RAMANA, Y.L. Ahuja, G. Sharma

### SILENT

- T-1031 The Role of Glutathione in Protecting Against Menadione-induced Cytotoxicity in Platelets Isolated from Rats  
Y.S. Cho, K.S. Park, J.Y. Lee, M.J. Kim, J.H. CHUNG
- T-1032 Comparative Heavy Metal Cytotoxicity to Established Fish Cell Lines  
H. SEGNER
- T-1033 Immortalization and Depolarizing Conditions Modulate c-Fos Expression in Retinal Cell Cultures  
G.M. SEIGEL

## PLANT POSTERS

**SUNDAY, MAY 21**  
10:00 am-6:00 pm

**MONDAY, MAY 22**  
10:00 am-6:00 pm

**TUESDAY, MAY 23**  
10:00 am-5:00 pm

### POSTER SESSION

*Posters Mounted Saturday, May 20, 3:00-6:00 pm*  
*Posters must be removed from Exhibit Hall by 5:00 pm, Tuesday, May 23*

Authors will be present at their posters the following days and times:

<b>SUNDAY, MAY 21</b>	<b>MONDAY, MAY 22</b>	<b>TUESDAY, MAY 23</b>
Even Authors Present 12:30-1:30 pm	Even Authors Present 12:30-1:30 pm	Odd Authors Present 12:30-1:30 pm
Odd Authors Present 4:30-5:30 pm		

### MICROPROPAGATION

- P-1030 Use of Clones in a Sugarbeet Improvement Program  
L. PANELLA and C. Rivera Smith
- P-1031 Micropropagation of Cowpea (*Vigna unguiculata*) Through Shoot Tip Multiplication  
J.M. AL-KHAYRI, T.E. Morelock, E.J. Anderson
- P-1032 Micropropagation of Agarita, *Berberis trifoliata*  
F. MOLINAR, JR., W.A. Mackay, M.M. Wall
- P-1033 Micropropagation of Banana Through Synseed Technology  
A.K. SUDHA VANI and G.M. Reddy
- P-1034 Inflorescence Development From *In Vitro* Node Cultures of Switchgrass  
K.S. ALEXANDROVA, P.D. Denchev, B.V. Conger
- P-1035 Use of an Acoustic Window in Ultrasonic Production of Nutrient Mist for Tissue Cultures  
M.J. CORRELL, P.J. Weathers, D. Walcerz, J. Czarnecki, M. Gibson, R. Owen
- P-1036 *In Vitro* Propagation of *Litsea Cubeba* (Lours) Pers. (Lauraceae)  
A.A. MAO, A. Wetten, P.D.S. Caligari
- P-1037 Cryopreservation of *Arachis glabrata* Benth. Shoot Tips by Vitrification  
L.E. TOWILL
- P-1038 Velvetleaf (*Abutilon theophrasti*): The Effects of Thidiazuron on *In Vitro* Culture of Seedlings and Seedling-derived Leaf and Hypocotyl Explants  
C.A. Wiley and D.A. STEEN
- P-1099 Tissue Culture Studies on the Nodal Explants of *Psidium Guajava* (Guava)  
Z.M. SIDDIQUI and S.A. Farooq

### MICROBE INTERACTIONS

- P-1039 Isolation of Rhodococcus Metabolites with Plant-Cell Regulation Activity by XAD-Adsorbent Resins  
A.C. González, J.L. IBAVE, J.C. López
- P-1040 Detection and Characterization of Bacterial Contaminants of Micropropagated Strawberry  
P. TANPRASERT
- P-1041 Bacterial Contaminants of *Corylus In Vitro* Cultures  
B.M. REED, J. Mentzer, P. Tanprasert, X. Yu, P. Buckley
- P-1042 Somatic Embryogenesis and Plantlet Regeneration in Rice Callus  
S. SANGAM and P.B. Kavi Kishor

### REGENERATION

- P-1043 Growth Regulator and Genotype Effects on Somatic Embryogenesis from Sugarbeet Callus  
C.J. TSAI and J.W. Saunders

## VERTEBRATE/INVERTEBRATE POSTERS

**SUNDAY, MAY 21**  
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Odd Authors Present 4:30-5:30 pm		

### BIOTECHNOLOGY

- V-1012 A New Culture Method of Three-Dimensionally Reconstituted Multicellular Mass Utilizing Cotton-Gauze  
T. TAKEZAWA and K. Yoshizato
- V-1013 Archival Storage and Analytical Display of Culture Media  
E.K. WHITE, T. Cuffel, R.G. Ham
- V-1014 Viral Inactivation of Serum with Ultra Violet (UV) Irradiation  
V.H. WILLIAMSON

### CANCER BIOLOGY

- V-1015 The Effect of Platinum Pharmacokinetics on the Growth of Low-Dose-Rate Radiation Resistant Peripheral Blood Lymphocytes  
S.L. SCHNEIDER, M. Szekeresova, M. DeGregorio
- V-1016 Abstract has been withdrawn.
- V-1017 Melatonin Modulates the Inhibitory Action of Some Chlorinated Acids on Intercellular Communication  
S.G. BENANE, C.F. Blackman, D.E. House

### CELLULAR IMMUNOLOGY

- V-1018 Isolation and Characterization of Monoclonal Antibodies to Surface Molecules of a Compaction-Defective Mutant of the Multicell Tumor Spheroid Phenotype  
S.N. GARCIA, P. Pineda, L.A. Jordan, L.S. Armstrong, A.O. Martinez
- V-1019 Analysis of Somatic Cell Hybrids Between MTS<sup>+</sup> and MTS<sup>-</sup> Cell Lines for Expression of Multicell Tumor Spheroid (MTS<sup>+</sup>) Phenotype  
M.L. UBINAS, J. Martinez, J. Pizarro, L.S. Armstrong, A.O. Martinez
- V-1020 A New Monoclonal Antibody 5G7 Reacting with Human Leukocytes  
E. DIMITROVA, H. Taskov, M. Nikolova, A. Pashov

### CELLULAR MODEL

- V-1021 Human Hydatidiform Mole in Culture: A Multi-Nucleated Trophoblast Cell Line  
D. THOMPSON, G.E. Sarto
- V-1022 Growth Factors Produced by the LA7 Rat Mammary Tumor Cell Line Stimulate Proliferation of Mouse Mammary Epithelial Cells  
U.K. EHMANN, J.T. De Vries, M.S.C. Chen, A.A. Adamos
- V-1023 Caloric Restriction *In Vitro*: Role of Serum on Cultured Adipocytes from Rats Fed Ad Libitum (AL) and Calorically Restricted (CR) Diets  
B.S. HASS, R.W. Hart, N.A. Littlefield, A. Turturro
- V-1024 Transport Mechanism of Histamine Receptor Type 2 (H<sub>2</sub>) Antagonists in Caco-2 Cells  
H.H. FARRISH, S.B. Yanni, L.-S. Gan, P.-H. Hsyu

## VERTEBRATE/INVERTEBRATE POSTERS

### DIFFERENTIATED CELLS

- V-1025 Serum-free Media for Growth of Seven Mammalian Kidney Cell Types  
J.A. DARNER, P. Miller, F. Simon, B.A. Van der Haegen
- V-1026 Characterization of Skeletal Muscle Atrophy Induced in Simulated Microgravity Culture Systems  
D. BROWN, K.I. Clark, N.R. Pellis, T.J. Goodwin
- V-1027 Antagonistic Actions of Triiodothyronine and Dexamethasone on the Differentiation of Cultured Adult Human Jaw Bone Osteoblasts  
C. Guerriero, D. De Santis, P. Gotte, P.F. Nocini, U. ARMATO

### EXTRACELLULAR MATRIX

- V-1028 *In Vitro* Production of Basement Membrane Extracellular Matrix by Human Umbilical Venous Endothelial Cells  
E.J. ROEMER, M. Spektor, S.R. Simon
- V-1029 An Improved Method for Ascorbate Supplementation of R22 Cells in Culture for *In Vitro* Biosynthesis of Interstitial Extracellular Matrix  
E.J. ROEMER, M. Spektor, S.R. Simon
- V-1030 Divalent Cations and Assembly of the FGF Receptor Complex  
M. KAN, F. Wang, W.L. McKeehan

### INVERTEBRATE

- I-1006 *In Vitro* Studies with the Corpora Allata of *Manduca sexta*  
B.G. UNNI

### SILENT

- V-1031 Retinoblastoma Derived Growth Factor Stimulation of DNA Synthesis in Human Retinal Pigment Epithelial Cells in Culture  
J.F. TARSIO
- V-1032 A Novel Serum-Free Medium for the Cultivation of Vero Cells on Microcarriers  
Z. CHEN, C. Xiao, H. Liu, B. Wu, X. Jia, Z. Huang
- V-1033 Failure of CFTR Plasma Membrane Targeting of CFTR in a CF Pancreatic Duct Cell Line  
C. Chemin-Thomas, C. Gonindard, C. Devaux, O. Guy-Crotte, C. Figarella, E. HOLLANDE
- V-1010 Human Virus Detection Using Cells Immortalised by Oncogenes  
J.B. CLARKE, H. Moulds, J. Golding, B. Griffiths
- I-1007 Inhibitory Effect of Niclex on Glycogen of Tape Worm (*Neokrimia singhia*)  
M.R. SIVA SAI KUMARI

## TOXICOLOGY POSTERS

**SUNDAY, MAY 21**  
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Odd Authors Present 4:30-5:30 pm		

### BIOTECHNOLOGY METHODS

- T-1012 IL-4 Production Using Macroporous Microcarriers  
B. LUNDGREN, J. Shirokaze, K. Yanagida, K. Shudo, K. Konomoto, K. Kamiya, K. Sagara
- T-1013 Subculture Method for Large Scale Cell Culture Using Macroporous Microcarrier  
B. LUNDGREN, K. Kamiya, K. Yanagida, J. Shirokaze
- T-1014 A Novel Method for the Analysis of Amino Acids in Cell Culture Media  
J.M. KUBIAK, C. Van Wandelen, S.F. Gorfien
- T-1015 Sensitivity of Isoenzyme Analysis for the Detection of Cell Line Cross-Contamination  
R.W. NIMS, A.P. Shoemaker, M.A. Bauernschub, J.W. Harbell
- T-1016 Cells on Rotating Fibers  
R. CLYDE
- T-1017 Photoregulation, Purification and Application of B-phycoerythrin from *Porphyridium cruentum*  
K. MINKOVA, A. Tchernov, E. Dimitrova, A. Mihova

### CELLULAR MODELS IN TOXICOLOGY: TEST SYSTEMS

- T-1018 Production of an *In Vitro* Reconstituted Skin Using Human Neonatal Foreskin Keratinocytes (HFK) in Combination with the Dermal Substrate AlloDerm®  
E.S. GRIFFEY and S.A. Livesey
- T-1019 *In Vitro* Cytotoxicity Testing of Potentially Active Anti-HIV Drugs with Cultured Cells  
F.A. BARILE, D. Hopkinson, P. Scheiner
- T-1020 Agar Diffusion Cytolysis and Aqueous pH: A Classification Algorithm of Two *In Vitro* Tests for *In Vivo* Ocular Hazard Categorization  
D.A. LASKA, W.P. Hoffman, J.T. Reboulet
- T-1021 Rabbit Corneal Epithelial Cell Lines as an *In Vitro* Alternative Model for Evaluating the Efficacy and Cellular Toxicity of Drugs: I. Immortalization and Preliminary Characterizations  
C. YAO, D. Wampler, D. Grimm, K. Hall, D. Shade, D. Crouch, J. Veltman, R. Hackett
- T-1022 Immortalized Lens Epithelial Cells as an *In Vitro* Model for the Efficacy and Cellular Toxicity Evaluations of Ocular Drugs: I. Immortalization of Cells and Preliminary Characterizations  
D. Wampler, D. Grimm, Guo-Tung Xu, D. Shade, R. Hackett, C. YAO
- T-1023 A Human (HepG2) Cell Line Model for Cadmium Toxicity Studies  
P.F. DEHN, C.M. White, D.E. Connors, G. Shipkey, T.A. Cumbo
- T-1024 Comparison of pH 6.70 SHE and Balb/c-3T3 Transformation Assays to Ames and Rodent Bioassay Results  
R.M. BRAUNINGER, G.A. Kerckaert, R.A. LeBoeuf
- T-1025 Communication By Keyword: Enhanced Storage, Retrieval and Dissemination of Information About *In Vitro* Technologies  
D.J. HUGGINS

## PLANT POSTERS

- P-1044 Increase in Somatic Embryogenesis from *Dactylis glomerata* L. Leaf Cultures by Silver Thiosulfate and Hypobaric Conditions  
A.I. KUKLIN, C.E. Sams, B.V. Conger
- P-1045 Somatic Embryogenesis in Pigeon Pea (*Cajanus Cajan* L.)  
S.R. ANBAZHAGAN
- P-1046 High Frequency Shoot Formation and Plant Regeneration from Mature Embryos of *Syzygium cumini*  
S.K. ROY and M.S. Islam
- P-1047 Effect of Silver Nitrate on Callus and Regeneration in Cotton Species  
Z.-S. KE and J.McD. Stewart
- P-1048 Asymmetric Somatic Hybridization via Protoplast Fusion in Peanuts  
Z. Li, A. Xing, M. CHENG, R.L. Jarret, R.N. Pittman, J.W. Demski
- P-1049 *In Vitro* Shoot Multiplication of Carnation Axillary Buds and Nodes  
M.S. BRAR, J.M. Al-Khayri, G.L. Klingaman
- P-1050 The Effects of Ethylene and Ethylene Inhibitors on White Spruce Embryogenic Tissue Maintenance and Somatic Embryo Maturation  
L. KONG and E.C. Yeung
- P-1051 Propagation of *Rauwolfia serpentina* By *In Vitro* Shoot Tip Culture  
S.K. ROY, M.Z. Hossain, N. Alam
- P-1052 Genotypic Basis for Multiple Shoot Induction from De-embryonated Cotyledons of Groundnut  
A. SABITHA and G.M. Reddy
- P-1053 Induction of Enhanced Plant Regeneration from Callus Cultures of Some *Indica* Rice Varieties  
J.S. SANDHU, M.S. Gill, S.S. Gosal
- P-1054 *In Vitro* Regeneration and Protoplast Culture Studies in Mungbean (*Vigna radiata* [L.] Wilczek)  
D.T. SELVI, N.M. Ramaswamy, S. Sukumar, S.R. Sree Rangasamy
- P-1055 Factors Affecting Organogenesis and Somatic Embryogenesis in Eggplant  
P. SHARMA and M.V. Rajam
- P-1056 *In Vitro* and *In Vivo* Multiplication of Virus-Free "Spunta" Potato  
R.A. SHIBLI, A.M. Abu-Ein, M.M. Ajlouni
- P-1057 Induction of Direct Multiple Shoots from Cotyledons and Meristems of *Gossypium Hirsutum* L.  
S. TRIPATHY and G.M. Reddy
- P-1058 Induction of Embryogenesis by Anther Culture of Pigeonpea  
P. VIJAYAKUMARI and S. Narasimha Chary
- P-1059 Callus Induction, Plant Regeneration and Somatic Embryogenesis in Primary Trisomics (2n+1) of *Indica* Rice *Oryza Sativa* L.  
N. FATIMA and S.Y. Anwar
- P-1060 Plant Regeneration from Immature Embryos of 48 Elite CIMMYT Bread Wheats  
S. FENNELL, N. Bohorova, M. van Ginkel, J. Crossa, D. Hoisington
- P-1061 Isolation of Fattyacid Desaturase Genes (Fad 2 and Fad 3) from Genomic Library of *Arachis Hypogaea* L.  
E.C. KANTH and G.M. Reddy
- P-1062 Molecular Studies on *In Vitro* Flowering in *Arachis hypogaea* L.  
T.A. KUMAR and G.M. Reddy
- P-1063 Selection for Improved Agronomic Value in Pigeonpea Somaclones Regenerated from Cotyledonary Explants  
P. LATHA, J.P. Moss, K.K. Sharma, J.K. Bhalla
- P-1064 High Frequency Callusing and Green Plant Regeneration from Anthers of *Indica* Rice  
G.V. LAXMI and G.M. Reddy
- P-1065 Effect of Thidiazuron on Regeneration from 'Half-Seed Explants' of *Capsicum annum* L.  
M.L. Binzel, N. Sankhla, D. Sankhla, T.D. DAVIS, S. Joshi

## PLANT POSTERS

- P-1066 Leaves Roots and Suspension Cultured Cells of Rice (*Oryza Sativa* L.) and its Genomic Polymorphism Analysed Using RAPD  
P.H. BAO, S. Granata, E. Cuzzoni, C. Giordani, S. Castiglione, G. Wang, F. Sala

### MISCELLANEOUS

- P-1067 Multiple Virus Eradication from Potato  
C. ZAPATA, J.C. Miller, R.H. Smith
- P-1068 Anther Culture Studies from Salt Tolerant Cultivars of Indica Rice  
S.K. ANITHA and G.M. Reddy
- P-1069 Genetic Analysis of Salinity Tolerance in Rice  
K.J. REDDY and G.M. Reddy
- P-1070 Salt-Responses in *Oryza sativa* Seedlings: Role of Calcium and Gibberelic Acid in Salt Toxicity  
S. SANGAM and P.B. Kavi Kishor
- P-1071 The Influence of Osmoticum on Protoplast Yields of Selected *Eucalyptus dunnii* Maid. Clones  
M.E.C. Graca, H.G. Hughes, S.D. REID
- P-1138 *In Vitro* Propagation of Mangosteen (*Garcinia mangostana* L.) From Shoot Cultures  
R. Aliudin and M.N. NORMAH

### SECONDARY PRODUCTS

- P-1072 Expression of Anthocyanins in Bilberry and Huckleberry Callus Cultures  
D.L. MADHAVI, M.A.L. Smith, R. Rogers
- P-1073 Anthocyanins in *Ocimum basilicum* cv. Purpurascens *In Vitro*  
D.L. MADHAVI, M.A.L. Smith, S. Juthangkoon
- P1074 Physical Microenvironmental Effects on Anthocyanin Production in Cell Cultures of *Ajuga pyramidalis* 'Metallica Crispa'  
S. JUTHANGKOON
- P-1075 Triterpenoid Composition of *In Vitro* Tissues of Maritime Pine (*Pinus pinaster* Ait)  
A.C.P. Dias and M. FERNANDES-FERREIRA
- P-1076 Synthesis and Accumulation of Essential Oils in *In Vitro* Regenerated Shoots and Calli of *Chamaemelum nobile*  
L.P.C. Santos-Gomes and M. FERNANDES-FERREIRA
- P-1077 Enhancing Production of Artemisinin in Transformed Roots of *Artemisia annua*  
P. WEATHERS, T. Smith, D. Hemmanvanh, E. Follansbee, J. Ryan, R. Cheetham
- P-1142 Comparisons of *Artemisia annua* Root Cultures, and *Nephrolepis exaltata* Whole Plant Cultures in a Newly Designed Nutrient-mist Bioreactor with Conventional Methods  
C.S. BUER, M.J. Towler, T.C. Smith, P.J. Weathers, D. Walcerz

### TRANSFORMATION

- P-1078 Regeneration and Transformation in Sunflower (*Helianthus annuus* L.) Mature Cotyledons  
C.M. BAKER and C.D. Carter
- P-1079 Effect of Donor Plant and Culture Factors on Transient Gene Expression in Alfalfa Following Microprojectile Bombardment  
L.-N. TIAN, D.C.W. Brown, J. Webb
- P-1080 Plant Regeneration and *Agrobacterium*-mediated Transfer of ROIC Gene in *Salpiglossis sinuata* L.  
C.W. LEE and L. Wang
- P-1081 Protoplast-mediated Transformation of Peanut (*Arachis hypogaea*) for Virus Resistance  
Z. Li, A. Xing, M. CHENG, R.L. Jarret, and J.W. Demski
- P-1082 Transformation of Elite Maize Inbreds by Microprojectile Bombardment of Type I Callus  
J. DAWSON, E. Dunder, N. Palekar, J. Suttie
- P-1083 High Frequency Co-Transformation of Embryogenic Peanut Cultures  
H.D. Wilde, Z.V. Magbanua, W.A. PARROTT

## PLANT POSTERS

- P-1084 *In Vitro* Regeneration and Potential Transformation of Peanut (*Arachis hypogaea* L. cv. Okrun)  
J. PONSAMUEL, D.V. Huhman, B.G. Cassidy, R.S. Nelson, D. Post-Beittenmiller
- P-1085 Genetic Transformation of Seashore Mallow by *Agrobacterium tumefaciens*  
J.D. RAO, D.M. Seliskar, J.L. Gallagher
- P-1086 Transient Expression of CAT and GUS Activities in Maize Embryos and in Germinating Pollen  
N. TSENGWA, J.A. Saunders, R. Patel, M.S. McIntosh
- P-1087 Optimization of Particle Bombardment Conditions for Long Term Stable Expression Using GUS Gene In Wheat  
W. CHUNG WANG and D. Marshall
- P-1088 Effect of Timentin for Controlling *Agrobacterium tumefaciens* Following Cocultivation on Select Plant Species  
T.W. ZIMMERMAN
- P-1089 Rice Transformation Using *Agrobacterium* and the Shoot Apex  
S.H. PARK and R.H. Smith
- P-1090 Insect Chitinase-mediated Resistance to Tobacco Budworm (*Heliothis virescens*) in Transgenic Tobacco Plants  
X. DING, L. Johnson, F. White, B. Gopalakrishnan, K. Kramer, S. Muthukrishnan
- P-1091 Transformation of *Sorghum bicolor* L.  
L.-S. KO and R.H. Smith
- P-1092 Transformation of *Solanum brevidens* Using *Agrobacterium tumefaciens*  
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- P-1093 Transformation of *Euphorbia lathyris* by *Agrobacterium rhizogenes*  
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