In Vitro Report
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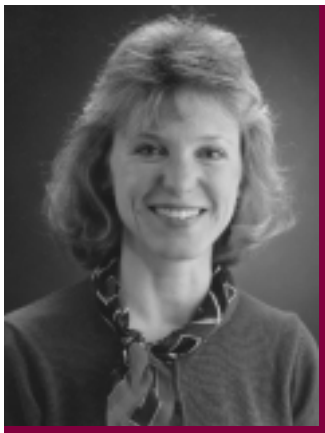
Notes and Views from the President



Mary Ann Lila Smith, Ph. D.

Over the course of the past several months, my university laboratory has become a virtual hotbed of research inquiry. While I've always taken great pride in my hardworking lab team, it is clear that the passion for scientific discovery and the intense level of experimental activity has now reached a zenith that exceeds anything I've seen previously during my 17+ years at the university. I've got students and postdocs wrestling with each other for a turn at using the autoclaves and the laminar flow hoods. Students have been working late nights in the lab, ridiculously early hours of the mornings, and all through the holiday season. What's going on? Are we on the verge of some critical scientific breakthroughs that somebody forgot to tell me about? Or have I somehow become such an inspirational scientific mentor that the students are now motivated to work overtime? No, that certainly can't be it. The real reason is that the lab team members have all been preoccupied with a single objective – to complete the requisite experiments and accumulate the data they needed in order to prepare abstracts in time for the submission deadline. It's all because, this coming June, they all want to visit the Mouse!

Less than four months away, the dual events of the 10th IAPTC&B Congress (Plant Biotechnology: 2002 and Beyond - June 23 - 28, 2002) and the 2002 Congress on In Vitro Biology (June 26 - 29, 2002) will convene at Disney's Coronado Springs Resort in Orlando, Florida. The fact that these upcoming events are generating excitement in my lab, and I hope in yours as well, should come as no surprise to anyone. The IAPTC&B Congress will merge symposia, special events and exhibits, and a spectacular setting to showcase the latest innovations in plant tissue culture and biotechnology from all over the globe. It will dovetail with the Congress on In Vitro Biology, which will especially focus on unique hands-on learning experiences in animal cell culture and biotechnology, invertebrate and toxicology workshops. Exhibitors will capitalize on this outstanding venue to showcase all of the latest innovations in lab tools, instruments, and techniques, available from all around the world in a single exhibit space. This is a not-to-be-missed opportunity for everyone involved in the in vitro sciences.

Our scientific congresses have always been great personal motivators – the deadlines for abstracts spur us to shape and finalize the research approach; the due dates for paper and poster preparations help to gel the presentations, and the scientific interactions that take place during the meetings themselves are perhaps the greatest motivators of all, as the free exchanges always stimulate renewed ideas for new research directions. The motivation is particularly strong this year – and for all of the right reasons. Don't miss it! See you in Orlando in June, 2002.

Mary Ann Lila Smith, Ph. D.
SIVB President

This Issue

Report of the Nomination Committee

The results of the 2002-2004 election are complete. This year for the first time we used an electronic ballot system. Members who did not have an electronic address listed with the business office were mailed a paper ballot. The office received approximately equal numbers of electronic and paper ballots for the elections.

President - Elect: David Altman
Vice-President: Dave Songstadt
Secretary: Barbara Reed
Treasurer: Richard Heller
Member at Large: Dave Ellis
Member at Large: Yvonne Reid
Member at Large: Cynthia Goodman
Publication Chair: Alda Vidrich
Public Policy Chair: Paul Price
Awards Chair: Eugene Elmore
Education Chair: Liz Roemer
Lab Materials and BioSafety: John Harbell
Constitution & ByLaws: Melissa Heatley Hinga

Delia Bethell
SIVB Nomination Committee Chair

Society Honors Ian Freshney

R. Ian Freshney Presented Lifetime Achievement Award in 2001

The highest honor given by the Society for In Vitro Biology is the Lifetime Achievement Award. It is presented to scientists who are considered pioneers or highly influential researchers to the science and art of cell culture. They are men and women who have devoted their careers to exemplary research and|or teaching. The recipients of the Lifetime Achievement Award are selected by vote of the Board of Directors from a list of nominations received and recommendation by the Awards Chair. Melissa Hinga was the chairperson for 2001. The Lifetime Achievement Award was presented to three scientists at the 2001 SIVB Annual Meeting in St. Louis, Missouri. The Awardees were Dr. June Bradlaw, Dr. Ian Freshney and Dr. Karl Maramorosch.

R. Ian Freshney was born in Scotland in 1938 and graduated in Zoology from Glasgow University in 1960. He started his research career in the Department of Biochemistry, also in Glasgow, under the supervision of Prof. John Paul, and graduated PhD in 1964. His early research interests were in the regulation of enzyme activity in cultured cells and the relevance of this to the expression of the specialized phenotype in culture. He spent 1964 - 1965 in Madison, Wisconsin, working with Dr. Robert Auerbach on cell interaction and differentiation of embryonic mouse liver. Soon after his return to Glasgow from Madison, he joined the Beatson Institute for Cancer Research and worked there until 1981, when he transferred to the CRC Department of Medical Oncology at Glasgow University, where he became a senior lecturer in charge of the administration of the laboratory, with teaching in experimental pathology, medical biochemistry, immunology and cancer nursing.

Dr. Ian Freshney

Prof Stan Kaye (head of Medical Oncology, GU, 1996) and Dr. Freshney

By this time, his research interests had turned to human tumor cultures, principally the culturing of early passage cell lines from brain tumors to develop a predictive test for chemosensitivity. He spent a few months in Dr. Richard Ham's laboratory, testing the growth of glioma cell lines in serum-free medium, finding considerable variation among glioma lines tested, but gaining a greater understanding of the underlying principles.

Subsequently, his interests turned to examining the effects of glucocorticoids on glioma and lung carcinoma in vitro. These studies implicated cell surface modification in the response to glucocorticoids and initiated a return of interest to cell-cell interaction in an attempt to regulate malignancy by inducing expression of differentiation. Studies with lung carcinoma confirmed that lung fibroblasts produced a factor which induced differentiation in the lung carcinoma cell line A549 and that this effect could be reproduced with cytokines such as oncostatin M, interleukin-6 and interferon b. The action of conditioned medium, and of the cytokines, required dexamethasone, a synthetic glucocorticoid analogue. It was shown that this was due to induction of synthesis by the A549 of a specific heparan sulphate which activated the fibroblast conditioned medium and the cytokines, possibly by stabilization or translocation to the high affinity receptor. His interests are now focused on cell culture in general, and on cell-cell interaction and paracrine control of cell differentiation, in particular.

Dr. Freshney is an international lecturer, and has organized and participated in both graduate and undergraduate courses and workshops worldwide. Many of his students are now contributing both as scientists and educators to "carry the torch" passed to them in this manner. He has made outstanding contributions to the science of cell culture through compilation of a series of works, the most well recognized of which is his text "Culture of Animal Cells — A Manual of Basic Techniques" now in it's fourth edition. The text is the most well known of the group of introductory books available for students, other novice practitioners, and postgraduate lab scientists utilizing cell culture techniques in research or for other purposes. It is well written, superbly illustrated and extremely timely, serving the intended community admirably. Literally tens of thousands of new and established investigators have benefited through the reading of this text. Freshney is also an editor or co-editor for other practical works such as "Animal Cell Culture — A Practical Approach" (Editions one and two), "Culture of Immortalized Cells" (with his wife Mary Freshney as co-author), "Culture of Epithelial Cells", and "Culture of Hematopoietic Cells" (with his wife and I.B. Pragnell).

The SIVB is proud to recognize Dr. Freshney's achievements through presentation of this award.

Robert Hay

Lab group from Medical Oncology, Glasgow University, walking West Highland Way in 1982

Dr. Freshney Graciously Accepts

First let me say what an honor it is to be awarded this mark of recognition by SIVB, and my sincere thanks go to the Society and the organisers of this meeting for inviting me to St Louis. I must also express my gratitude to John Masters and Glyn Stacey for proposing me and their successful efforts with financial support.

My research career, based largely on tumor cell culture and differentiation, has spanned nearly 40 years, during which time I have owed a great deal to those that I have worked with, such as Diana Morgan, Margaret Frame, John McLean, Elaine Hart, Bob Auerbach, Dick Ham, Wally McKeehan, Carol McCormick and Natasha Yevdokimova, as well as to those colleagues that I have been privileged to work alongside, and whose help and advice I have greatly appreciated, including Patrick Fottrell, Frank Ruddle, Robert Brown, Nicol Keith, Stan Kaye and Ken Calman, and in particular the late John Paul, with whom I first embarked on my research in cell culture.

I realise that much of the acclaim that I have received has been due to the popularity of my textbook on cell culture and for that I must first acknowledge Paul Chapple whose suggestion it was that I write this book, and to the many people who have contributed ideas, advice, and protocols.

Finally, and most important, I owe a great deal to the support of my wife, Mary, and to my daughter, Gillian, and son, Norman. Mary, in particular, has not only been my loving companion, but has also been a source of continuing practical advice in cell culture and a tireless editor and proof-reader.

Nomination packets for the 2002 Lifetime Achievement Award were required to be submitted to the Awards Chair no later than January 5, 2002. The nomination packet must include the nominee's Curriculum Vitae, a letter of nomination and two additional letters of recommendation. Any other supporting material is welcome. The nominator must secure a donation of $1500 to defray the cost of giving the award. A letter from the donor acknowledging their contribution must be included in the nomination packet. The nominator is also required to collect materials for a poster for display at the SIVB annual meeting on the achievements of the nominee. Please send future nomination packets to the Awards Chair, Melissa Hinga, by email: mhinga@ricetec.com or by mail: Ms. Melissa Hinga, RiceTec, Inc., PO Box 1305, Alvin, Texas 77512

Journal Highlights

From left to right: Dr. A. Seguin, Dr. K. Klimaszewska, Mr. G. Pelletier, and Mr. D. Lachance

Transgenic *Picea* Using *Agrobacterium tumefaciens*

Transgenic plants of three *Picea* species were produced after coculture of embryogenic tissue with the disarmed strain of *A. tumefaciens* C58/pMP90/pBIV10 and selection on medium containing kanamycin. In addition to the *nptII* selectable gene (conferring resistance to kanamycin), the vector carried the *uid*A (b-glucuronidase) marker gene. Transformation frequencies were dependent on the species, genotype, and post- cocultivation procedure. Of the three species tested, *P. mariana* was transformed at the highest frequency, followed by *P. glauca* and *P. abies*. The transgenic state of the embryogenic tissue was initially confirmed by histochemical GUS assay followed by Southern hybridization. One to over five copies of T-DNA were detected in various transgenic lines analyzed. Transgenic plants were regenerated for all species using modified protocols for maturation and germination of somatic embryos. ***Krystyna Klimaszewska*, *Denis Lachance*, *Gervais Pelletier***, *Marie-Anne Lelu, and* ***Armand Ségui.*** *Regeneration of Transgenic* Picea glauca, P. mariana *and* P. abies *After Cocultivation of Embryogenic Tissue with* Agrobacterium tumefaciens*, In Vitro Cellular and Developmental Biology – Plant, 37:6, 748-755.*

Mutations of *patched* gene in oral squamous cell carcinoma cell lines

We have analyzed tumor DNA from oral squamous cell carcinoma (OSCC) cells for *patched* mutations using an exon-by-exon single strand conformation polymorphism assay and direct sequencing. We found two missense mutations, which affected conserved residue in transmembrane domains of the gene product (T1682G), and in the intracellular loop at C-terminal residue (T3944C). In addition, N-terminal fragment of Sonic Hedgehog (SHh) stimulates the growth of normal epithelial cells, OSCC cells, NA and salivary adenocarcinoma cell lines, HSG and HSY, which have no detectable mutation in patched gene. On the other hand, SHh has no effect on OSCC cells those have mutations in *patched*. These results strongly suggested that a SHh-Patched signaling is involved in the cell growth of oral epithelial cells, and in the tumorigenesis of oral squamous cell carcinomas. *Eiji Michimukai, Naoya Kitamura, Yan Zhang, Hua Wang, Yoshiko Hiraishi, Ken-Saku Sumi, Yasutaka Hayashido, Shigeaki Toratani, and* ***Tetsuji Okamoto****, Mutations in the Human Homologue of the Drosophila Segment Polarity Gene Patched in Oral Squamous Cell Carcinoma Cell Lines, In Vitro Cellular and Developmental Biology – Animal 37: 459-464, 2001.*

Maria Jose Gravisaco, Claudia Waldner, Paula Ruybal, Claudia Mongini (sitting)

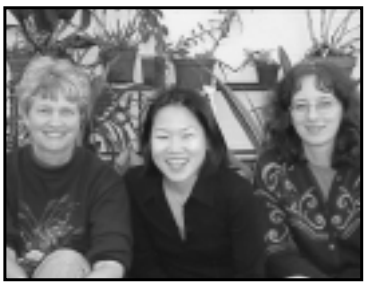
Unexpected Expression of Cytoplasmatic CD4

We report the first characterization of a mouse T-lymphoma cell line that surprisingly expressescytoplasmatic (cy) cyCD4. Phenotypically, LBC cells are CD5+, CD8+, CD16+, CD24+, CD25+, CD2-/dim, CD3-/dim, TCRβ-/dim, TCRγδ-, CD154-, CD40-, and CD45R- Coexpresses cyTCRβ, cyCD3, cyCD4 yet lacks surface CD4 expression. Transplantation of LBC cells into mice resulted in an aggressive T-lymphoblastic lymphoma that infiltrated lymph nodes, thymus, spleen, liver, ovary and uterus but neither peripheral blood nor bone marrow. LBC cells display a modal chromosome number of 39 and a near-diploid karyotype. Based on the characterization data, we demonstrated that LBC cell line derived from an early T cell lymphocyte precursor. We propose that the malignant cell transformation of LBC cells could be coincident with the transition stage from late double-negative, DN3 ($CD4^-$, $CD8^-CD44^{-/low}$, $CD25^+$) or DN4 ($CD4^{-/low}$, $CD8^{-/low}$, $CD44^-$, $CD25^-$) to double-positive (DP: CD4+CD8+) stage of T-cell development. LBC cells provide a T-lymphoblastic lymphoma model derived from a malignant early T lymphocyte that can be potentially useful as a model to study both cellular regulation and differentiation of T-cells. In addition, LBC tumor provides a short latency neoplasm to study cellular regulation and to perform preclinical trials of lymphoma -related disorders. ***C. Mongini*, *P. Ruybal*, *M. J. Gravisaco***, *M. Croci, M. Sánchez Lockhart, V. Fabris, and* ***C. Waldner****, Characterization of the Immunophenotype and the Metastatic Properties of a Murine T-Lymphoma Cell Line. Unexpected Expression of Cytoplasmatic CD4, In Vitro Cellular and Developmental Biology – Animal, 37: 499 –504.*

Earnest H.L. Leung

Differentiation & Growth Potential of Human Ovarian Cells

The epithelial ovarian carcinomas arise in the ovarian surface epithelium (OSE) which is the mesothelial covering of the ovary. Studies of human OSE have been hampered by the small amounts and limited lifespan in culture of this epithelium. OSE cells expressing SV40 large T antigen (Tag) or the HPV genes E6 and E7 have increased growth potentials but lack some of the normal characteristics of OSE. In this study, we used conditional SV40 Tag expression to produce OSE cells with increased proliferative potentials but relatively normal phenotypes. Primary OSE cultures from 3 women, of which one had a BRCA1 mutation, were infected with a temperature–sensitive Tag construct (tsTag) and from these, 28 monoclonal and 4 polyclonal lines were isolated. The effects of temperature changes were examined in 2 monoclonal and 2 polyclonal lines. At the permissive temperature (34°C), these cell lines underwent 52-71 population doublings (pds) compared to 15-20 pds for normal OSE. Nuclear SV40-Tag and p53 expression, demonstrated by immunofluorescence, showed that tsTag was uniformly present and biologically active in all lines. At 34°C, culture morphologies ranged from epithelial to mesenchymal. The mean % of cells expressing the epithelial differentiation marker keratin varied between lines from 20% to 97%. Collagen type III, a mesenchymal marker expressed by OSE in response to explantation into culture, was present in 24% to 43% of cells. At 39°C, tsTag disappeared after 1-2 days while nuclear p53 staining diminished to control levels over 2 weeks. Over 3 days, the cells assumed more epithelial morphologies; keratin expression reached 85-100% in all lines and collagen expression increased significantly in 2 lines. The cultures with the BRCA1 mutation expressed the most keratin and the least collagen III at both temperatures. As indicated by ?-galactosidase staining at pH 6.0, changes leading to senescence were initiated at 39°C by 6 h and were present in all cells after 24 h. However, the cells underwent 1-3 population doublings over up to 1 week before growth arrest and widespread cell death, thus providing an experimental system where large numbers of OSE cells with different genetic backgrounds and growth potentials can be studied without the concurrent influence of Tag. ***Earnest H. L. Leung****, Peter C. K. Leung, and Nelly Auersperg, Differentiation and Growth Potential of Human Ovarian Surface Epithelial Cells Expressing Temperature-sensitive SV40 T Antigen, In Vitro Cellular and Developmental Biology – Animal, 37: 515 – 521.*



l. to r. : Pam Weathers, Yoojeong Kim, and Barbara Wyksliouzil

Secondary Metabolism of Hairy Roots

In vitro cultures are being considered as an alternative to agricultural processes for producing valuable secondary metabolites. Most efforts that use differentiated cultures instead of cell suspension cultures have focused on transformed (hairy) roots. Bioreactors used to culture hairy roots can be roughly divided into three types: liquid-phase, gas-phase, or hybrid reactors that are a combination of both. The growth and productivity of hairy root cultures are reviewed with an emphasis on successful bioreactors and important culture considerations. The latter include strain selection, production of product in relation to growth phase, media composition, the gas regime, use of elicitors, the role of light, and apparent product loss. Together with genetic engineering and process optimization, proper reactor design plays a key role in the development of successful large-scale production of secondary metabolites from plant cultures. ***Yoojeong Kim***, ***Barbara E. Wyslouzil,*** *and* ***Pamela J. Weathers****, Secondary Metabolism of Hairy Root Cultures in Bioreactors, Invited Review, In Vitro Cellular and Developmental Biology – Plant 38: 1 – 10, 2002.*

l. to r. Phillip Ternes, D. James Morré, and Dorothy Morré

Cell Enlargement of Plant Tissue Explants

Rate of plant cell enlargement, measured at intervals of 3 min using a sensitive linear transducer, oscillates with a minimum period of about 24 min that parallels the 24 min periodicity observed with the oxidation of NADH by the external plasma membrane NADH oxidase and of single cells measured previously by video-enhanced light microscopy. Also exhibiting 24 min oscillations is steady-state rate of cell enlargement induced by the addition of the auxin herbicide dichlorophenoxyacetic acid (2,4-D) or the natural auxin indole-3-acetic acid (IAA). Immediately following 2,4-D addition, a very complex pattern of oscillations is frequently observed. However, after several hours a dominant 24 min period emerges. The length of the 24 min period is temperature compensated and remains constant at 24 min when measured at 15^{o}, 25^{o} or 35^{o} C despite the fact that the rate of cell enlargement approximately doubles for each 10^{o} rise over this same range of temperatures. ***D. James Morré, Philipp Ternes****, and* ***Dorothy M. Morré,*** *Cell Enlargement of Plant Tissue Explants Oscillates with a Temperature-compensated Period Length of Ca. 24 Min, In Vitro Cellular and Developmental Biology – Plant, 38:18 – 28, 2002.*

V. K. Tuli

Micropropagation with 3 methyl-eneoxindole

3 Methyl-eneoxindole (MO), a metabolite of the plant auxin indole-3-acetic acid (IAA), was more active than IAA in supporting Stage II and III micropropagation of several plant species. In Stage II micropropagation, characterized by the rapid numerical increase of shoots, the optimal IAA concentration was 0.01 mM compared to 0.1nM MO for most plants. In Stage III micropropagation where auxin is required for the rhizogenic response, 0.1 mM MO was more effective than 0.01 mM IAA. Inhibition analysis of plant growth with chlorogenic acid (CGA) suggested an obligatory role for MO in IAA-mediated auxin reactions: CGA, which blocks the enzymatic oxidation of IAA to MO, *in vivo*, completely abolished IAA's ability to support the growth of explants during micropropagation. In contrast, CGA did not inhibit the auxin activity of MO, the product of the blocked reaction. The growth rate and rooting efficiency of tobacco propagules in Stage III medium was improved substantially if these were first exposed to a high concentration of MO and subsequently transferred to media containing low or no MO. ***V. K. Tuli,*** *Micropropagation with 3 methyl-eneoxindole: Its obligatory role in indole-3-acetic acid mediated auxin action*, *In Vitro Cellular and Developmental Biology – Plant, 38: 66 – 72, 2002.*

Back Row: Zivko Nikolov, Christopher Brooks, Stephen Streatfield, John Howard, Michael Horn, Barry Lamphear. Front Row: Donna Delaney, Jocelyne Mayor, Elizabeth Hood, Donna Barker, Katherine Beifuss, Susan Woodard. Not pictured: Joseph Jilka, DV Vicuna, LA Massey

Development of an Edible Vaccine

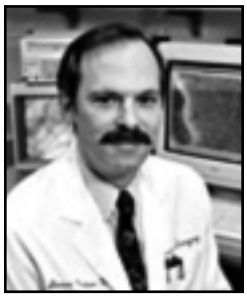
Advances in the development of subunit vaccines and in the production of foreign proteins in plants together offer the prospect of stable and inexpensive vaccine delivery systems. Various bacterial and viral proteins stably produced in plants have been shown to elicit immune responses in feeding trials. We have extended this approach by using *Zea mays* as the plant production system. Corn has several advantages as a vaccine delivery vehicle, most notably established technologies to generate transgenic plants, to optimize traits through breeding and to process the seed into a palatable form. Here we report on the production in corn seed of the GM_1 receptor binding (B) subunit of the heat-labile toxin (Lt) from enterotoxigenic strains of *Escherichia coli*. Versions of the Lt-B gene were synthesized to give optimum codon usage for corn and to target the protein to either the cell surface or the cytoplasm. These synthetic genes were fused to a strong promoter and transformed into corn. Lt-B was highly expressed in corn seed at up to 1.8% of the total soluble protein and this was further increased approximately five fold through plant breeding. As in *E. coli*, Lt-B produced in corn forms a functional pentamer that can bind to the GM_1 receptor. Furthermore Lt-B pentamer stored in corn seed is much more resistant to heat than is the pure protein, allowing the transgenic corn to be readily processed into an edible form. This work demonstrates the potential of using products derived from transgenic corn seed as delivery vehicles for subunit vaccines. ***Stephen J. Streatfield, Jocelyne M. Mayor, Donna K. Barker, Christopher Brooks, Barry J. Lamphear, Susan L. Woodward, Katherine K. Beifuss****, Debra A. Vicuna, Leigh Anne Massey,* ***Michael E. Horn, Donna E. Delaney, Zivko L. Nikolov, Elizabeth E. Hood****, Joseph M. Jilka, and* ***John A. Howard****, Development of an Edible Subunit Vaccine in Corn Against Enterotoxigenic Strains of* Escherichia coli, *In Vitro Cellular and Developmental Biology – Plant, 38: 11 – 17, 2002.*

Fen Wang

Directional Specificity of Cell Communication

The fibroblast growth factor (FGF) signaling complex consists of FGF ligands, FGF receptor (FGFR) tyrosine kinases, and highly heterogeneous heparan sulfate proteoglycans (HSPG). Members of the FGF and FGFR mediate regulatory communication between epithelial and stromal compartments of parenchymal organs by partition between epithelium and stroma compartments, which is important for function and homeostasis. In vivo experiments demonstrate that the epithelial cells that express the IIIb isoform of FGFR2 only respond to FGF7/FGF10, but not FGF2, whereas stromal cells that express the IIIc isoform of FGFR1 do not respond to FGF7/FGF10, but respond to FGF2. Yet,

cell-free binary complexes of heparin and FGFR exhibit little specificity of FGF ligands. This suggests that the specificity of the FGFR isoforms for FGF isoforms is dependent on cell context. Here I demonstrated that HSPGs derived from prostate stroma (DTS) and epithelial (DTE) cells supported binding of FGF1 and FGF7, but not FGF2 binding to FGFR2IIIb. Both DTS and DTE derived HSPG supported FGF1 and FGF2 binding to FGFR2IIIc, whereas only DTE derived HSPG supported binding of FGF7 to FGFR2IIIc. This suggests that the specificity of epithelial cells for FGF7, relative to FGF2, lies in FGFR2IIIb-specific HSPG that is not cell-specific, while the restriction of FGF7 binding to stroma cells lies in cell-specific HSPG and FGFR isoforms. This work shows that the directional specificity of paracrine signaling from stroma to epithelium in normal prostate and nonmalignant prostate tumors is determined by a partnership between cell type-specific expression of both subunits of the fibroblast growth factor receptor signaling complexes. This consists of the ectodomain of the transmembrane kinase and a cell type-specific heparan sulfate chain. This is in contrast to previous studies that contended that specificity was encoded solely in the ectodomain of the transmembrane kinase subunit. *Mikio Kan, Fumiyuki Uematsu, Xiaochong Wu, and* ***Fen Wang****, Directional Specificity of Prostate Stromal to Epithelial Cell Communication Via FGF7/FGFR2 is Set by Cell- and FGFR2 Isoform-specific Heparan Sulfate, In Vitro Cellular and Developmental Biology – Animal, 37:575 – 577, 2001.*



Steven J. Mentzer

Effect of Sheer Stress on Lymphocytes

Lymphocyte interactions with endothelial cells in the microcirculation are an important regulatory step in the delivery of lymphocytes to peripheral sites of inflammation. In normal circumstances, the predicted wall shear stress in small venules ranges from 10 dyn/cm^2 to 100 dyn/cm^2. Attempts to measure the adhesivity of lymphocytes under physiologic conditions have produced variable results, suggesting the potential importance of studying the lymphocytes that actually migrate to sites of inflammation. To quantify the effect of shear stress on these migratory lymphocytes, we used lymphocytes obtained from sheep efferent lymph ducts, defined as migratory cells, to perfuse sheep endothelial monolayers under conditions of flow. Quantitative cytomorphometry was used to distinguish cells in contact with the endothelial monolayers from cells in the flow stream. As expected, migratory cells in contact with the normal endothelial monolayer demonstrated flow velocities less than the velocity of cells in the adjacent flow stream. The flow velocities of these efferent lymphocytes were independent of cell size. To model the inflammatory microcirculation, dual endothelial monolayers were used to directly compare the velocity of cells in contact with cytokine-activated and unactivated control monolayers. The tumor necrosis factor (TNF) and interleukin-1 (IL-1)-activated endothelial monolayers marginally decreased cell velocities at 1.2 dyn/cm^2 (3.6%), but significantly reduced cell velocities 0.3 dyn/cm^2 (27.4%; $p<.05$). Similarly, the fraction of statically adherent lymphocytes decreased as shear stresses increased to 1.2 dyn/cm^2. These results suggest that typical wall shear stresses in small venules, on the order of 20 dyn/cm^2, are too high to permit adhesion and transmigration of migratory lymphocytes. Unless additional mechanisms to facilitate lymphocyte adhesion are present in vivo, lymphocyte transmigration in inflammation is predicted to occur only in venular regions with unusually low shear stresses. *Xiaopu Li, Mei Su, Charles A. West, Chufa He, Scott J. Swanson, Timothy W. Secomb, and* ***Steven J. Mentzer****, Effect of Shear Stress on Efferent Lymph-derived Lymphocytes in Contact with Activated Endothelial Monolayers, In Vitro Cellular and Developmental Biology – Animal, 37: 599 – 605, 2001.*

Angie Rizzino and Troy Luster. Insert, Michelle Kingsley-Kalleson.

Transforming Growth Factor-β2

The expression of transforming growth factor-β-2 (TGF-β2) appears to play a strong role in the establishment and progression of glial tumors. In particular, elevated expression of TGF-β2 appears to be responsible for the impaired cell-mediated immunity often observed in patients with a glioblastoma. This study examined the regulation of the TGF-β2 at the transcriptional level in the U87MG glioblastoma cell line. We demonstrate that a CRE/ATF site and an E-box motif located just upstream of the transcription start site are essential for the transcription of the TGF-β2 gene in U87MG cells. Gel mobility analysis determined that ATF-1, and possibly CREB, binds to the CRE/ATF site, and USF1 and USF2 bind to the E-box motif. Interestingly, expression of a dominant negative USF protein down-regulates TGF-β2 activity by 80-95% in glioblastoma cells. We conclude that the binding of transcription factors, in particular the USF proteins, to the TGF-β2 promoter is essential for its expression and possibly its up-regulation in glioblastomas. *Michelle Kingsley-Kallesen, Tory A. Luster, and* ***Angie Rizzino****, Transcriptional Regulation of the Transforming Growth Factor-β2 Gene in Glioblastoma Cells, In Vitro Cellular and Developmental Biology – Animal, 37: 684 – 690, 2001.*

Tamiko Kano-Sueoka

Phosphatidylethanolamine Deficiency in Membrane Lipids

Ethanolamine (Etn) is required for growth of epithelial cells in culture. Without ethanolamine, the amount of phosphatidylethanolamine (PE) in membrane lipids is reduced, and cell proliferation stops. When the membrane lipids are deficient of PE, some extra-cellular signaling processes become impaired. In this study, we examined the effect of Etn deprivation on the formation of intercellular networks in immortalized human oral keratinocytes. Keratinocytes proliferate with undifferentiated morphologies in a low- calcium medium, whereas they undergo differentiation to form intercellular networks in a high-calcium medium. The cells were first cultured with or without Etn supplement in a low calcium (0.07 mM) medium, and then the calcium concentration was raised to 1.8 mM. The localization and organization of following proteins were examined: (1) desmogleins and plakoglobin in desmosomes, (2) E-cadherin and b-catenin in adherens junctions and (3) actin and keratin filaments in cytoskeletons. As expected, in the Etn-supplemented cells, the elevated level of calcium induced the junctional localization of the proteins associated with desmosomes and adherens junctions and also induced the formation of keratin and actin networks. On the contrary, in the Etn-deprived cells, the elevated level of calcium induced none of the above processes. The results suggest that having a sufficient amount of PE or proper phospholipid composition in the membranes is crucial for differentiation in epithelial cells. ***Tamiko Kano-Sueoka****, Dolphine Oda, and Janelle K. Kawamoto, Phosphatidylethanolamine Deficiency in Membrane Lipids Inhibits Keratinocyte Intercellular Networks Formation, In Vitro Cellular and Developmental Biology – Animal, 37: 691 – 697, 2001.*

Points To Ponder

The following article is another in a series evaluating cloning. J. Lannett Edwards was the first person to clone a cow from an adult donor, using standard cell culture techniques. Millie, the Jersey cow, was born on August 23, 2000, and died last year. Lannett's success — and failures — have given her ample opportunities to reflect on cloning technology and its implications.

Wayne Parrott

Life with Dolly: Potential Applications, Challenges and Concerns with Cloning Adult Animals

J. Lannett Edwards and F. Neal Schrick
Department of Animal Science, Tennessee Agricultural Experiment Station; Institute of Agriculture;
The University of Tennessee, Knoxville

Production of transgenic farm animals provides one with an exciting means in agricultural and biomedical disciplines for studying the importance of genes involved in variety of biological systems. Discovery of genes of physiological significance will be important for increasing efficiency of animal production, discovering the genetic basis of animal and human diseases, gene therapy, and identification of factors involved in disease susceptibility or resistance. Moreover, genetic modifcation of farm animals has created a new form of "pharming", whereby, transgenic animals are used as bioreactors for production of pharmaceuticals or perhaps organ donors for the human population.

To appreciate life with Dolly, it is important to remember life before. Traditionally, genetic modification of farm animals required micro-injection of a transgene into the pronucleus of a 1-cell embryo. Use of such an approach is technically demanding and extremely inefficient! Only 0.1 to 2.1% of resulting offspring are confirmed to express the transgene (Wall et al., 1992). Inefficiencies of this magnitude contribute to the overall costliness of the procedure. Wall and coworkers at the USDA in Beltsville, MD estimated the cost of producing one transgenic dairy cow to be $546,000. In livestock species, production of transgenic animals using embryonic stem cells was and still remains not an option; seeking the "Holy Grail" might prove more fruitful.

In March of 1997, Wilmut and coworkers announced to the world the first ever clone of an adult animal. Such an announcement was startling and significant for a number of reasons. First, ability to clone an adult animal was previously thought to be "biologically impossible" (McGrath & Solter, 1984). Second, given that somatic cells can be easily obtained from adult animals, grown in the laboratory, and then genetically modified, the procedures of somatic cell nuclear transfer are ideal for producing transgenic farm animals. To date, transgenic sheep (Schnieke et al., 1997), cattle (Cibelli et al., 1998) and pigs (Park et al., 2001) have been derived using procedures of somatic cell nuclear transfer.

The ultimate challenge of cloning procedures is to force the somatic cell to forget that it ever was such, and reprogram it in such a way that it will function as an early embryo. The cell type of choice for reprogramming somatic cells is an unfertilized egg. This is because the egg has within it, all the components critical for early embryo development. To construct a 1-cell cloned embryo, the nucleus from a somatic cell is introduced into an egg whose nuclear DNA has been previously removed. In some cases, a brief electrical pulse is sufficient to "jump start" the cloned embryo to begin development. After transfer into surrogate recipients, a limited number will establish and maintain a pregnancy to term. If the nuclear DNA within the somatic cell was genetically modified before transfer into egg cytoplasm, then one could expect 100% of resulting offspring to contain the transgene of interest (Schneike et al., 1997).

As wonderful and grand as this technology may first appear, it is not without limitations. Specifically, procedures are extremely inefficient for producing live offspring. Dolly was just one offspring that resulted after 277 attempts (0.3% efficiency). In our experience with cloning cattle at The University of Tennessee, death of cloned embryos and fetuses occurs throughout pregnancy. Moreover, approximately 50% of cloned offspring may die within the first 24 hours of birth and an additional 20% of those that survive die within first week of life. In extreme cases where placental problems arise with excessive fluid accumultion (hydrallantosis), death of the surrogate recipient may also occur.

Given that the procedures of cloning defy basic principles in developmental biology, it is in mere wonderment any cloned embryos survive to term. Clearly, many, yet unidentified, factors related to the cloning or culture procedures are contributing to the death of cloned embryos, fetuses and offspring. And, because of the complexity that must be involved in unraveling the mysteries of life beginning with just a somatic nucleus and cytoplasm of an oocyte, it is probably a safe assumption that many more years of effort will be required before understanding the specifics of the process. Improvements for increasing survival of cloned embryos, fetuses and offspring are imperative for realizing the ultimate potential of this technology.

It would be nice to speculate that identification of factors required for increasing efficiency of obtaining live, healthy cloned offspring are just around the corner. However, in the "cloning world" there is oftentimes unwillingness among many, to discuss or share information pertaining to specific research findings. Any or every advancement made in this field has the potential to become intellectual property of economic significance.

Aside from the science or lack thereof, the use of cloning procedures to clone adult animals continues to raise great concerns of the general and scientific communities for use in human cloning. The question is no longer "Is it possible to use somatic cell nuclear transfer to clone humans". Efforts to clone humans for reasons of replacing a lost loved one, assisting infertile couples or developing replacement tissues for treating a variety of human diseases are currently underway throughout the world. Reported examples of individuals or lab groups intending to do so can be found in the popular press (New York Times; 11/12/98; Los Angeles Times; 12/16/98 "Move Made Toward Human Cell Cloning"; Washington Post 01/27/01) and now, even in the scientific literature (Cibelli et al., 2001). Will the first clone of a human be born by 2003 as posed by Dr. Zavos? Probably not anytime soon. This certainly won't be due to the lack of effort but more related to technical difficulties associated with the procedures. "Will a human be cloned within the next 10-15 years?" More than likely, unless legislation is passed preventing it.

It is imperative that individuals proposing to clone humans recognize potential negative consequences existing at present. What is true for one species is generally true for another. It would be extremely naive to assume that complications observed with cloning several other species would not be associated with cloning humans (death of cloned embryos, fetuses, offspring; sometimes death of surrogates). Infertile couples are distraught enough without having to deal with additional issues of fetal and neonatal deaths, and the potential for resulting offspring to be immunocompromised or have genetic disorders. Is it a coincidence that Dolly developed arthritis at an early age? Only time and extensive research efforts will tell.

Cloning for therapeutic purposes is not without concern as well. Therapeutic cloning is the process whereby cloned embryos would be derived from a given individual to provide a source of stem cells for ultimately regenerating tissues. Doing so would obviate any concerns for "tissue or cell" rejection. However this approach does require destruction of an early human embryo. ❖

ExPlants

March 2002

Greetings to all in this new year! 2002 promises to be an exciting year in the annals of plant cell biology. The Plant Section of the SIVB is an active and dynamic group on the forefront of the agricultural revolution from both the academic and industrial perspectives. If you are reading this and have not yet joined the SIVB, we urge you to do so.

This column depends on the kind submission of news items to me at mhorn@prodigene.com or mailed to me at ProdiGene, 101 Gateway Blvd., Suite 100, College Station, TX 77845. All news will be considered including transitions, grants, travel events, promotions, graduations, new graduate students/postdocs, etc.

News

A new Research Associate, Dr. Chris Knight, has just joined the laboratory team of Prof**. Mary Ann Lila Smith**. Dr. Knight will be investigating biological activity and interactions between polyphenolic compounds from berry and grape cell cultures. This is a hot area especially after the recent report that polyphenols in red wine lower the risk of heart disease.

Dr. Suzanne Rogers of the Dept. of Bioscience, Salem International University in Salem, WV was recently promoted to Associate Professor. Congratulations Suzanne!

Kan Wang (Iowa State U.), **Heidi Kaeppler** (U Wisconsin), Stan Gelvin (Purdue), and Bill Thompson (NC State) have been awarded a NSF grant for the "Establishment of Robust Maize Transformation Systems for the Public Sector. This grant came through the NSF Plant Genome Program. Its focus is to enhance transformation protocols, transgene integration, and stability of transgene expression in maize, and to transfer information and techniques to the public sector through publication and "hands-on" workshops.

Upcoming Meetings – The Big Kahuna!

Arriving quickly is the biggest of the biggest meetings for plant tissue culturists everywhere! June 23-28 in Orlando Florida will be the 10th IAPTC&B Congress, Plant Biotechnology 2002 and Beyond. If you read this newsletter then you know that Prof. Indra Vasil, with help from a strong team, has put together what is likely the best Congress ever. I urge everyone to do everything possible to attend and contribute to this historic event.

Michael E. Horn
exPlants Editor

Philip White Award

Applicants are sought for the Philip White Memorial Award.

The White Memorial Award is a national training award made in honor of Dr. Philip R. White, an eminent teacher and researcher in plant cell and tissue culture techniques. The fund is to be used to supplement expenses for continuing education in plant tissue culture. A stipend of up to $650 is awarded yearly for training at an institution of the awardee's choice. This can include attendance at a professional meeting but preference is given to those seeking "hands-on" training. Additional information and application requirements can be found at www.kitchenculturekit.com/white.htm

10th IAPTC&B Congress
Plant Biotechnology 2002 and Beyond
A Celebration and a Showcase

Disney's Coronado Springs Resort
Orlando, Florida
June 23-28, 2002

The International Association for Plant Tissue Culture and Biotechnology (IAPTC&B), founded in 1963, is the largest, oldest and most comprehensive international professional organization in the field of plant tissue culture and biotechnology. For nearly four decades, the quadrennial IAPTC&B congresses, held in different parts of the world, have served as a major international forum for the exchange of scientific information and professional interaction. The published proceedings of the past congresses document the history and advances in this important area of biology.

The 10th IAPTC&B Congress will take place at a time when many transgenic crops are being widely grown in many parts of the world, and transgenic products are being increasingly used for human and animal food. The organizers of the 10th IAPTC&B Congress have developed a truly world-class scientific program, and have invited the best and the brightest of international stars of plant biotechnology to describe, discuss and debate the latest advances and developments in a broad range of important topics.

The American and Canadian Chapters of the IAPTC&B, the Plant Section of the Society for In Vitro Biology, and the University of Florida are jointly hosting the 10th IAPTC&B Congress. More detailed information about the congress, including registration, abstract submission, housing, etc., can be obtained from its web site: www.sivb.org/iaptcb.htm.

Indra K. Vasil

SciNEWS

Len Schiff recently participated as an invited faculty member in The Foundation of Medical Professionals Alliance in Taiwan's Clinical Research Seminar at the National Taiwan University Medical College, Taipei, Taiwan. The seminar was jointly sponsored by the Department of Health, Republic of China. The all day seminar held October 27, 2001, concentrated on case studies and bridging studies of biological products. His presentation was **"Safety Testing Issues for Biological Products"** dealing with both pre-clinical safety studies and safety issues related to product manufacturing.

Janis Demetrulias would like to make SIVB members aware of a valuable resource, the SOT Toxicology Specialty Section. In brief, members of this established section have expertise or interest in the application of in vitro techniques to problems in cellular toxicity with a special emphasis on product safety evaluation. The interests of this specialty section include studies using in vitro techniques of the basic cellular processes involved in the induction of adverse effects of drugs/xenobiotics in specific organs and the whole animal and the development of simple to complex cellular and subcellular systems to predict toxicity in vivo and for risk assessment purposes. Other topics include in vitro test validation and all aspects of test development and acceptance for individual or regulatory purposes. Each year, the section presents graduate and postgraduate awards for posters presented at the annual meeting.

IFER Offers Fellowships

The International Foundation for Ethical Research is offering Graduate Student Fellowships. The submission of preproposals is currently open, with a deadline date off March 15, 2002. Additional information and application process information can be obtained by visiting www.IFER.org.

Visit Us Online
www.sivb.org

Education Committee Sponsors Workshop

The SIVB Education Committee sponsored a workshop**,** "Plant Tissue Culture in the Classroom," at the 2001 National Association of Biology Teachers (NABT) annual meeting. The presentation was attended by more than 35 people, in spite of the fact that it was held on the afternoon of the last day. Due to the events of September 11, we did a demonstration instead of a hands-on workshop based on Carol Stiff's "Kitchen Culture Kits. We intended to provide culture supplies for the participants to take home. However, with the new tighter travel restrictions, metal tools and unidentified white powders are not welcomed by the airlines. Not only were we faced with the problem of how to bring in our own supplies, we were pretty sure that the session participants would not thank us if we caused them to be detained at customs or in the airport on their return flights.

At the last minute Carol was unable to attend, but with her help, Zuzana Zachar and Pat Bossert stepped in and pulled together an excellent presentation. Using Carol's slides, Zuzana presented an overview of Plant Tissue Culture geared for a high school classroom. Pat followed with a wonderful talk highlighting the research that one of her own students did using Carol's kit to culture carrot callus for DNA sequencing.

Even though only three of us, Pat Bossert, Zuzana Zachar and I, Liz Roemer, were able to attend the meeting, we made several good contacts and were able to collect information from three different viewpoints. Pat, as an active teacher, was able to give us insight into what teachers want and need, and how best to deliver it in the context of a National meeting. Zuzana, as a teacher of teachers, gathered information on where teacher education needs to go in the near future and what resources are out there. I focused most of my attention on the exhibit hall and spent time talking with the exhibitors and with several of the senior people in NABT exploring a number of possible collaborations.

The first of what we hope will be many more SIVB interactions with the NABT was a success. We learned a great deal, our presentation was extremely welcome and we are planning on attending next year's meeting in Cincinnati where we hope to run multiple sessions, including a 4 hour hands-on Plant Tissue Culture workshop, a demonstration session on *in vitro* toxicology and perhaps some posters. I invite any SIVB members who are interested in getting involved in future education events to contact me at: eroemer@notes.cc.sunysb.edu.

Elizabeth J. Roemer
SIVB Education Chair

Future Meetings

SIVB MEETINGS

2002 – June 23-28, International Association for Plant Tissue Culture and Biotechnology (IAPTC&B), Orlando, FL. Contact the IAPTC&B Congress Secretariat, Society for In Vitro Biology, 9315 Largo Drive W, Suite 255, Largo, MD 20774, (301) 324-5054, fax (301) 324-5057, email: sivb@sivb.org

2002 – June 26-29, Congress on In Vitro Biology, Orlando, FL

2003 – May 31-June 5, Congress on In Vitro Biology, Portland, OR

OTHER MEETINGS

2002 – Feb 28-March 1, AAPS Workshop on Critical Issues in the Design and Applications of Polymeric Biomaterials in Drug Delivery, Arlington, VA. For more information, please contact (703) 243-2800, email: aaps@aasp.org.

2002 –March 18-20, AAPS Workshop on Drug Substances and Drug Product Specifications (Co-sponsored with FDA), Arlington, VA. For more information, please contact (703) 243-2800, email: aaps@aasp.org.

2002 – April 1-6, Cell Culture Engineering VIII, Snowmass, CO. For more information, contact (212) 591-7836, fax (212) 591-7441, or visit the conference website at http://www.engfnd .org/engfnd/2AC.html.

2002 - April 8 - 12, Society for Experimental Biology Annual Main Meeting, Swansea, Wales, UK. For more information contact Christine Trimmer at +44 (0) 207 439 8732, fax +44 (0) 207 287 4786, email c.trimmer@sebiology.org or visit the SEB website at http://www.sebiology.org

2002 - August 11-14, SOY 2002: The 9th Biennial Conference of the Cellular and Molecular Biology of the Soybean, Urbana-Champaign, IL. Contact the University of Illinois at Urbana-Champaign, Illini Union via email at soy2002@aces.uiuc.edu, or visit the conference website at www.soy2002.uiuc.edu.

Classifieds

POSTDOCTORAL RESEARCH ASSOCIATE

Postdoctoral Research Associate with expertise in phytochemistry (in particular, extraction and fractionation of plant flavonoids), and interest in manipulating flavonoid-rich plant cell cultures to label and modify profiles of accumulating proanthocyanidins and anthocyanidins. Project is concerned with qualitative and quantitative analysis of cell culture-derived flavonoids, and bioactivity testing for anticancer and neuroprotective properties. Seeking candidates for spring and summer semester start dates. Please send inquiries and vitae/references to M.A.L. Smith via email initially, at imagemal@uiuc.edu.

ASSISTANT PROFESSOR
Salem, WV

As part of an aggressive building program in Bioscience, Salem International University is searching for an Assistant Professor in the area of plant molecular biology and molecular genetics. The faculty will teach undergraduates and participate in the Master degree graduate program in molecular biology and biotechnology. The academicenvironment and the newly renovated research facilities, including a biocontainment level 3 facility, are excellent. Successful applicants will engage in scholarly work related to their research interest, and are expected to interact with bioscience faculty.

Applicants should send resume, accompanied by his/her official transcripts, 3 letters of references, up to 3 reprints, and a statement of research and teaching interests to:

Molecular Biology Search Committee
Department of Bioscience
Salem International University
223 West Main Street
P.O. Box 500, Salem, WV 26426-0500

DIRECTOR OF OPERATIONS

A well established Contract Research Organization in Maryland that supplies Pharmaceutical, Biotech and Chemical companies with in vitro testing products and services for studying chemical/biological interactions in vitro, is searching for a Director of the Pharmacokinetic-Drug Metabolism and Bioanalytical Chemistry departments. This is a new position. He/She will have 4-6 direct reports and oversee 15-20 scientists.

He/She must have a Ph.D. in pharmacology, toxicology, biochemistry or a related field. Must have 5 years ADME/TOX experience in industry and first hand knowledge of GLP/GMP regulations.

Interested candidates contact Gary Bell or Sue Neren 201-670-4900 gsbassoc @aol.com

ASSISTANT SCIENTIST
Winchester, KY

GenApps, a company dedicated to serving the needs of agriculture has a position immediately available for an Assistant Scientist located in our Winchester, Kentucky facility. The qualified applicant should possess a M. S. degree or a B.S. degree with 3-5 years relevant working experience in biology/molecular biology, agricultural or related field. Three years laboratory experience emphasizing molecular biology required. Strong knowledge of and outstanding skills in a wide range of recombinant DNA techniques, gene expression systems, enzyme activity assays and plant tissue culture are desired.

Qualified applicant must be able to provide technical support under minimum supervision by planning and implementing individual duties and participating in interdisciplinary projects in support of overall company objectives. Must possess accurate oral and written communication skills, math knowledge associated with technical problems, computer capability, and the ability to perform assigned duties in varied environments including laboratory, greenhouse, and field. Responsibilities will include, but are not limited to, conducting assigned projects to meet department goals and providing assistance to Scientist to initiate new projects.

We offer competitive wages, excellent company benefits and the opportunity to become part of a dynamic organization. If you meet the above qualifications and wish to explore this opportunity further, please send your resume with salary history/ requirements and references to:

Human Resources Coordinator
GenApps, Inc.
4262 Colby Road
Winchester, KY 40391
Fax: (859) 744-4195

RESEARCH SCIENTIST
SUNSEEDS CO.
Keiser, Oregon

A Research Scientist position is immediately available at Sunseeds Co. Emphasis of the position will be on molecular marker systems, DNA fingerprinting, RAPDs and AFLPs. Experience with many types of molecular techniques, as well as with automated DNA sequencers and analyzers preferred. The position is open to Ph.D's or equivalent. Willingness to help on the many different types of projects in the lab, including tissue culture, when appropriate. Ability to work independently, but also cooperate with an international team. Competitive salary and attractive benefits package commensurate with experience. Sunseeds is a member of Aventis Crop Science world wide vegetable seed division. Send letter of application, a detailed CV and three letters of reference to Sunseeds Co., PO Box 20672, Keizer, OR 97303.

SCHOLARSHIPS AND STIPENDS, MS GRADUATE PROGRAM SALEM INTERNATIONAL UNIVERSITY
Salem, WV

Scholarship and stipends are available in the Department of Bioscience, Salem International University, Salem WV for the MS Graduate Program in Molecular Biology and Biotechnology. A position is available to work on the genetic transformation of wetland monocots with novel genes with activity against specific metals and to develop a plant model for the study of metal remediation.

Interested individuals should submit official transcripts, cv and three letters of reference to Dr. S Rogers, Department of Bioscience, Salem International University, Salem, WV 26426-0500 Telephone 304-782-5585 FAX 304-782-5579 Make e-mail inquiries to Rogers@Salemiu.edu EOE/AA.

DIRECTOR TISSUE CULTURE LABORATORY

Oversee the day-to-day activities of a leading edge Tissue Culture lab utilizing proprietary liquid media technology. Identify and manage client opportunities for tissue culture and interfacility communication. Additionally, responsible for setting up systems for working with clients of proprietary media systems in the development of their own liquid tissue culture systems. Manage the overall productivity, distribution, sales and marketing to the labs client base assuring that QC objectives are being met and clients satisfied. Continue developmental efforts in the advancement of the company's proprietary, liquid media bioreactor system

Essential Job Functions

Develop and oversee the operational goals and objectives of Southern Sun's Tissue Culture Laboratory. Oversee daily activities of 20 employees ensuring their activities are in keeping with the tissue culture labs goals and objectives and the company's goals and objectives. Oversee all financial aspects of the lab ensuring that the lab is profitable. Develop markets for the labs stage 3 plants ensuring that the majority of lab plants are contracted to customers. Develop and manage a support structure for clients of Southern Sun's proprietary Liquid Lab™ technology. Identify and establish new plants for culture and ultimate sale. Oversee the accurate maintenance of data records and experimental protocols. Reports to Southern Sun's President and CEO and carries all responsibility for managing staff and directing activities in keeping with the labs established goals and objectives. Responsible for monthly reports on the labs inventory, sales and activities. Communicates all efforts with company senior management and maintains open lines of communication with clients and company's other facilities. Responsible for monthly reports on the labs inventory, sales and activities. Communicates all efforts with company senior management and maintains open lines of communication with clients and company's other facilities.

Education

Required: BS/BA, in plant sciences, plant physiology, horticulture or botany, MS preferred.

Experience

Comparable laboratory management and sales experience is a must, preferably the incumbent has established client relationships. Must have a working knowledge of all aspects of plant tissue culture. Must have managed budgets and employees and established working goals and objectives.

Please respond with salary history, salary requirements and resume to:

Richard Schlott
VP Bus/Corp Dev.
Southern Sun BioSystems
email - rich@sosun.com
web - www.sosun.com

In Vitro Report

Submissions

The ***In Vitro Report*** accepts submissions from members or interested scientists, including: feature articles, letters, forum articles, reviews, photographs or artwork related to the educational goals of he Society. Submissions to ***In Vitro Report*** are subject to editing. Submissions must include author's name, address, phone, or other number where you can be reached. For additional information regarding submissions to ***In Vitro Repor***t, contact the Editor-in-Chief, Martha Wright by phone (913-239-0877) or email (KCWrightM@aol.com), or contact the SIVB office at sivb@sivb.org.

Features (2500 words) are on topics or scientists of general interest to the SIVB membership. Features should be written in an informative style for an audience that ranges from laboratory technicians to senior scientists. Photographs may be submitted with a feature article. Features may be subject to substantial editing.

Letters (500 words) are published based on the decision of the Editor-in-Chief. Publication of letters will be considered if the information concerns SIVB activities, or information is of significant interest to the membership.

Forum (1,000 words) articles reflect the point of view of the author, and do not necessarily reflect the opinion of the SIVB. Authors should be knowledgeable in the subject, as evidenced by previous published works or presentations.

Reviews (250 words) on journal articles, books, educational or software material of interest to SIVB members will be considered by the Editor. The review should be written as a scholarly and critical analysis of the material reviewed.

Membership News (250 words) includes brief articles on section or branch information, award s, position changes, and other information related to SIVB members. Obituary notices for SIVB members should include name, date of birth, major research interests, and contributions to the field in vitro biology.

Photographs or Other Artwork will be considered dependent on space in the issue. Submitted photographs become property of SIVB and cannot be returned unless special arrangements are made beforehand. Digital photographs are accepted on **pc** compatible disk in the following format only: **300 dpi grayscale tif.** GIF and JPG images are not acceptable and will not be used! Contact Michele Schultz, Managing Editor, at the SIVB Business Office (301) 324-5054 or email michele@sivb.org for photographs or artwork considerations.

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