

Platform Presentations

Physical, Chemical, Mathematical, Computer, Electrical, and Nanotechnical Sciences

Session 1

Science Center Room 101

Morning Session I

Paper 1.1—9:10 am

A STATISTICAL ANALYSIS OF THE STANDARD & POOR'S 500 INDEX.

Reutzel, M. P.*, and Raths, O.

Physics Department, Wagner College, Staten Island, NY 10301

Paper 1.2--9:30 am

CRYSTAL SYMMETRY OF BICR₀₃ USING SECOND HARMONIC GENERATION

Chimenti R.V.*, Lynch S., Pues H-C, Jurewicz S, Lofland S, and Knoesel E

Dept of Physics and Astronomy, Rowan University, Glassboro, NJ 08028

Paper 1.3--9:50 am

QUANTUM STATES AND ENERGY LEVELS OF MULTIPLE COUPLED JOSEPHSON JUNCTION
QUBITS

Sun, Y.*, and Ramos, R. C.

Department of Physics, Drexel University, Philadelphia, PA 19104

Paper 1.4—10:10 am

ABSORPTION – A PHYSICAL INTERPRETATION

Buffington, K.*, and Raths, O.

Physics Department, Wagner College, Staten Island, NY 10301

10:30 Coffee Break – Science Center Patio and Campion Lawn

Morning Session II

Paper 1.5--10:50 am

SYNCHRONIZED BEHAVIOR AND THE ROLE OF THE COMMUNICATION NETWORK

Douglass, A., Thomas, J. M.*, and English, L.

Department of Physics and Astronomy, Dickinson College, Carlisle, PA 17013

Paper 1.6—11:10 am

CLIENT SIDE PERSONALIZATION: IMPROVING THE DIGITAL LIBRARY EXPERIENCE

Cameron, W.*, and Cassel, L.

Department of Computing Sciences, Villanova University, Villanova, PA, 19085

**Physical, Chemical, Mathematical, Computer,
Electrical, Nanotechnical Sciences
Session 2
Science Center Room 210
Morning Session I**

Paper 2.1—9:10 am

INVESTIGATING SCALING IN BROWNIAN MOTION

Corn, B.*, and Raths, O.

Department of Physics, Wagner College, Staten Island, NY, 10301

Paper 2.2--9:30 am

NANOPOOLS: AN ENVIRONMENT FOR ARTIFICIAL LIFE

Ralston, M.*

Computer Science Department, Kutztown, PA

Paper 2.3--9:50 am

ELECTRICAL AND OPTICAL CHARACTERIZATION OF CONDUCTIVE FABRICS COATED
WITH POLYANILINE

Periyaswamy, T.*

School of Engineering and Science, Philadelphia University, Philadelphia, PA 19144

Paper 2.4—10:10 am

AN ASESMENT OF COMPUTER PLUG-LOADS IN THE CENTER FOR NATURAL SCIENCES
AT ITHACA COLLEGE

Rivard, R.*, and Swensen S.

Biology Department, Ithaca College, Ithaca, NY 14850

10:30 Coffee Break – Science Center Patio and Campion Lawn

Morning Session II

Paper 2.5--10:50 am

NANOTECHNOLOGY: THE ORGANIC SYNTHESIS OF CYCLACENES AND INTRODUCING
NANOTECHNOLOGY TO THE PUBLIC

D'Onorio DeMeo, D.*; Farrell, K.*; and deProphetis, W.

Department of Physical Sciences (Chemistry), Wagner College, Staten Island, New York 10301

Paper 2.6—11:15 am

CHARACTERIZATION OF POLYDIMETHYLSILOXANE TUBING AS AN EXTRACTANT FOR
JUGLONE

Goodrich, M.*, and Weidenhamer, J.

Department of Chemistry, Ashland University, Ashland OH, 44805

Afternoon Session

Paper 2.7—4:15 pm

STRUCTURAL ANALYSIS OF SPUNLACED AND MELTBLOWN NONWOVENS USING
DIGITAL IMAGE PROCESSING

Balasubramanian, K.*

School of Engineering and Textiles, Philadelphia University, Philadelphia, PA 19144

Paper 2.8—4:35 pm

ANT COLONY OPTIMIZATION: HOW MANY ANTS ARE ENOUGH?

Vasko, F. J., Keffer, J. D.*² and Rieksts, D. J.*¹

¹Department of Mathematics, Kutztown University, Kutztown, PA 19530

²Department of Computer Science, Kutztown University, Kutztown, PA 19530

Paper 2.9 – 4:55 pm

RE-ENTRANT GLASS TRANSITION IN A COLLOID-POLYMER MIXTURE

Graneto, N.*, Latka, A., and Habdas, P.

Department of Physics, Saint Joseph's University, Philadelphia, PA 19131

Psychology and Sociology

Session 3

Science Center Room 212

Morning Session I

Paper 3.1—9:10 am

SPEECH-GESTURE SYNCHRONY IN MOTHER-TO-INFANT WORD PRESENTATION

Sahlstrom, A.*, and Rader, N.

Department of Psychology, Ithaca College, Ithaca, NY 14850

Paper 3.2—9:30 am

AGE-RELATED DIFFERENCES IN FACIAL RECOGNITION AND CONFIDENCE RATINGS

Dunleavy, E. A*. and Berthold, H.

Psychology Department, Lycoming College, Williamsport, PA, 17701

Paper 3.3—9:50 am

INFANT LOOKING BEHAVIOR IN SYNCHRONOUS VS. ASYNCHRONOUS BIMODAL OBJECT-SOUND

North, J.*, and Rader, N.

Psychology Department, Ithaca College, Ithaca NY, 14850

Paper 3.4—10:10 am

SCENE PERCEPTION & PERCEPTUAL BLINDNESS

Russo, K.*, and Jewell, J.

Department of Psychology

Saint Joseph's University, Philadelphia, PA 19131

10:30 Coffee Break – Science Center Patio and Campion Lawn

Morning Session II

Paper 3.5—10:50 am

WORD PROCESSING VERSUS PENMANSHIP IN EMPLOYEE HIRING DECISION MAKING

Whisenant, D.*, and Berthold, H.

Psychology Department, Lycoming College, Williamsport, PA 17701

Paper 3.6—11:10 am

INFANT PREFERENCES FOR NOVEL AND FAMILIAR TOYS: CREATING FAMILIARITY USING STICKY MITTENS

Dengler, M.*, Gubala, R., West, A., and Fisher-Thompson, D.

Psychology Department, Niagara University, Lewiston, NY 14109

**Psychology and Sociology
Session 4
Science Center Room 109
Morning Session I**

Paper 4.1—9:10 am

BLIND SPOT SIZE IN BALL SPORT ATHLETES, SWIMMERS, AND NON-ATHLETES

Purcell, J. *, and Berthold, H.

Psychology Department, Lycoming College, Williamsport, PA 17701

Paper 4.2—9:30 am

COGNITIVE DISSONANCE AND INTENTIONS TO USE CONDOMS IN COLLEGE STUDENTS

Nygaard, S. *, and Eshleman, A.

Psychology Department, Wagner College, Staten Island, NY 10301

Paper 4.3—9:50 am

HOW MUCH FRUIT IS IN FROOT LOOPS? EFFECTIVENESS OF A MEDIA LITERACY CURRICULUM IN IMPROVING CHILDREN'S NUTRITIONAL KNOWLEDGE

Cooper, L. *, Oliver, K., Simpson, H., Sambor, S., Research Team 07, and Scheibe, C.

Psychology Department, Ithaca College, Ithaca, NY 14850

Paper 4.4—10:10 am

APOSEMATIC COLORATION IN SNAKES AND ITS EFFECT ON HUMANS

Keller, M. *, and Berthold, H.

Psychology Department, Lycoming College, Williamsport, Pa. 17701

10:30 Coffee Break – Science Center Patio and Campion Lawn

Morning Session II

Paper 4.5—10:50 am

THE ROLE OF SPEAKERS' GESTURES IN SUPPORTING EARLY WORD ACQUISITION

DellaRocco, J. *, Walsh, C., Spyrtatos, A., Research Team 04, and Rader, N.

Psychology Department, Ithaca College, Ithaca NY 14850

Paper 4.6—10:50 am

A GREAT SCHISM: HOW DIFFERENCES BETWEEN RELIGIOSITY AND SPIRITUALITY ARE RELATED TO IDENTITY STYLES AND ANXIETY

Pipher, A. *, Daley, K., Bullock, M., and White, A.S.

Psychology Department, Ithaca College, Ithaca, NY 14850

**Psychology and Sociology
Session 5
Science Center Room 214
Morning Session I**

Paper 5.1—9:10 am

EFFECTIVE TEACHING METHODS FOR FOREIGN LANGUAGE ACQUISITION AND LEARNING

Agnitti, J.*, and Beins, B.

Psychology Department, Ithaca College, Ithaca, NY 14850

Paper 5.2—9:30 am

EYE MOVEMENTS, ATTENTION, AND MEMORY: EXAMINING PLEASANT, NEUTRAL, AND UNPLEASANT PHOTOGRAPHS IN A COLLAGE

Stulak, C.* and Jewell, J.

Department of Psychology, Saint Joseph's University, Philadelphia, PA 19131

Paper 5.3—9:50 am

EFFECTS OF LIFEGUARD SCANNING TECHNIQUES ON IDENTIFYING STIMULI

Dvorscak, N*., Melnykevich, S*, and Berthold, H.

Department of Psychology, Lycoming College, Williamsport, Pennsylvania, 17701

Paper 5.4—10:10am

THE EFFECT OF LANGUAGE ON INFANT LOOKING BEHAVIOR

Walsh, C.*, and Rader, N.

Psychology Department, Ithaca College, Ithaca, NY 14850

10:30 Coffee Break – Science Center Patio and Campion Lawn

Morning Session II

Paper 5.5—10:50 am

EFFECT OF SIZE AND APPARENT SIZE ON PERCEPTION OF DETAIL.

Cunningham, A* and Berthold, H.

Lycoming College, Williamsport, PA 17701

Paper 5.6—11:10 am

ACTIVATION OF IL-1 RECEPTORS IS NOT REQUIRED FOR THE SUPPRESSION OF FOOD INTAKE DURING THE OVARIAN CYCLE.

Honors, M. A.*; and Butera, P. C.

Department of Psychology, Niagara University, Lewiston, NY 14109

Regulating Molecules in Cells
Session 6
Forum Theater, Champion Student Center
Morning Session I

Paper 6.1—9:10 am

CHONDROCYTE-PRODUCED TGF β REGULATES EARLY STAGES OF OSTEOBLAST DIFFERENTIATION.

Scheinfeld, V.L.* , Day, S., Mattioli, P.M., Bodine, P.V.N.¹ and D'Angelo, M.

Center for Chronic Disorders of Aging, Philadelphia College of Osteopathic Medicine, Philadelphia, PA,

¹Women's Health Research Institute, Wyeth Research, Collegeville, PA

Paper 6.2—9:30 am

A POTENTIAL ROLE FOR IMP (IGF-II MRNA BINDING PROTEIN) IN THE GERMLINE OF ELONGATING SPERMATID CYSTS.

Stabrawa, C.* , Talbert, C., and Fabrizio, J.

Biology Department, College of Mt. St. Vincent / Manhattan College, Bronx, NY 10471

Paper 6.3—9:50 am

AKT1 SUPPRESSES RADIATION- INDUCED GERM CELL APOPTOSIS IN VIVO

DiPalma, K.*¹, Rasoulpour, T. ², Kolvek, B. ², and Hixon, M.²

¹Providence College, Providence, RI 02918

²The Laboratories of Molecular Medicine, Department of Pathology and Laboratory Medicine
Brown University, Providence, RI 02912

Paper 6.4—10:10 am

ZCL2884X, IS A NEW GFP-TAGGED PROTEIN TRAP UNCOVERING THE *IMP* (IGF-II MRNA BINDING PROTEIN) GENE.

Hutter, J* and Fabrizio, J.

Biology Department, College of Mount Saint Vincent / Manhattan College, Riverdale, NY 10471

10:30 Coffee Break – Science Center Patio and Champion Lawn

Morning Session II

Paper 6.5—10:50 am

EFFECTS OF RETINOL AND PHYTOL ON METAMORPHOSIS AND GENE EXPRESSION FOR ANTIOXIDANT ENZYMES IN LIMBS OF ANURAN TADPOLES.

Claros, J.* , Rozman R. and Menon J.

Department of Biology, William Paterson University of New Jersey, Wayne, NJ 07470

Paper 6.6—11:10 am

ENHANCER TRAPPING REVEALS CANDIDATE SOMATIC REGULATORS OF POST-MEIOTIC SPERMATOGENESIS.

Talbert, C.* and Fabrizio, J.

Biology Department, College of Mount Saint Vincent / Manhattan College, Riverdale, NY 10471

Paper 6.7—11:30 am

ROLE OF THE COX ENZYME SYSTEM IN THE ANORECTIC ACTION OF INTERLEUKIN-1 BETA IN FEMALE RATS

Nodzo, S. R.*¹, and Butera, P. C.²

Departments of Biology¹ and Psychology², Niagara University, Lewiston, NY

Afternoon Session

Paper 6.8 – 4:15 pm

LOWERING ENDOGENOUS MELATONIN IN *RANA CATEBEIANA* TADPOLES ACCELERATES METAMORPHOSIS

Demoracski, L.*, and Wright, M.

Biology Department, Elms College, Chicopee, MA 01013

Paper 6.9 – 4:35 pm

IDENTIFICATION OF A NOVEL UNTRANSLATED RNA REGULATING STEM CELL FORMATION IN THE AQUATIC LEECH, *THEROMYZON TESSULATUM*

Nuthulaganti, T.*, Hohenstein, K. A., and Shain, D. H.

Department of Biology, Rutgers, The State University, Camden, NJ 08102

Ecological Processes

Session 7

Science Center Room 200

Morning Session I

Paper 7.1—9:10 am

MECHANICAL STRESSES OF PRIMARY BRANCHES: A SURVEY OF 40 WOODY TREE AND SHRUB SPECIES

Torres, J.*, and Evans, L.

Laboratory of Plant Morphogenesis, Biological Sciences Research Laboratories, Manhattan College, Riverdale, NY 10471

Paper 7.2—9:30 am

LIGHT-DEPENDENT LEUCINE INCORPORATION AND ABUNDANCE OF POTENTIAL PHOTOHETEROTROPHS ACROSS THE ATLANTIC OCEAN

Michelou, V. K.*, Cottrell, M. T., and Kirchman, D. L.

College of Marine Studies, University of Delaware, Lewes DE 19958

Paper 7.3—9:50 am

THE IMPACT OF A GYPSY MOTH (*LYMANTRIA DISPAR*) OUTBREAK ON TREE SPECIES COMPOSITION IN A NORTHEASTERN HARDWOOD FOREST

Clark, M.*, and Wiener, E.

Environmental Science Program, Ramapo College of New Jersey, Mahwah, NJ 07430

Paper 7.4—10:10 am

SPATIAL CHARACTERISTICS OF PERENNIAL VEGETATION OF TUCSON MOUNTAIN PARK OF THE ARIZONA UPLAND PROVINCE OF THE SONORAN DESERT

McGinty, D.* and Evans, L.

Biology Department, Manhattan College, Riverdale NY, 10471

10:30 Coffee Break – Science Center Patio and Campion Lawn

**Inheritance
Session 8
Science Center Room 200
Morning Session II**

Paper 8.1—10:50 am

WHO GIVES A CRAB: A POPULATION STUDY OF THE NORTH AMERICAN HORSESHOE CRAB, *LIMULUS POLYPHEMUS*, IN LONG ISLAND SOUND.

Goodell, P.* , Erasmus, K., and Mattei, J.

Biology Department , Sacred Heart University, Fairfield, CT. 06825

Paper 8.2—11:10 am

RAPID RADIATION OF THE GENUS *SAINTPAULIA*

Caro, S. E.* , and Kotarski, M.

Department of Biology, Niagara University, Lewiston, NY 14109

Afternoon Session

Paper 8.3—4:15 pm

BACTERIOPHAGE THERAPY: IDENTIFICATION AND CHARACTERIZATION OF LYSOGENIC BACTERIA AMONG ISOLATES OF *PROPIONIBACTERIUM ACNES*

Bolcun, A* , and Davis, M

Dept. of Biomolecular Sciences, Central Connecticut State University, New Britain CT 06050

Paper 8.4—4:35 pm

GENETICALLY MAPPING THE *FRIZZY* MUTATION ON MOUSE CHROMOSOME 7.

Soucy, F.* , Paul, E., Badal, R., Magnan, D., Thompson, D., Bajrami, B. Valtin, E. and King, T.R.

Biomolecular Sciences, Central Connecticut State University, New Britain, CT 06053

**Cell Function
Session 9
Science Center room 300
Morning Session I**

Paper 9.1— 9:10 am

EFFECTS OF ACUTE ARSENATE EXPOSURE AND THIOARSENATE COMPLEXATION ON *VIBRIO FISCHERI*

Battista, D. R.^{1*} , Visviki, I.² , Judge, M. L.¹ , and Mahony, J.³

¹Department of Biology Manhattan College, Riverdale, NY 10471

²College of Mount Saint Vincent, Riverdale, NY 10471

³Department of Environmental and Civil Engineering, Manhattan College, Riverdale, NY 10471

Paper 9.2—9:30 am

PRECLINICAL TOPICAL MICROBICIDE DEVELOPMENT: EVALUATION OF CYTOKINES AS BIOMARKERS FOR CYTOTOXICITY

Cokonis, M.* and Boyd, A.

Department of Biology, Hood College, Frederick, Maryland 21701

Paper 9.3—9:50 am

THE ROLE OF E-CADHERIN IN PARIETAL ENDODERM MIGRATION

Damiano, J.* , and Mulrooney, J.

Department of Biomolecular Sciences, Central Connecticut State University, New Britain, CT 06053

Paper 9.4—10:10 am

PROMOTION OF APOPTOSIS USING SMALL MOLECULES AS INHIBITORS OF BCL-X_L

Ambrosini, L. M.*, and Pike, J. D.

Department of Chemistry and Biochemistry, Providence College, Providence, RI 02918

10:30 Coffee Break – Science Center Patio and Campion Lawn

Morning Session II

Paper 9.5—10:50 am

EXPRESSION OF BCL-XL AND BAX FOR THE PROMOTION OF APOPTOSIS USING SMALL MOLECULES

Fullam, S. L.*, and Pike, J.

Department of Chemistry and Biochemistry, Providence College, Providence, RI 02918

Organism Function- External influences

Session 10

Science Center Room 400

Morning Session I

Paper 10.1—9:10 am

EXPOSURE OF *DUNALIELLA PRIMOLECTA* TO ARSENIC: EFFECTS ON GROWTH, CELL SIZE, AND CHLOROPHYLL CONTENT

Cojuangco*¹, N., Visviki, I.¹, and Judge, M.L.²

Department of Biology

¹College of Mount Saint Vincent, Riverdale, NY 10471

²Manhattan College, Riverdale, NY 10471

Paper 10.2—9:30 am

INDUCTION OF METALLOTHIONEIN IN CHICK EMBRYO AS TOLERANCE MECHANISM TO PLATINUM GROUP METAL EXPOSURE

Capecci, J.*¹, Patel, A.², Trivedi, P.¹, and Gagnon, Z.¹

¹Marist College, Poughkeepsie, NY

²New York University, New York, NY

Paper 10.3—9:50 am

COHORT DEVELOPMENT OF *LEPTOCHEIRUS PLUMULOSUS* UNDER CHRONIC ARSENATE STRESS

Jaquez*¹, L., Judge, M.², Visviki, I.¹, Mahony, J.³, O'Mara, C.³, and Loor, T.³

¹Department of Biology, College of Mount Saint Vincent

²Department of Biology, Manhattan College

³Department of Civil and Environmental Engineering, Manhattan College
Riverdale, NY 10471

Paper 10.4—10:10 am

INTERACTIONS BETWEEN ESSENTIAL MINERAL NUTRIENTS WITH PLATINUM GROUP METALS IN AQUATIC AND TERRESTRIAL PLANTS

Diehl, D.*, and Gagnon, Z.

School of Science, Marist College, Poughkeepsie, NY 12601

10:30 Coffee Break – Science Center Patio and Campion Lawn

Morning Session II

Paper 10.5—10:50 am

FUTURISTIC DISEASE: THE EFFECT OF ATMOSPHERIC CHANGE ON FOLIAR SOYBEAN PATHOSYSTEMS.

DeGennaro, M. *, Foster, J., and McElrone, A.

Department of Biology, Saint Joseph's University, Philadelphia, PA 19131

Paper 10.6—11:10 am

ONTOGENY AND FLUID ENVIRONMENT IN SCYPHOZOAN DEVELOPMENT

Feitl, K.*¹, Millett, A.², Colin, S.², and Costello, J.¹

Biology Department

1. Providence College, Providence, RI 02918

2. Roger Williams University, Bristol, RI 02809

Paper 10.7—11:30 am

EXPOSURE OF *DUNALIELLA TERTIOLECTA* TO ARSENIC: EFFECTS ON GROWTH, CHLOROPHYLL CONTENT, AND CELL SIZE DISTRIBUTION

Burriesci, L.*¹, Visviki I.², and Judge, M.L.¹

Department of Biology

¹Manhattan College, Riverdale, NY 10471

²College of Mount Saint Vincent, Riverdale, NY 10471

Afternoon Session

Paper 10.8 – 4:15 pm

ELEVATED ATMOSPHERIC CO₂ ALTERS TROPHIC INTERACTIONS AMONG WEB-BUILDING SPIDERS, INSECTS AND PLANTS: A STABLE ISOTOPE ANALYSIS

Gattis, A.S.*¹, Hamilton, J.G.¹, Sparks, J.P.², Elich, L.¹, Woodring, V.¹, and DeLucia, E.H.³

¹Dept. of Biology, Ithaca College, Ithaca, NY 14850

²Dept. of Ecology and Evolutionary Biology, Cornell University, Ithaca, NY 14853

³Dept. of Plant Biology, University of Illinois, Urbana, IL 61801

Paper 10.9 – 4:35 pm

A MORPHOLOGICAL EXAMINATION OF REGENERATION IN THE AQUATIC OLIGOCHAETE, *LUMBRICULUS VARIEGATUS*

Modarai, F.*, and Shain, D. H.

Biology Department, Rutgers University, Camden, NJ 08012

Paper 10.10 – 4:55 pm

STRAIN SPECIFICITY AND A POSSIBLE TARGET OF ALCOHOL ACTIONS IN AN ANIMAL MODEL OF EARLY ONSET ALCOHOL DEPENDENCY.

McLaughlin, J.*, Pereira, A., Feldman, R. and Rhoads, D.

Biology Department, Monmouth University, W. Long Branch, NJ 07764

Organisms
Session 11
Science Center Room 316
Morning Session I

Paper 11.1—9:10 am

THE FAT BODY DURING FROG DEVELOPMENT

Richardson S.*, Nowak M., Pilotte N., Scott J., Noyes A., Demoracski L., and Wright M.L.
Biology Department, Elms College, Chicopee MA, 01013

Paper 11.2—9:30 am

MECHANICAL ASPECTS OF INITIAL CLOSURE OF VENUS FLYTRAPS (*DIONAEA MUSCIPULA*)

Clarke, D. A. *, and Evans, L.

Biology Department, College of Mount Saint Vincent, Staten Island, NY, 10301

Paper 11.3—9:50 am

ANATOMY AND MORPHOLOGY OF WATER LILY (*NUPHAR ADVENA*) IN RELATION TO INTERNAL AIRFLOW AND RESPIRATION RATE

Okawa, Y. *, and Evans, L.

Laboratory of Plant Morphogenesis, Biological Sciences Research Laboratories, Manhattan College, Bronx, NY 10471

Paper 11.4—10:10 am

QUANTIFYING THE CONTRIBUTION OF AQUAPORINS TO OVERALL WATER TRANSPORT IN DEEP ROOTS ACCESSED VIA CAVES

Bichler, J*., Kuczynski, M.D., and McElrone, A.J.

Department of Biology, Saint Joseph's University, Philadelphia, PA, 19131

10:30 Coffee Break – Science Center Patio and Campion Lawn

Morning Session II

Paper 11.5—10:50 am

METAL INTERACTIONS WITH SLUG GLUE PROTEINS

Werneke, S.* and Smith, A.

Biology Department, Ithaca College, Ithaca, NY 14850

Paper 11.6—11:10 am

ANATOMY AND MORPHOLOGY OF RED MANGROVE (*RHIZOPHORA MANGLE*) PLANTS IN RELATION TO INTERNAL AIRFLOW

Okawa, Y. ^{1*}, Evans, L.¹, and Searcy, D.²

¹Laboratory of Plant Morphogenesis, Biological Sciences Research Laboratories, Manhattan College, Bronx, NY 10471

²Department of Biology, University of Massachusetts, Amherst, MA 01003-9297

Paper 11.7 – 11:30 am

DIRECTIONAL BIAS IN PLANARIA (*DUGESIA TIGRINA*) BEFORE AND AFTER REGENERATION

Moriello, D.L.* and Wong, G.K.

Department of Biological Sciences, Quinnipiac University, Hamden, CT 06518

Afternoon Session

Paper 11.8 – 4:15 pm

THE TRAINABILITY OF PLANARIA (*DUGESIA TIGRINA*) FOR DIRECTIONAL PREFERENCE

Abbott, S.M.* and Wong, G.K.

Department of Biological Sciences, Quinnipiac University, Hamden, CT 06518-1908

Paper 11.9 – 4:35 pm

CRAVING FOR POTATOES IN CATERPILLARS: IS IT INDUCED BY CHANGES IN GENE
EXPRESSION?

Palmer, S.*¹, del Campo, M. L.², and Caillaud, M.¹

¹Department of Biology, Ithaca College, Ithaca, NY 14850 USA

²Department of Biological Sciences, Binghamton University, State University of New York, Binghamton,
NY 13902

PLATFORM PRESENTATION ABSTRACTS

THE TRAINABILITY OF PLANARIA (*DUGESIA TIGRINA*) FOR DIRECTIONAL PREFERENCE

Abbott, S.M.* and Wong, G.K.

Department of Biological Sciences

Quinnipiac University, Hamden, CT 06518-1908

Planaria (*Dugesia tigrina*) are freshwater flatworms with a rudimentary brain and synaptic nervous system, suggesting the ability to learn. Previous studies have taken advantage of this by training planaria to favor a direction in a Y- or T-maze using an electrical shock as a negative stimulus. Previous studies have also shown that 1/3 to 1/2 of tested planaria seem to have a directional preference (Bianki *et al.*, 1990, *Zh Vyssh Nerv Deiat Im I P Pavlova*, **40**:102-107). Many of these early works performed few runs and/or used a small number of planaria. To re-examine whether planaria have a directional bias and the ability to learn, planaria were run through Y-mazes in pre-training, training, and post-training sessions. Each of these sessions involved 3 trials on 3 consecutive days, with each trial consisting of 10 successive runs through the Y-maze. The pre-training period determined the initial directional bias of planaria and was the basis of assigning a training direction. Planaria were trained to select a specific direction in the Y-maze by using an electrical shock as a negative stimulus when the wrong arm was selected. Post-training analysis was performed to determine if planaria retained their trained behavior. Control planaria were not shocked during the training period, and allowed to freely select their direction. When observed on individual days, some planaria appear to have a directional bias. However, as cumulative results over 3 consecutive days are compiled, the majority of planaria display no directional preference or are non-bias. Experimental planaria showed changes in their directional bias during the training period, but then returned to the same percentages of directional bias as the controls in the post-training session. Throughout all trials the control planaria maintained approximately the same percentages of directional bias for each individual day. The trained planaria do not appear retain their trained behavior under the set conditions. Planaria show evidence of being trainable, but the 3-day training period, totaling 30 runs, does not appear to be enough time for planaria to retain their training. Hence, an extended training period is probably required to ensure longer retention in the post-training period.

EFFECTIVE TEACHING METHODS FOR FOREIGN LANGUAGE ACQUISITION AND LEARNING

Agnitti, J.*, and Beins, B.

Psychology Department

Ithaca College, Ithaca, NY 14850

There are many methods claiming to be the most effective for learning a foreign language. This study looks at two of the most popular: teaching by grammar and teaching by the audio-lingual method. Teaching by grammar includes using vocabulary lists and repetition. Activities focus on grammatical analysis and translation. The audio-lingual method implies that the native language is rarely used during the learning process. Language is taught in a conversational style, with no formal recognition of grammatical rules. It is based on the theory that language learning is habit formation. This study focuses on the effectiveness of these methods on the learning of the foreign languages Spanish and Italian. Participants in both languages learned the same material, regardless of condition. That is, that the participants in both the grammar and audio-lingual condition for Italian learned the same vocabulary regarding the Italian café. The participants in the Spanish conditions learned about getting directions. The participants took questionnaires regarding their interests, attitudes, and anxieties about learning a foreign language. It is expected that participants in the audio-lingual conditions will show greater development and comprehension of the foreign languages than the participants in the grammar conditions. Likewise, participants who display a greater interest, more positive attitude, and less anxiety about learning a foreign language are expected to show a higher understanding of the language.

PROMOTION OF APOPTOSIS USING SMALL MOLECULES AS INHIBITORS OF BCL-X_L

Ambrosini, L. M.*, and Pike, J. D.

Department of Chemistry and Biochemistry

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Cancer is the result of cells that, through mutation, gain the ability to grow unrestrained and often avoid apoptosis, or natural cell death. The mitochondrial apoptotic pathway is regulated by the Bcl-2 family of proteins, which consists of both pro-survival and pro-apoptotic members. Over-expression of Bcl-x_L, a pro-survival member of the Bcl-2 family, prevents cell death by inhibiting the pro-apoptotic member, Bax, which leads to cancer progression. Antimycin A₃, an antibiotic isolated from *Streptomyces antibioticus*, has been shown to bind to Bcl-x_L and inhibit its pro-survival function. Computational molecular docking analysis verified that Antimycin A₃ has a strong interaction with two arginine residues in the BH3 domain of Bcl-x_L, as well as a hydrophobic pocket formed

by alanine, leucine, and phenylalanine residues. From these results, it is suggested that analogs with the capacity for hydrogen bonding to the arginine residues and a long hydrophobic region will have a similar binding effect and may lead to the promotion of apoptosis more effectively. We have designed simple organic molecules derived from salicylic acid and isophthalic acid containing the necessary carboxylate functional groups for effective binding. Our laboratory has been focusing on the syntheses of a series of such derivatives, which will be discussed in detail. These molecules may be used as pharmacological tools to better understand the apoptotic pathway, as well as serve as potential chemotherapeutic drugs for a wide range of cancers.

STRUCTURAL ANALYSIS OF SPUNLACED AND MELTBLOWN NONWOVENS USING DIGITAL IMAGE PROCESSING

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Nonwovens are a class of textile materials that are manufactured as fabrics directly from fiber through various techniques including spunlacing and meltblowing. A thin nonwoven fabric can be treated as a two-dimensional fiber network in which fibers (staple or filament) lie in various directions and are bonded or in contact with one another at the fiber crossover points.

The mechanical properties of nonwoven fabrics are determined by the properties of the fabric constituents and their structural arrangement. Among the important structural morphology are fiber orientation, thickness and curl. A thin nonwoven fabric can be treated as a two-dimensional fiber network in which fibers (staple or filament) lie in various directions and are bonded or in contact with one another at the fiber crossover points.

Many researchers have endeavored to construct theoretical models from the essential information of fiber segment characteristics to predict the mechanical performance of nonwoven fabrics. More recently, computer simulation techniques came into use in the creation of computer models of various nonwoven fabrics. In modeling the performance of nonwovens, it is desirable to understand the impact of the constituent characteristics and fiber arrangement. To that end, there is a need for determining the fiber orientation and the other structural features reliably and accurately.

This research explains about the extraction of features, like orientation distribution and diameter distribution of fibers in spunlaced and meltblown fabrics, using image analysis technique, with algorithms having higher computational efficiency and accuracy than the present methods. Mathematical transforms like Hough Transform and Distance Transform are used for the feature analysis.

EFFECTS OF ACUTE ARSENATE EXPOSURE AND THIOARSENATE COMPLEXATION ON *VIBRIO FISCHERI*

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Arsenic is considered the number one pollutant of concern at EPA Superfund sites. It exists in two inorganic forms arsenite (AsIII) and arsenate (AsV). Arsenite is prevalent in anoxic environments and arsenate is prevalent in oxic ones. In the present study the effects of arsenate were studied using the Microtox® toxicity bioassay, which relies upon the attenuation of light intensity emitted by the marine bacteria *Vibrio fischeri*. Arsenate inhibits ATP production and increasing amounts of arsenate inhibit the respiratory rate of this bacterium and decrease its rate of bioluminescence. The Effective Concentration (EC₅₀) of arsenate which reduced bioluminescence by 50% was determined after 30 minutes of exposure. Based on experimental data, the EC₅₀ of arsenate was found to be 2110.19 µg/L. However, given the ubiquitous nature of sulfides in these systems and its propensity to bind strongly with arsenic, arsenic-sulfide complexes may further affect arsenate EC₅₀. Previous published data suggests the EC₅₀ of sulfides alone to be 292 mg/L. Additional Microtox® experiments further suggest sulfides ameliorate arsenate toxicity.

QUANTIFYING THE CONTRIBUTION OF AQUAPORINS TO OVERALL WATER TRANSPORT IN DEEP ROOTS ACCESSED VIA CAVES

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Deep roots can contribute substantially to whole tree water use by accessing reliable water resources. Despite their importance, we lack knowledge of deep root physiology due to limited access for *in situ*

measurements. We used a cave system on the Edward's Plateau of central Texas to investigate transport physiology in fine roots tapping a perennial stream at ~20 meters depth. An Ultra-Low Flow Meter was used to measure fine root hydraulic conductivity (FRC) and hydroxyl radicals were used to assess aquaporin activity in two tree species, the evergreen *Quercus fusiformis* and the deciduous *Bumelia lanuginosa*. During the summer, FRC and aquaporin activity were found to cycle diurnally in both species with peaks corresponding to the period of highest canopy water demand. During whole tree shade treatments, *B. lanuginosa* FRC ceased diurnal cycling and decreased by 76 and 21% during the day and night, respectively, while aquaporin activity decreased by ~28% at both time periods. Results from a controlled growth chamber study of hydroponically-grown *B. lanuginosa* saplings confirm shade induced reductions in FRC and aquaporin activity. During the winter, *Q. fusiformis* maintained high FRC and aquaporin activity, while *B. lanuginosa* ceased diurnal cycling and exhibited the lowest FRC and aquaporin activity of the year. We demonstrate that aquaporins play an important role in deep root water transport by adjusting to canopy water demands under varying environmental conditions. Such adjustments may aid in maintaining deep water usage.

CHANGING THE METHOD OF CONSEQUENCE: EFFECTIVE CRIMINAL PUNISHMENT

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Abstract Withdrawn

Justice systems have run the gamut from corporal punishment to incarceration to capital punishment. Innovations since then have run the gamut from probation to community corrections to restorative justice. Criminal punishment seeks to achieve two goals, the first is to prevent the public from similar courses of action, and the second is to prevent the public from similar courses of action. Criminal punishment is successful at achieving one or the other, but rarely both. The best case for effective punishment is the reformed prison system.

BACTERIOPHAGE THERAPY: IDENTIFICATION AND CHARACTERIZATION OF LYSOGENIC BACTERIA AMONG ISOLATES OF *PROPIONIBACTERIUM ACNES*

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Bacterial pathogens continue to evolve resistance to antibiotics used for treatment. One of the promising alternative therapies involves the use of bacteriophage (phage), viruses that use bacterial cells as hosts for viral reproduction. One common result of this parasitism is the death of the bacterial cell, and it is this feature of the phage lifecycle that we seek to exploit. Phage are usually very limited in host range, which gives them a distinct targeting advantage over common chemical antibiotics.

We have chosen to focus on the bacterial agent involved in the skin disease acne, a member of the common skin microbiota known as *Propionibacterium acnes*. We have isolated phage which target this species. However, these are "temperate" phage, meaning that infection of susceptible bacteria does not always lead to phage reproduction and cell lysis. Small numbers of bacteria are latently infected, which leads not to cell death, but a stable integration of the phage genome into the bacterial chromosome. Cells bearing a repressed phage, known as lysogenic cells, are nearly identical phenotypically to wild-type bacteria, with one exception: lysogens are immune to further infection by phage of the same type. Earlier published reports suggest that our large lab collection of *P acnes* bacterial isolates contains such lysogens at a frequency of about one in ten.

It is essential for our studies that we distinguish lysogenic from non-lysogenic bacteria. For instance, analyses of the host range of our purified phage stocks can be confounded by the presence of lysogens in the bacteria testes. More serious, though, is the danger of propagating our purified phage stocks on host bacteria which are latently infected by phage of another type, allowing homologous recombination to mix alleles from different phage genomes. We have developed a simple blotting technique for distinguishing lysogens from non-lysogens, and are applying this protocol to characterize our collection of *P acnes* bacteria. We will continue this study of the temperate behavior of our isolated phage as part of a plan to modify the behavior of the phage to a lysis-only lifecycle.

ABSORPTION – A PHYSICAL INTERPRETATION

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A look at the properties of water absorption, from a physical view. Absorption seems to violate a simple rudimentary rule of physics - conservation of energy. A look at the apparent violation of gravity and conservation of energy in absorption of water in paper. Energy is being generated from the change in the structure of the paper when wet.

EXPOSURE OF *DUNALIELLA TERTIOLECTA* TO ARSENIC: EFFECTS ON GROWTH, CHLOROPHYLL CONTENT, AND CELL SIZE DISTRIBUTION

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The effects of arsenate on growth, chlorophyll content, and cell size distribution in *Dunaliella tertiolecta* were investigated. Arsenic is a metalloid, which can be found naturally in certain soils and aquatic ecosystems. A stock culture of *Dunaliella tertiolecta* (UTEX 999) was grown in Erdschreiber medium and incubated under a dial light cycle of 12 hours of darkness and 12 hours of light at 25° C. *D. tertiolecta* is an ideal candidate for phytoremediation because it is tolerant and capable of concentrating pollutants from the water. A 72-hour arsenic exposure, with an initial inoculum of 550,300 cells per mL, was run using concentrations of 0, 12.5, 25, 50, and 100 mg/L with 3 replicate vials per concentration. A 96-hour arsenic exposure, with an initial inoculum 298,000 of cells per mL, was run using concentrations of 0, 153, 200, and 307 mg/L with 3 replicate vials per concentration. Cell density was determined via replicated direct counts using hemocytometer. Chlorophyll content was determined using spectrophotometer at an absorbance at 649nm and 665nm. Size distribution was determined using Beckman Vi-CELL Analyzer. *D. tertiolecta* showed no growth inhibition during 72h exposure. *D. tertiolecta* showed 53% growth inhibition when exposed to 307 mg/L (EC₅₀) of arsenic during 96h exposure. In both 72h and 96h exposure, chlorophyll a and b per cell and total chlorophyll per cell were not affected by arsenic stress. Cell size distribution was similar in both control replicates and those exposed to 307 mg/L As(V). Because *D. tertiolecta* has high tolerance to arsenic and can easily take up arsenate, this species offers potential for phytoremediation in seawater.

CLIENT SIDE PERSONALIZATION: IMPROVING THE DIGITAL LIBRARY EXPERIENCE

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I proposed to research within the domain of Digital Libraries the feasibility and value potential of developing and implementing a system for the client-side personalization of the digital library experience. This is a system in which the client maintains privacy control over the release of information from a local personal profile. The profile would explicitly gather from the user generic interest and background information directly relevant to the retrieval of digital library resources and allow the server side utilization of such information for the duration of a single session. This information would be used in the refinement of search results and the presentation of potentially valuable resources while maintaining client user maintenance and control of the information.

INDUCTION OF METALLOTHIONEIN IN CHICK EMBRYO AS TOLERANCE MECHANISM TO PLATINUM GROUP METAL EXPOSURE

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Recent data show that platinum group metals (PGMs), primarily platinum (Pt), palladium (Pd) and rhodium (Rd) from automobile catalytic converters, are being deposited in the environment. We investigated the neurotoxicity and the tolerance mechanism to PGMs in developing chick embryos. Chick embryos were injected on the 7th and 14th days of incubation with different concentrations of PGM solutions. Metallothionein (MT) induction as a heavy metal tolerance mechanism was examined by addition of exogenous zinc (Zn²⁺) combined with the highest Pt^(IV) exposure levels. SDS-PAGE assay and digital image system were used to identify MT in homogenized brain and liver tissues. Quantitative analysis revealed an increase of MT in the 5 ppm Pt exposure compared to control. The addition of exogenous Zn²⁺ increased MT production in the 10 ppm Pt concentration. Chemical analysis using ICP-

AES atomic absorption revealed PGM accumulation in chick embryo tissues proportional to exposure concentration. The presence of Pt^(IV) in brain tissue suggests that the undeveloped blood brain barrier is permeable to PGMs. This raises concerns regarding the effect these metals may have on neural injury.

RAPID RADIATION OF THE GENUS *SAINTPAULIA*

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The plant genus *Saintpaulia* (African violet) is endemic to a small area in northeastern Tanzania and Kenya and is composed of twenty species that are similar in morphology and are cross fertile. To construct a molecular phylogeny of the genus, exon 2 of the chalcone synthase (*CHS*) genes was PCR amplified from nineteen *Saintpaulia* species. A concatenated sequence of the two genes (*SaCHS A* and *SaCHS D*) in each species was used to construct a gene tree. The sequence analysis produces a complex of thirteen very closely related species confirming that the genus has undergone a recent radiation producing species that are difficult to distinguish phylogenetically. Although no obvious basal taxon can be identified, the data clearly show that the epicenter of the species is in the Usambara Mountains region.

CRYSTAL SYMMETRY OF BiCrO₃ USING SECOND HARMONIC GENERATION

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We have studied multiferroic properties of epitaxial thin films of BiCrO₃ on (100) and (111) and LAO₃ substrates. The magnetic transition occurs around 100 K and is antiferromagnetic although there appears to be a spin canting transition near 50 K. We used a pulsed laser to investigate second harmonic generation at room temperature and 80 K. The polarization dependence of the second harmonic signal indicates that the structural symmetry is very low (monoclinic or triclinic). While we did not observe any magnetic field dependence at low temperature below the magnetic transition, we did observe changes in the signal from that of room temperature, suggesting either structural changes with temperature or the effect of antiferromagnetism. These results are similar to the related multiferroic compound BiFeO₃.

THE IMPACT OF A GYPSY MOTH (*LYMANTRIA DISPAR*) OUTBREAK ON TREE SPECIES COMPOSITION IN A NORTHEASTERN HARDWOOD FOREST

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A gypsy moth outbreak in 2002 led to high mortality of oak trees in a mixed hardwood forest at the Ramapo Valley County Reservation, northeast New Jersey. The objective of this study was to determine the impact that the tree mortality had on: a) current forest tree species composition; b) projected future forest tree species composition. In 2005, eight 1-hectare plots along the mid-slope of one ridge were inventoried for all live trees ≥ 10 cm dbh, as well as all trees ≥ 10 cm dbh that had died since 2002. Tree species composition was compared between pre-outbreak and post-outbreak assemblages, and a projection model drew from the subcanopy tree flora to predict the species composition of the trees that will eventually replace the canopy trees that died.

Results revealed that all four of the oak species in the survey are in decline at the site. The density of sugar maple trees in the canopy will likely increase, and most other species are likely to benefit from the oak mortality, as well. Overall, gypsy moth outbreaks at the site appear to help accelerate the rate of forest succession toward a sugar maple-dominated forest, while also providing opportunities for some tree species to remain for longer than would otherwise be the case. Additional projections also indicate that white oak (*Quercus alba*) could be eradicated from the study area after two more gypsy moth outbreaks with similar scale of impact, while red oak (*Q. rubra*), black oak (*Q. velutina*) and chestnut oak (*Q. prinus*) could be eradicated by the end of this century.

MECHANICAL ASPECTS OF INITIAL CLOSURE OF VENUS FLYTRAPS (*DIONAEA MUSCIPULA*)

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Venus flytraps (*Dionaea muscipula*) possess leaves that close to engulf insects when appropriately stimulated. The purpose of our research was to document that a variety of initial closure responses occurred when a sufficient number (92) of flytraps were analyzed. We tested initial closure, the closure response in which the two

halves of the leaf move towards each other enough for the tynes to initially enclose an insect. About 58% of all traps exhibited a constant rate of initial closure, about 36% of all traps exhibited a variable rate of initial closure in which the rate changed during closure, and about 6% of all traps did not close after stimulation. Video recordings, physical characteristics of traps and calculated mechanical parameters were obtained. There were no morphological differences between constant traps and variable traps. However, constant traps closed faster (mean=1.94 s) than variable traps (mean=3.36 s) and constant traps had higher torque and power (1.69×10^{-5} Nm and 5.16×10^{-5} W) values than variable traps (3.09×10^{-6} Nm and 4.75×10^{-6} W). There was a strong correlation ($r^2= 0.67$) between the leaf trap angular velocity squared and the energy associated with the initial closure motion among all traps tested. This relationship would be expected since energy expended by the plant is converted into kinetic energy. Moreover, there appeared to be a positive relationship between torque and radius of gyration [k^2] with a correlation coefficient of 0.47. We attempted to model the morphology/geometry of flytraps that closed effectively. We attempted to identify a dynamic similitude parameter for the various traps that was based on the relationships associated with the strong correlations. As a result of this effort, a non dimensional number of the form $(k^2)^3 / bcA^2$ (k = radius of gyration during closure, b =width (height) of half leaf, c =thickness of half leaf and A = area of half leaf) was identified. A further analysis resulted in a geometric similitude number that was the ratio of the leaf aspect ratio to the thickness ratio and a chi-square test should this number to be a constant at the 99% confidence level.

EFFECTS OF RETINOL AND PHYTOL ON METAMORPHOSIS AND GENE EXPRESSION FOR ANTIOXIDANT ENZYMES IN LIMBS OF ANURAN TADPOLES.

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Retinol and its metabolites, (retinoic acids) have multiple effects on cell differentiation and morphogenesis and have severe developmental defects in animals and humans. We have previously shown that metabolites of retinol are teratogenic during limb development of tadpoles *Xenopus laevis*. Effects of retinoic acids are exerted through nuclear hormone receptors; the retinoic acid receptors (RARs) and retinoid X receptors (RXRs). In mice, teratogenic effects of retinol are reduced by phytol and its metabolite phytanic acid – an RXR selective ligand (Arnhold, et al., 2002). Effects of thyroid hormones (most crucial for anuran metamorphosis) are mediated by thyroid hormone receptors (TR) which heterodimerize with RXR (Shi, 1999).

It has been recently shown that retinol treatment induces oxidative stress during tail regeneration in tadpoles (Mahapatra et al., 2002). Oxidative stress can also stimulate alteration in gene expression (Schulze-Osthoff and Bauerle, 1998). The objectives of the present study were to investigate a) the effects of retinol, and phytol alone and in combination on metamorphosis of tadpoles *Xenopus laevis*, b) whether retinol mediated teratogenic effects in limbs involve alteration in gene expression of antioxidant enzymes, catalase and superoxide dismutase (SOD), and c) if phytol can reduce teratogenic effects induced by retinol as shown in mice.

Tadpoles treated with phytol alone showed an increased rate of growth, whereas retinol + phytol treated tadpoles reduced rate of growth and increased incidence of teratogenicity compared to all other groups. RT-PCR analysis showed that in retinol + phytol treated tadpoles, there was downregulation of SOD compared to control, indicating an increased oxidative stress. In conclusion, effects of retinol and phytol in combination seem different from what is reported for mammals and present results highlight phyla/species specific differences.

EXPOSURE OF *DUNALIELLA PRIMOLECTA* TO ARSENIC: EFFECTS ON GROWTH, CELL SIZE, AND CHLOROPHYLL CONTENT

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Heavy metals and metalloids, with high affinity towards sulphhydryl groups (SH), may have adverse effects on aquatic microorganisms. Microalgae belonging to the genus *Dunaliella*, however, are tolerant and even thrive in environments highly contaminated with heavy metals. In this study the effects of arsenic on the green alga, *Dunaliella primolecta*, were investigated. *D. primolecta*, (UTEX 1000), was obtained from the University of Texas Algae Collection and cultured in Erschreiber medium at 25°C with a 24 hour light cycle (12 h L: 12 h D). Two arsenate (AsV) dosing experiments were conducted to examine population growth, individual cell size, and cell chlorophyll content in this species. In the first experiment, cultures (initial inoculum of 455,000 cells/mL) were tested for 72 hours, replicated in triplet, and exposed to a concentration series of AsV in Erschreiber medium (0, 12.5, 25, 50, and 100 mg/L). In a second experiment, cultures (initial inoculum of 504,000 cells/mL) were tested for

96 hours, replicated in triplet, and exposed to a higher AsV concentration series (0, 150, 200, and 307 mg/L). There was no effect on growth with any of the concentrations used as evidenced by hemocytometer cell counts. Chlorophyll content was measured by spectrophotometry and cell size was determined using VI-CELL analyzer. There was no observable effect (NOEC) on these parameters at 307 mg/L, the highest concentration used in any exposure. This chlorophyte exhibits one of the highest levels of resistance recorded. High arsenate resistance makes *D. primolecia* a promising candidate for phytoremediation.

PRECLINICAL TOPICAL MICROBICIDE DEVELOPMENT: EVALUATION OF CYTOKINES AS BIOMARKERS FOR CYTOTOXICITY

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Human Immunodeficiency Virus Type 1 (HIV-1) is the virus responsible for causing Acquired Immunodeficiency Syndrome (AIDS). Among the 43 million persons infected worldwide, 75% are living in regions of the world where costly antiviral treatments are unavailable and/or unaffordable. Currently available therapies have many shortcomings since they do not prevent infection, are reliant on patient compliance, and have significant side effects. In the continuing pursuit to discover new and cost-effective HIV prevention methods, research has shifted towards HIV entry inhibitors, compounds that block HIV from entering the cell.

Topical microbicides are a new class of therapeutics. These agents possess the potential to be a stable, cost-effective preventative measure against HIV infection. To date, the ‘gold standard’ for evaluation of these compounds is the *in vivo* rabbit vaginal irritation model, which is both expensive and low-throughput. Therefore, alternative *in vitro* screening assays are needed in order to prioritize the development of candidate therapies. Due to the mechanism of action of this class of compound, it is imperative that they demonstrate minimal toxic or inflammatory responses in cervicovaginal tissues. This paper describes a series of *in vitro* studies conducted to identify potential surrogate markers that correlate with *in vitro* toxicity.

Utilizing a multiplexed assay platform, nine cytokine expression profiles were simultaneously characterized. This evaluation was performed in five cell lines following exposure to toxic and nontoxic concentrations of three different compounds that have been considered for clinical use. The results of the multiplex assay platform were confirmed by standard cytokine ELISA assays. To further characterize the cell specific pro-inflammatory response, microarray expression profiles were determined. A number of significant modifications of gene expression were observed. In this paper we will summarize the results of these studies and discuss the predictive value of these surrogate markers for the preclinical evaluation of topical microbicides.

“HOW MUCH FRUIT IS IN FROOT LOOPS?” EFFECTIVENESS OF A MEDIA LITERACY CURRICULUM IN IMPROVING CHILDREN'S NUTRITIONAL KNOWLEDGE

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Concerns about the nutritional messages displayed on TV are well-founded; prior content analyses have shown that foods advertised to children are often low in nutritional value and high in fat and sugar (Horgen, Choate & Brownell, 2001; Harrison, 2005). Misleading messages in commercials include showing a sugary cereal (e.g. Lucky Charms) as the central part of a “good breakfast” and implying that foods like Froot Loops, Fruit by the Foot, and Sunny Delight have a lot of fruit in them when they actually do not. Past studies have concluded that children below the age of 8 cannot understand selling intent, although they have not tested children who have been taught about TV commercials using media literacy techniques. The current study assesses the effectiveness of a media literacy curriculum designed to educate children about nutrition and about how to think critically about TV commercials. Through the curriculum “A Healthy Connection to Media Literacy,” children in grades kindergarten through third learn about the selling intent of commercials, the nutritional content of different foods, how to identify tricks used to sell products, and a better understanding of the food groups. To analyze the effectiveness of this curriculum assesses of non-verbal measures were used in individual interviews with children in kindergarten through third grades at a local elementary school. Children were interviewed either before or after being taught the media literacy lessons by their regular classroom teachers. Findings comparing trained and untrained children will be reported, as well as developmental differences in children’s understanding of nutrition and selling intent.

INVESTIGATING SCALING IN BROWNIAN MOTION

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Upon revisiting Jean Perrin's 1909 experiment on Albert Einstein's theory of Brownian motion, we investigated whether it only holds true for Perrin's thirty-second intervals, or for any scale of time. Various applications of this experiment will also be discussed.

EFFECT OF SIZE AND APPARENT SIZE ON PERCEPTION OF DETAIL.

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The effect of image size and apparent size on the perception of detail in an image was studied. In experiment 1, participants were timed as they searched for letter Ys among Vs in two consecutive circles, one of which was magnified to increase its size. Experiment 2 sought to discover if similar search time differences occurred if the circles only differed in apparent size but not actual size. Experiment 2 therefore used the same procedure as experiment 1 but with 2 same-sized circles differing in apparent size due to the Ebbinghaus illusion.

THE ROLE OF E-CADHERIN IN PARIETAL ENDODERM MIGRATION

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The Aim of this work is to understand the role of cadherins in Parietal Endoderm migration. To address this question we are using the F9 teratocarcinoma cell line as a model system. Evidence, from live cell imaging, shows that as parietal endoderm migrate away from the embryoid body, cells display a pattern of altering cell-cell adhesions. Initially the cells begin as a sheet and ultimately become single cells as they migrate out towards the periphery. We propose a role for E-cadherin in this process. Towards this aim we have examined the protein expression and localization of E-cadherin in F9 derived parietal endoderm cells. Here we show evidence that suggests E-cadherin is playing a role in the migration of parietal endoderm.

THE ROLE OF SPEAKERS' GESTURES IN SUPPORTING EARLY WORD ACQUISITION

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Eye movements provide a view into the non-verbal infant's mind. To examine the effect of speakers' gestures on attention in infants 10-14 months of age, we measured visual fixations and heart rate. Visual fixations were measured using Eyetracker and Gazetracker hardware and software, while heart rate was measured using a Biopac system. All infants viewed two short video segments during the learning phase of the study and during the comprehension phase. During the learning phase a speaker presented two novel objects with corresponding nonce words either moving the object as she spoke (dynamic gesture condition) or holding the object still as she spoke (static gesture condition). We hypothesized that infants would attend more to the object and show greater heart rate deceleration in the dynamic gesture condition. We found that infants had longer total fixations to the object in the dynamic condition and were more likely to look at the object as it was being named in this condition. Infant heart rate did not differ across the two conditions. In the comprehension phase of the study, the speaker asked the infant to look at one of two objects using the nonce words from the learning phase. We predicted that infants would show more correct looks if the word had been taught during the learning phase using a dynamic gesture. However, there was no difference in correct looks between the two conditions. In summary, we found that the dynamic gesture resulted in looking more at the object overall and in looking at the object more while it was being named; however, this difference did not result in better word learning.

FUTURISTIC DISEASE: THE EFFECT OF ATMOSPHERIC CHANGE ON FOLIAR SOYBEAN PATHOSYSTEMS.

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Since the inception of the industrial revolution, anthropomorphic emissions have been altering the atmosphere's composition. Due primarily to the combustion of fossil fuels, atmospheric concentrations of carbon dioxide (CO₂) and ozone (O₃) are on the rise. Previous studies of soybeans indicate that elevated atmospheric CO₂

increases growth, yield, and photosynthetic activity, while elevated tropospheric O₃ negatively affects these same parameters. Past research has focused on climate change effects on the plant system itself and has failed to look into plant – pathogen interactions. At the SOYFACE field site located in Urbana, IL we examined the effect of four atmospheric treatments (ambient, elevated CO₂ (550ppm), elevated O₃ (2x ambient), and an elevated CO₂ and O₃ combination) on foliar soybean disease abundance and severity. Subsequently, these disease parameters were related to changes seen in the soybean plant chemistry, physiology, and structure. Despite the severe drought in 2005, there was a significant outbreak of Brown spot throughout SOYFACE with as much as 73% severity on some of the leaves and 77% abundance in some of the rings. While there was no significant difference between the four treatments regarding severity and abundance averaged across rings, the number of lesions per leaf varied within each treatment and correlated to the lesion size. Smaller lesions found under ambient and elevated O₃ treatments were more frequent, whereas fewer larger lesions were seen in the elevated CO₂ and combination treatments. Disease susceptibility at the leaf level may become more important in years with normal levels of precipitation.

LOWERING ENDOGENOUS MELATONIN IN *RANA CATESBEIANA* TADPOLES ACCELERATES METAMORPHOSIS

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Melatonin is a hormone synthesized by the retina of the eye, mucosa of the gut, and the pinealocytes in the pineal gland of the brain. Experiments previously completed in our laboratory involving separate enucleation and pinealectomy operations have shown a decrease of circulating melatonin levels in tadpoles indicating that both of these organs contribute melatonin to the plasma. In this experiment, both eye and pineal removal were done in order to further reduce endogenous melatonin. Lowering melatonin in the tadpole might enable us to determine if this hormone has a role in the hormonal control of metamorphosis. Tadpoles deprived of their eyes and pineal gland for 26 days showed a substantial reduction in circulating plasma melatonin levels. Moreover, the metamorphic rate of tadpoles in the experimental group was significantly accelerated over that of the control group after 14 days. These findings confirm that both the eyes and the pineal gland contribute to plasma melatonin in *Rana catesbeiana* tadpoles, and indicate that endogenous melatonin retards metamorphosis, possibly through inhibition of the thyroid gland. Funded by NSF grant IBN0236251

INFANT PREFERENCES FOR NOVEL AND FAMILIAR TOYS: CREATING FAMILIARITY USING STICKY MITTENS

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The purpose of this study was to examine infant looking using a serial paired comparison task. Infants viewed two different stimuli simultaneously. Objects appeared in two different locations during the perception task. A novel stimulus was presented in one location and a familiar object in the other. To create familiar objects, some infants had prior exposure to the stimulus. Four groups of infants were tested. One group of infants watched an adult manipulate an object; this object was presented as the familiar toy during the perception task. A second group actually manipulated the toy themselves using sticky (Velcro) mittens. Each of these groups had a control condition in which the infants saw a random toy that did not appear in the video. Both 14- and 20-week-old infants were tested in each condition. First it was hypothesized that infants, as a group will look longer and more frequently at novel stimuli producing an overall preference for novelty. Second, it was hypothesized that this effect will be greater for infants in the sticky mitten group because they will be attending to object location. In addition to better novelty scores, it was predicted infants in the sticky mitten group would have more rapid shift rates than infants in the control group.

INTERACTIONS BETWEEN ESSENTIAL MINERAL NUTRIENTS WITH PLATINUM GROUP METALS IN AQUATIC AND TERRESTRIAL PLANTS

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Platinum Group Metals (in particular, platinum, rhodium and palladium) are increasingly present in roadside soils and river sediments due to their use in automobile catalytic converters. In this study, the impact of PGMs on the uptake and use of essential mineral nutrients was examined in two plant models: the submerged

aquatic plant, *Elodea canadensis*, and the emergent plant, *Peltandra virginica*. The plants were grown for two weeks in nutrient solutions with either platinum, at concentrations ranging from 0.05 - 5 mg/L or 0.1 mg/L of a PGM mix. Some treatments received additional Ca^{2+} or Zn^{2+} . Several metal treatments also received 5 mg/L humic acid to study how this ubiquitous chelator affects the uptake of heavy metals. Analyses of metal concentrations were conducted using a GFAAS or ICP. Growth response was assessed through total chlorophyll content of new shoots, extracted in dimethylformamide and analyzed using a UV/VIS spectrophotometer. There was a significant accumulation of platinum in plant tissues, ranging from 55 to 326 times the concentration in the nutrient solution. The presence of humic acid had no significant effect on platinum accumulation at pH 5 to 7, however accumulation at pH 8 was well over twice that experienced by the plants grown in the same concentration of platinum without humic acid. Increasing accumulation with increasing pH was also observed in copper, although the increase in copper levels in plant tissue increased in a linear fashion as pH rose from 5 to 8. There was no significant difference in tissue concentrations of calcium, copper or iron with any of the treatments applied. There was also no significant difference in chlorophyll levels in new shoots of *E. canadensis*, however, the older leaves of the 5 ppm Pt treatment were severely chlorotic, suggesting that platinum does break down chlorophyll, but does not interfere with its synthesis. The overall toxicity of low levels of PGMs to plants is minimal. However, the plants' tendency to accumulate high levels of these metals in their tissues raises the concern that these metals will be introduced to the food chain at levels toxic to humans and other animals. In order to assess the actual accumulation of these metals in plants growing along roadsides, samples of *Daucus carota* were collected from four sites along the side of a busy road in Dutchess County, New York and analyzed for PGM content. Samples from all four sites did contain both platinum and rhodium, with an average tissue concentration of 14.6 $\mu\text{g/g}$ and 0.752 $\mu\text{g/g}$, respectively. Palladium occurred in the tissues of only two plants (average of 5.1 $\mu\text{g/g}$) both of which were collected from the same site.

AKT1 SUPPRESSES RADIATION- INDUCED GERM CELL APOPTOSIS IN VIVO

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Germ cell death occurs in the mammalian testis both spontaneously and following toxicant-induced injury. Akt1 plays a central role in propagating pro-survival signals that confer resistance to various cytotoxic insults including DNA damage, cell cycle perturbation, growth factor withdrawal, and loss of cell adhesion. However, the *in vivo* significance of this pathway has not been well explored in the testis. We hypothesized that mice deficient in Akt1 exhibit greater sensitivity to germ cell death in response to radiation. To this end, we exposed Akt1 (+/+), Akt1 (+/-), and Akt1 (-/-) C57BL6 mice to 5 Gy of gamma radiation and obtained testis samples at 1 hr., 3 hr., 6hr., 12 hr., and 24 hr. post irradiation. Loss of Akt1 function resulted in the early onset of ionizing radiation-induced germ cell apoptosis. This was manifested as a 2-fold increase in the number of seminiferous tubules with >3 apoptotic nuclei at 6 hours in Akt1 deficient mice (p=0.027) relative to Akt1 wild type and Akt1 heterozygous mice at the same time point. Akt1 (-/-) mice also exhibited an overall greater rate of apoptosis at all time points. To address this enhanced sensitivity, we examined phosphorylated p53 which is known to be activated upon radiation. We observed that p53 exhibited a more prolonged period of activation in Akt1 (-/-) mice as compared to Akt1 (+/+) mice in response to irradiation treatment. Taken together, our data indicate that loss of Akt1 leads to enhanced sensitivity to germ cell injury *in vivo* and provide a potential link between p53-mediated apoptosis and the PI3K-PKB/AKT signaling pathway.

NANOTECHNOLOGY: THE ORGANIC SYNTHESIS OF CYCLACENES AND INTRODUCING NANOTECHNOLOGY TO THE PUBLIC

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Scientists are always studying ways to invent new materials that will be beneficial to society. One way in particular is through nanotechnology, which involves many areas of research dealing with and manipulating objects that are measured in nanometers. One major material in the field is the carbon nanotube, a long, cylinder shaped structure that is considered one of the allotropes of carbon. The objective of this research was to design and apply a synthesis for a cyclacene, a compound that consists of a single ring of an armchair carbon nanotube, to further the benefits of nanotechnology to humanity. The synthesis requires several reactions, where two reactions were completed. The first reaction synthesized 1,2-phenylenebis(2-ethynylbenzyl alcohol) from a palladium-catalyzed cross coupling reaction of ethynylbenzyl alcohol with o-diiodobenzene in triethylamine. The second reduction

reaction synthesized 1,2-phenylenebis(2-Z-ethenylbenzyl alcohol) from the 1,2-phenylenebis(2-ethynylbenzyl alcohol) using Lindlar's catalyst. These reactions were the initial steps toward synthesizing cyclacenes, where their applications will benefit the public.

Essentially, this, as well as other research, explores the many applications that nanotechnology has to offer in everyday life. In order to educate the public at an early age, a workbook was developed to introduce nanotechnology to elementary students grades six through eight. Tabletop demonstrations were performed at Liberty Science Center to illustrate how useful and versatile this technology has become. Assessment forms were filled out by participants, which include children able to write as well as adult participants. The feedback received and analyzed was overall positive and therefore, led to a teacher workshop. The workshop allowed educators to learn how to use the workbook in classrooms and to utilize the tabletop demonstrations as their own classroom activities. The comments and continued support and interest from Liberty Science Center and educators from New Jersey schools has allowed further research to be performed in this growing area of science.

SYNCHRONIZED BEHAVIOR AND THE ROLE OF THE COMMUNICATION NETWORK

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How does the connectivity and structure of a network affect its ability to exhibit global synchronization? This is the central question we aim to study experimentally using an electronic network relaying the responses of eight human participants. Each participant has a circuit board with one push button and eight LEDs (lights) in front of them. Seven of these LEDs are activated by the other participants' buttons while the eighth LED (of a different color) indicates the participant's own response. We ask the participants to synchronize their own LED to the other seven.

The connectivity and structure of the network is controllable via dip-switch settings which turn on and off individual routes of communication. We test the participants' ability to synchronize their responses depending on how connected the system is. One prediction is that as connections are lost and participants see less of the system, synchronization may persist (though harder to achieve) up to a critical point, beyond which the no level of global synchronization can be established.

We study the dependence of synchronization not only on the number of connections, but also on their arrangement, i.e., on the network structure. We test a theoretical result from the Kuramoto model precluding the emergence of global synchronization in a one-dimensional lattice network.

AGE-RELATED DIFFERENCES IN FACIAL RECOGNITION AND CONFIDENCE RATINGS

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This study examined the differences in facial recognition between age groups (young adults, middle-aged adults, and older adults) using a signal detection paradigm. The hypotheses contended that young participants would have higher hits than other age groups, older participants would have higher false alarms than other age groups, all groups would be most accurate in identifying faces within their corresponding age group, and high confidence ratings would be present with false alarms of faces in other age groups. Participants viewed 30 faces on PowerPoint. Then, they attempted to detect the faces when intermixed with 30 distracter faces. They also rated their confidence in their decisions. The results were evaluated in relation to the hypotheses.

EFFECTS OF LIFEGUARD SCANNING TECHNIQUES ON IDENTIFYING STIMULI

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Lifeguards need to be able to scan large groups of people and detect potential problems. In the present study, certified lifeguards were shown a training video purporting to enhance scanning and detection ability, while another group of certified lifeguards and a group of non-lifeguards were shown an unrelated surfing video. Participants in the three groups then completed the Davis Visual Scan Test and a task involving the identification of a specific size and shape from among a large number of differently sized and shaped stimuli. The performance of certified lifeguards who viewed the training tape was compared to the performance of the two groups that did not view the training tape.

THE IMPACT OF GENDER ON CRIME AND VIOLENCE IN OUR NATIONS SCHOOLS

ELEVATED ATMOSPHERIC CO₂ ALTERS TROPHIC INTERACTIONS AMONG WEB-BUILDING SPIDERS,
INSECTS AND PLANTS: A STABLE ISOTOPE ANALYSIS

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Anthropogenic increases in atmospheric CO₂ concentration have the potential to alter the chemical composition of plant tissue, and thereby affect the amount consumed by herbivorous arthropods. Many studies have predicted that future leaf tissue losses to herbivory will increase as insects eat more to compensate for reduced nutritional value. However, field studies at the Duke University Free Air CO₂ Enrichment Facility (FACE) have shown a decrease in herbivory under elevated CO₂. To determine whether this decrease is the result of altered insect populations within the FACE plots, we took advantage of the depleted ¹³C composition in the fumigation gas. Stationary predators inside the elevated CO₂ plots (web-building spiders) were expected show different d¹³C and d¹⁵N signatures if their prey were feeding primarily inside or outside the plots. We sampled spider and leaf tissue from understory trees along transects from the center of each elevated CO₂ plot to a distance two radii from the edge of the plots. Leaf tissue within the FACE plots showed more depleted d¹³C compared to foliage outside the ring with a clear boundary at the edge of the plot. Spider tissue showed a similar trend in d¹³C with greater variability inside the rings compared to outside. d¹⁵N was higher inside the plots (8.7 ‰ ± 0.5) compared to outside (4.2 ‰ ± 0.2) indicating that spiders were feeding on an increased proportion of higher trophic level prey. These results suggest a lower density of herbivores inside the elevated CO₂ plots, consistent with reduced levels of herbivory.

WHO GIVES A CRAB: A POPULATION STUDY OF THE NORTH AMERICAN HORSESHOE CRAB,
LIMULUS POLYPHEMUS, IN LONG ISLAND SOUND.

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An ongoing population study of the North American Horseshoe Crab, *Limulus polyphemus*, has been conducted during the 2003 – 2005 breeding seasons at Milford Point, in Milford CT. Spawning behavior peaked at the full and new moons during the strongest high tides. The sex ration was skewed towards males, and the tagging study showed that males returned to the beaches during the spawning season more often than females. Most of the individuals stayed close to their spawning beaches and were recaptured near or at these locations. Observed mating behavior was predominately in pairs differing from the clustered behaviors observed in other areas.

CHARACTERIZATION OF POLYDIMETHYLSILOXANE TUBING AS AN EXTRACTANT FOR JUGLONE

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Study of the potential phytotoxic (allelopathic) effects of chemicals released by plants into the soil has been severely limited by a lack of methods that allow the monitoring of the chemical dynamics of the soil. Polydimethylsiloxane (PDMS) materials have been proposed for use as a possible soil analysis tool which would function to sorb compounds as they are released, and thus provide an indication of the flux rates of compounds rather than single point of time concentrations. The objective of this study was to characterize PDMS tubing as a sorbent for juglone, a toxic naphthoquinone released by the roots of black walnut trees, prior to its use for field studies of juglone dynamics in soil. Sorption of juglone from aqueous 40 mg/L solutions increased linearly with increasing exposure time, from 29 µg with 10 minutes exposure up to 96 µg after 60 minutes exposure. This trend was also seen at lower concentrations. Maximum recovery of juglone from the tubing was obtained using sonication with 1:1 acetonitrile: 0.1 M acetic acid for 10 minutes. The amount of juglone recovered from PDMS tubing was linear for a range of aqueous juglone solutions from 2 - 40 mg/L. Testing is in progress to determine the stability of juglone on PDMS tubing over time under various conditions. Initial results indicate that juglone disappears within days from tubing maintained in aqueous solutions, open air, and in moist soil. Tubing samples stored in freezers appear to retain juglone more effectively over a longer period of time. PDMS rods, which have a higher volume to surface area ratio than PDMS tubing, may prove more effective in trapping and retaining this highly reactive and slightly water-soluble compound.

RE-ENTRANT GLASS TRANSITION IN A COLLOID-POLYMER MIXTURE

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Glass is one of the most commonly used products, yet we still do not fully understand its nature. For example, is glass a slowly flowing liquid or is it a solid? The molecular structure of glass is not organized like a solid, but completely disordered like a liquid. It is generally expected that a solid forms in crystalline arrays, but glass does not follow this convention. Also, the transition from a liquid to a glass is gradual unlike the sharp change from liquid to solid (ex.: water into ice). Glass and the glass transition have been studied through multiple techniques such as light scattering and dielectric spectroscopy.

We use a model system of colloidal suspensions to study the glass transition. Colloidal suspension is a system containing small particles (micrometer scale) dispersed in a liquid. Blood, black ink, and paint are examples of colloidal suspensions. We use a colloidal system of poly-(methyl- metacrylate) (PMMA) particles (1.5 - 2 μm in diameter) suspended in a mixture of decalin and cyclohexylbromide. These colloidal particles can be viewed as hard spheres. They behave like very small pool balls – they repel when in contact and do not have any attractive forces. Since these particles are larger than molecules in a molecular glass we can use microscopy to observe their motion. In molecular glass, the glass transition is induced by lowering the temperature. In a hard-sphere glass model system the glass transition is induced by increasing the volume fraction (we increase the number of colloidal particles in a fixed volume).

Once a certain volume fraction is reached ($\phi_g \approx 0.58$) a hard-sphere glass is formed. The formation of the glass phase is attributed to the caging effect. Namely, when the particles get too tightly packed they create a cage around each other and a particle cannot move unless some other particle around it moves first. Interestingly, although the particles in a glass are tightly packed, there is still space for the particles to move ($\phi_{max} \approx 0.64$).

By adding small particles to the system^(a) (smaller than the colloidal particles) we induce an attraction between the colloidal particles. Therefore, the colloidal particles move closer together and the colloidal particles have more space to move around. The system changes from a hard-sphere glass back to a liquid! Adding still more small particles decreases this free space and the particles have less space to diffuse. This results in the system transitioning back to a glass - an attractive glass rather than a hard-sphere glass. Adding attraction to hard spheres may be thought as bringing colloidal systems one step closer to the molecular glasses. Our work focuses on this transition, the re-entry glass transition.

ACTIVATION OF IL-1 RECEPTORS IS NOT REQUIRED FOR THE SUPPRESSION OF FOOD INTAKE DURING THE OVARIAN CYCLE.

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Previous findings indicate that behavioral and physiological effects of IL-1 are sexually dimorphic, with females showing greater responsiveness than males. One potential cause of this sex difference may stem from neuroendocrine, rather than the classic immune, functions of IL-1, as IL-1 plays a role in the processes that regulate follicular development. The fact that IL-1 has neuroendocrine functions in females may explain why responsiveness to IL-1 is modulated by estrogen. Although IL-1 has a physiological effect in females, it is not known if changes in endogenous IL-1 also produce behavioral effects. This experiment was conducted to determine whether endogenous IL-1 is involved in the changes in food intake and meal patterns that occur during the estrous cycle. Ten female rats were given ip injections of the IL-1 receptor antagonist (IL-1ra) or saline one hour before dark onset during diestrus and estrus stages of the ovarian cycle. Food intake and meal patterns were recorded during the subsequent nocturnal period. As expected, food intake was reduced during estrus, and this effect of cycle stage on feeding occurred via a decrease in meal size and an increase in meal number. However, IL-1ra treatment did not increase food intake during estrus and had no significant effects on meal size or meal number. These findings do not support a role of endogenous IL-1 in the changes in food intake and meal patterns that occur during the rat estrous cycle.

ZCL2884X, IS A NEW GFP-TAGGED PROTEIN TRAP UNCOVERING THE *IMP* (IGF-II MRNA BINDING PROTEIN) GENE.

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The post-meiotic morphogenesis of spermatids results in the production of sixty four ~2mm long spermatozoa from an individual founder cell, or gonialblast. However, despite the renewed interest in the later stages of spermatid maturation, little is known about the elongation of spermatids to such an extraordinary length. In screening a collection of P-element GFP-tagged protein traps, an X-chromosomal insertion (ZCL2884X) was uncovered that exhibited GFP expression toward the tail-ends of elongating spermatids, suggesting that this protein trap may represent a gene involved in spermatid elongation. Interestingly, an identical expression pattern has previously been reported by our lab for the *Imp* gene, which is also located on the X-chromosome. To determine if this second insertion represented a new gene involved in spermatid elongation, or a new allele of *Imp*, total genomic DNA was isolated from these flies and digested with restriction enzymes. After ligation, inverse PCR of neighboring genetic units followed by cycle sequencing and BLAST analysis revealed that ZCL2884X represented a second insertion within *Imp*. Since there are only two populations of cells (the germline and the somatic cyst cells) in the testis, immunolocalization analysis was conducted to precisely ascertain the localization of *Imp*. Immunofluorescence against a marker of cyst cell nuclei indicates that *Imp* is not localized to the cyst cells, suggesting that *Imp* is expressed in the germline. Interestingly, since *Imp* protein has been previously shown to bind and localize α -actin mRNA to the leading edge of filopodia in migrating cells, the localization of *Imp* to the elongating end of the spermatid cyst suggests that the extension of filopodia and the elongation of the cyst may proceed by a similar mechanism.

COHORT DEVELOPMENT OF *LEPTOCHEIRUS PLUMULOSUS* UNDER CHRONIC ARSENATE STRESS

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In a chronic 28-d exposure to sublethal arsenate As (V), the cohort maturation of the amphipod *Leptocheirus plumulosus* was analyzed. Arsenate was added to natural sediments (particle sizes <250 μ m), aiming to achieve a pore water concentration of approximately 500 μ g/L (approximately one-fifth of the LC₅₀ value determined from 96-h acute water-only toxicity testing). Experimental chambers of 1 L (900mL 20 psu seawater and 100mL sediment) were assigned to the two treatments of As(V) (presence/absence). The stability of As(V) in the sediment over the 28d exposure had been verified in previous research. Batch renewal and feeding (Tetramin® milled to 250 μ m) were performed following EPA Chronic Toxicity Methods (3x per week). Chambers were held between 20-25 °C and under constant illumination. A total of 16 experimental jars were utilized, 8 replicate chambers per concentration, which were each stocked with 12 amphipods. The individuals used were staged-sorted juveniles (average width between 500 and 600 μ m). Two replicates of each treatment were destructively sampled each week. Individuals were recovered on a standard sieve series. We hypothesized that the size frequency shift would be delayed and survivorship adversely affected by the presence of As(V). Weekly changes in cohort structure were assessed by length (individual width and length) frequency analysis. Recovery rate exceeded 75% of deployed individuals. Within 14d, individuals were regularly retained on the 1000 μ m mesh (in both arsenate treatments) indicating a biomass increase of about 8x. The presence of arsenate had no effect on amphipod growth and/or shift in the cohort size frequency at 500 μ g/L. By 28d in both treatments, *Leptocheirus* recruits (30-40 per replicate) were retained on small meshes (<600 μ m). Because these small sizes had not been observed during the previous two weeks, reproduction of initial cohort was likely. Overall, reproductive rates in the presence of As(V) were not lower than controls. The full impact of As(V) exposure on life history parameters has not been adequately investigated. Cohort analysis of amphipod populations under chronic exposure higher than 500 μ g/L of arsenate may provide valuable insights in toxicity modeling.

APOSEMATIC COLORATION IN SNAKES AND ITS EFFECT ON HUMANS

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The purpose of this experiment was to study the effects of aposematism on humans. Participants were asked to determine whether they thought snakes shown in pictures were venomous or nonvenomous based on the snakes' colors. The results showed that the participants were not more likely to guess that brightly colored snakes were venomous compared to darkly colored snakes. However, participants were better able to accurately differentiate between venomous and nonvenomous snakes when the snakes were brightly colored. The improved ability disappeared when color was removed from the pictures.

HABITUAL CRUELTY BECOME THE PRECURSOR TO HUMAN VIOLENCE?

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Abstract Withdrawn

Behavioral and cognitive factors have been investigated including examples of social learning in childhood can be crucial in aiding researchers, social scientists, and educators to develop strategies which may prevent potential later life effects. Such later life effects of childhood cruelty may result in violence against humans.

SPATIAL CHARACTERISTICS OF PERENNIAL VEGETATION OF TUCSON MOUNTAIN PARK OF THE ARIZONA UPLAND PROVINCE OF THE SONORAN DESERT

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The purpose of this study was to understand the spatial characteristics of perennial vegetation within and among 28 desert (10.9 ares per plot) plots (over a distance of about 10 km) in Tucson Mountain Park (a preserve of the Pima County Parks Department), Arizona, located within the Arizona Upland region of the Sonoran Desert. For the 1999 perennial plants in the 28 plots (14 pair of contiguous plots) the average plant population density was 0.075 plants m⁻², or one plant per 13.3 m². Taken together almost 50% of all plants in the plots were *Opuntia phaeacantha* var. *discata* and *Cylindropuntia acanthacarpa* var. *major*. Large plants such as *Cercidium microphyllum*, *Prosopis velutina*, and *Carnegiea gigantea* comprised only 9.0, 10.1 and 6.0% of all plants, respectively. Plants of *O. phaeacantha* and *C. acanthacarpa* occurred in all plots while plants of *Cylindropuntia fulgida* var. *fulgida*, *Cylindropuntia leptocaulis*, *Cylindropuntia versicolor*, *Simmondsia chinensis*, and *Cylindropuntia bigelovii* var. *fulgida*, were found in less than half of all plots. The vegetation showed a strong tendency toward aggregation. Simpson's index values ranged from 0.01 to 0.21 while Shannon's indices of plots ranged from 0.04 to 0.51. Association analysis indicated that (1) *C. gigantea* was positively associated with *C. microphyllum* and (2) *C. bigelovii* was positively associated with conspecifics. In contrast, (1) *P. velutina* and *C. acanthacarpa* were negatively associated with *Larrea tridentata* var. *tridentata*, (2) *Ferocactus wislizeni* and *O. phaeacantha* were negatively associated with *C. fulgida*, (3) *C. leptocaulis* was negatively associated with *C. microphyllum* and *C. fulgida*, and (4) *S. chinensis*, and *O. phaeacantha* were negatively associated with *C. leptocaulis*. A vegetation cover computer program was used to understand vegetation dynamics for the plots. Data of this study show that nine of the 14 contiguous plots showed statistically significant differences in vegetation cover between contiguous plots. In five of the 14 contiguous plots, vegetation coverage was nearly twice in one plot compared with its contiguous neighbor. Data show statistical differences in the amount of vegetation cover among the plant species in the plots. Overall, there were very marked differences in the amount of vegetation coverage among the plant species found in the plots. Data of vegetation coverage coincide well with traditional ecological procedures.

STRAIN SPECIFICITY AND A POSSIBLE TARGET OF ALCOHOL ACTIONS IN AN ANIMAL MODEL OF
EARLY ONSET ALCOHOL DEPENDENCY.

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The frequency with which human alcohol consumption begins during and before adolescence has prompted increased interest in animal models for assessing the effects of acute and chronic alcohol consumption on the immature brain. Alcohol dependency can be assessed in animal models by the appearance of physical withdrawal symptoms when alcohol consumption is terminated abruptly. Previous work from this lab established that juvenile rats of the Long-Evans (LE) strain developed rapid (within 1-2 weeks) and severe (high frequency of withdrawal seizures) alcohol dependency that was not seen in the adults.

The present study began with a side-by-side comparison of three different rat strains given unrestricted access to an ethanol-containing liquid diet. Alcohol consumption began during the early adolescent period (P25-30). LE rats had significantly higher seizure frequency (71%) than juvenile Wistar (50%) or Sprague-Dawley (29%) rats. There were no significant differences between the three strains in the amount of alcohol they consumed (18-19g/kg day). Levels of alcohol dehydrogenase and aldehyde dehydrogenase, measured in subcellular fractions from livers of naïve rats, were also comparable between strains. Thus, underlying differences in brain systems, rather than differences in consumption or alcohol metabolism, may explain the susceptibility of juvenile LE rats to alcohol dependency. Such differences may be manifested in other behaviors, especially those related to anxiety. Anxiety in a novel environment (% time in an enclosed box within a lit activity chamber) was higher for LE rats (85%) than either W (67%) or SD (70%) rats. To test the responsiveness of the GABAergic system (activity of γ -aminobutyric acid, GABA), anxiety was measured after injection with 1-3 mg/kg diazepam. Corresponding differences in baseline anxiety, responsiveness to diazepam, and severity of alcohol withdrawal would be consistent with an underlying deficiency in GABA activity.

LIGHT-DEPENDENT LEUCINE INCORPORATION AND ABUNDANCE OF POTENTIAL
PHOTOHETEROTROPHS ACROSS THE ATLANTIC OCEAN

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The recent discovery of potential photoheterotrophic bacteria raises questions about their impact on carbon and energy fluxes in the oceans. We examined the contribution of photoheterotrophic microbes to carbon cycling by following light-dependent leucine incorporation on a transect from Fort Pierce, Florida to the Azores in May-June 2005. Rates of leucine incorporation were up to 46% higher in the light than in dark-incubated samples. A similar pattern of increased uptake in light versus dark incubations was seen in the North Atlantic spring bloom north of the Azores to Iceland. In these waters, rates of bacterial biomass production in the light were 3% to 60% higher than in the dark throughout the water column. To further characterize this light effect, we examined the abundance of potential photoheterotrophic organisms during the bloom using flow cytometry and epifluorescence microscopy. Cyanobacteria and picoeukaryotes were abundant in sub-surface waters where light-dependent leucine incorporation was observed. Picoeukaryotes ranged from 1% to 6% of total cells in the transect stations, while *Prochlorococcus* accounted for up to 14% of total cells throughout the transit south of the Azores. Aerobic anoxygenic phototrophic bacteria were not abundant at any location in this study (< 2% of total bacterial cells). The influence of leucine uptake by cyanobacteria and picoplankton on estimates of bacterial production will be discussed.

A MORPHOLOGICAL EXAMINATION OF REGENERATION IN THE AQUATIC OLIGOCHAETE,
LUMBRICULUS VARIEGATUS

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The California blackworm (*Lumbriculus variegatus*) displays the remarkable ability to regenerate both anterior and posterior ends from as few as 3 midbody segments. Although blackworms can reproduce sexually, they more typically undergo a process of fragmentation that involves breaking into two pieces, each of which then regenerates into a complete worm. We are interested in the cellular and morphological changes that accompany these regenerative processes. Our approach has been to cut adult worms into small pieces (3-5 segments) and fix

regenerating fragments at specific time points following the dissection (e.g., 20 min, 1 h, 4 h, 1 day, 4 days, etc).
Histological and SEM (scanning electron microscopy) analyses have been employed to monitor to process of regeneration at cellular and anatomical levels, respectively.

DIRECTIONAL BIAS IN PLANARIA (*DUGESIA TIGRINA*) BEFORE AND AFTER REGENERATION

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Planaria (*Dugesia tigrina*) are freshwater flatworms with the ability to regenerate lost body parts. Preliminary works on directional choices of planaria in Y- and T-mazes have suggested that a majority in a planaria population favor turning in one direction. Bianki *et al.* (1990, *Zh Vyssh Nerv Deiat Im I P Pavlova*, **40**:102-107) noted that 1/3 to 1/2 of tested planaria had a directional preference, while a search of other works has found no mention of a bias. To confirm whether or not planaria have a directional bias, flatworms were placed in Y-mazes and their left or right travel recorded. A trial for a planaria was 10 consecutive runs each day, over 3 successive days, after which half were cut transversely and allowed to completely regenerate. Both uncut and regenerated segments were retested for directional bias. Results suggest that the test period and number of trials can influence the perception of whether planaria have a directional bias, bringing into question some of the results of previous studies using directional mazes. Regenerated segments of planaria show similar findings. In addition, the majority in a planaria population are non-bias (no directional preference) both before and after regeneration.

ROLE OF THE COX ENZYME SYSTEM IN THE ANORECTIC ACTION OF INTERLEUKIN-1 BETA IN FEMALE RATS

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Administration of lipopolysaccharide (LPS) induces an acute phase response (APR), which induces anorexia, fever, and many other physiological defense mechanisms. These components of the APR are mediated by the release of proinflammatory cytokines (e.g., IL-1) following LPS exposure. Among the mechanisms by which IL-1 acts to produce fever and decrease food intake is through the production of prostaglandins (PGE₁, PGE₂) via activation of the cyclooxygenase (COX) enzyme system. Past studies have demonstrated a sex difference in the febrile and anorectic response to LPS and IL-1, which reflects an increased immune response in female rats. The COX enzyme system (COX-1 and COX-2 isoforms) has been shown to play an important role in the response of males to LPS and IL-1, but no studies have examined the role of prostaglandins in the anorectic action of IL-1 in females. In this study, the effects of piroxicam (COX-1 inhibitor) and NS-398 (COX-2 inhibitor) on IL-1-induced anorexia were examined in estrogen-treated and untreated females, although there was a tendency for this effect to be less pronounced in the estrogen group. These findings indicate that the anorectic effect of IL-1 in females is dependent on the COX enzyme and identify prostaglandins as a potential mediator of this response.

INFANT LOOKING BEHAVIOR IN SYNCHRONOUS VS. ASYNCHRONOUS BIMODAL OBJECT-SOUND

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This study was designed to determine the importance of bimodal (auditory and visual) synchrony in capturing the visual attention of a preverbal infant. Infants from seven to nine months are being tested to ascertain their preference in looking between a bimodal synchronous and bimodal asynchronous, digitally created, video segment. For the purposes of this study bimodal gestures are synchronous if the presentation (motion) of the object coincides with the sound (name) of the object, and asynchronous if the two do not occur in tandem. A plasma screen displays the synchronous and asynchronous video segments juxtaposed, while total fixation time of the infant's looking is recorded using Eye Tracker and Gaze Tracker technology. The data collected to date support the hypothesis that bimodal synchronous gestures more effectively capture infant attention than bimodal asynchronous gestures.

IDENTIFICATION OF A NOVEL UNTRANSLATED RNA REGULATING STEM CELL FORMATION IN THE AQUATIC LEECH, *THEROMYZON TESSULATUM*

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One central challenge in stem cell biology is to identify genes that are unique to stem cells. Currently, this quest is not experimentally approachable in humans because of the small size of human embryos, and a variety of technical and ethical problems associated with isolating human embryonic stem (ES) cells from developing embryos. Leeches, on the other hand, offer an alternative approach to this question because they have among the largest ES cells in the animal kingdom (50-300 μm in the leech, *Theromyzon tessulatum*). Leech ES cells and their immediate precursors (i.e., cells that give rise to ES cells) offer an experimentally amendable system for identifying key genes associated with ES cell genesis. Since these cells are asymmetrically positioned on the surface of developing leech embryos, ES cells and their precursors are identifiable and are readily purified to homogeneity. By differential display gene profiling, we have identified and isolated an untranslated RNA (designated K110) that may play a pivotal role in stem cell formation. K110 is dramatically up-regulated upon the birth of leech embryonic stem cells, and its genetic knock-down causes hyper-proliferation of stem precursor cells thus preventing normal stem cell genesis.

COGNITIVE DISSONANCE AND INTENTIONS TO USE CONDOMS IN COLLEGE STUDENTS

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College students are keenly aware that condom use is the most effective way for sexually active individuals to reduce chances of contracting sexually transmitted disease. Yet college students sometimes engage in unprotected sex. Stone, Aronson, and Crain (1994) demonstrated that inducing cognitive dissonance through asking individuals to remember past risky sexual behaviors causes greater intentions to use condoms in the future. In a replication, feelings of hypocrisy were induced through reminders of past personal risky sexual behaviors followed by asking participants to create a public service announcement for younger students regarding dangers of unprotected sex. Participants in the hypocrisy condition were predicted to elect to take more condoms (offered in the laboratory) than would participants in two comparison conditions. Data are being collected; results will be presented at the conference.

ANATOMY AND MORPHOLOGY OF WATER LILY (*NUPHAR ADVENA*) IN RELATION TO INTERNAL AIRFLOW AND RESPIRATION RATE

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Nuphar advena is a species of water lily that grows in lakes and other water bodies in which its rhizomes and roots are maintained under anaerobic conditions and air must flow into leaves and down through petioles to reach the rhizomes and roots. We (i) used air/liquid pressure tests to determine the path of least resistance to airflow, (ii) determined the dimensions of plant organs, (iii) determined the dimensions of lacunae within plant organs, and (iiii) determined rates respiration of rhizomes and roots. Overall, we estimated the rates of flow of air through leaves, petioles and rhizomes. The path of least resistance is through small openings near midveins of leaves. Results of air pressure tests show that most air enters the upper leaf surfaces near the main vein. Lacunae (air spaces) are most numerous and are larger near the main vein. Dye injection tests confirm that lacunae near the midveins flow most directly into petioles. The number and sizes of lacunae in leaves, petioles, rhizomes, and roots will be described. The volumes of lacunae and the volumes of these organs will be described in relation to respiration rates (oxygen consumption) of rhizomes and roots.

ANATOMY AND MORPHOLOGY OF RED MANGROVE (*RHIZOPHORA MANGLE*) PLANTS IN RELATION TO INTERNAL AIRFLOW

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Mangroves cover large areas of shoreline in the tropics and subtropics where they are important components in the productivity and integrity of their ecosystems. Many mangrove plants are rooted (most are stilt roots-adventitious roots derived from stems) directly through standing sea water into anoxic substrate. Under these

conditions, shoots must provide O₂ to roots. The purpose of this research was (1) to understand the tissues involved with the predominant airflow pattern in red mangroves (*Rhizophora mangle*) from leaves to roots (2) to understand the anatomical characteristics of air conducting tissues, and (3) to quantify these structures and tissues. Cork warts (density = 0.17 mm⁻²) on abaxial leaf surfaces are responsible for air uptake. Cork warts deliver air to an aerenchyma tissue near adaxial leaf surfaces. This aerenchyma layer is about 60 μm thick over the entire leaf so that the volume of aerenchyma in a typical leaf is about 0.23 cm³. The aerenchyma in each leaf is linked to the aerenchyma in each petiole (mean cross-sectional area, 0.0024 cm²). Petiole aerenchyma then joins the aerenchyma in the innermost portion of stems (aerenchyma constitutes about 2 to 4% of total stem area). Air descends the stem aerenchyma and then passes to the inner aerenchyma of stilt roots (inner aerenchyma constitutes about 18% of the cross-sectional area of roots). Our results indicate that air descends into the smallest roots growing in anoxic substrates where it may provide O₂ to the most rapidly growing portions of the roots. From these growing areas, air ascends the outer aerenchyma of roots (outer aerenchyma constitutes over 70% of such roots) where it may be released through lenticels. Surface densities of lenticels ranged from 0.68 mm⁻² in air root (adventitious roots that have not reached substrate) to 1.07 mm⁻² in mud roots (the lower portions of stilt roots in anoxic substrate). Densities of lenticels on mud roots were greater than densities on air roots (probability = 0.0001). We believe this report to be the first documentation of the path of airflow within tissues of red mangrove plants including the quantitative anatomical characteristics of these tissues. Taken together these results provide a quantitative assessment of the tissues involved in airflow in *R. mangle* plants.

CRAVING FOR POTATOES IN CATERPILLARS: IS IT INDUCED BY CHANGES IN GENE EXPRESSION?

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Food preferences of larvae of the moth *Manduca sexta* vary depending on the diet experienced after hatching. If neonate larvae feed on solanaceous foliage (potato for instance), they subsequently accept only solanaceous foliage. In contrast, if fed on non-solanaceous foliage or artificial diets, these larvae remain able to accept a variety of plants as food. Previous research shows that this modification in feeding preference involves the formation of a recognition template to the chemical Indioside D, a steroidal glycoside so far only found in Solanaceae. Previous research also shows that this behavioral change involves chemosensory tuning to indioside D in 50% of the taste receptor cells located on the mouthparts of the larvae. We hypothesize that these changes in taste receptor responses may be due in part to changes in gene expression in these cells. To test this hypothesis, and to identify genes that are differentially expressed, caterpillars were reared until the 5th larval instar on either potato foliage or wheat germ artificial diet. Two types of tissues were collected from these caterpillars: maxilla containing taste receptors as well as the maxillary palp, and the dorsal abdominal horn containing neural tissue but no taste receptors (control tissue). Total RNA was extracted from each tissue type, in each type of caterpillar, and turned into cDNA. The profile of cDNAs generated in each tissue and type of caterpillar was compared by differential display. Differentially expressed cDNAs were extracted from Polyacrylamide gels, reamplified by PCR then sequenced.

ELECTRICAL AND OPTICAL CHARACTERIZATION OF CONDUCTIVE FABRICS COATED WITH POLYANILINE

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The integration of electronic components into conventional garments to introduce novel fashion effects, visual displays or audio and computing systems has generated interest in recent years. Such systems are also proving useful in the development of wearable diagnostic systems for monitoring of vital data (heart, pulse rate) in medical and military applications. The integration of sensors and actuators into fibres/ textiles has also been of interest. The realization of high efficiency in conducting polymer fibres with chemical sensing or electro chromic capabilities raises promising opportunities. Alternatively, conducting polymer coatings on textiles can function as sensors, electromagnetic interference (EMI) shielding materials and fiber batteries of wearable integrated systems.

This project presents the development of conductive fabric using conductive polymers. The substrate fabrics of Cotton, Polyester, Nylon and Lycra are used for conductive coating with polyaniline. Conductive polyaniline coated fabrics are prepared by in situ chemical oxidative polymerization of aniline using ammonium persulphate as the oxidant by a process of diffusion polymerization in a mixed bath. Various electrical and optical properties of these fabrics are characterized by conductivity measurement, current verses voltage analysis and

A STATISTICAL ANALYSIS OF THE STANDARD & POOR'S 500 INDEX.

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A Statistical Analysis of the Standard & Poor's 500 Index, over a period of days, weeks, and months. By observing the different histograms for a set period of days, weeks, and months it allows for the assessment of the S & P 500 and the stock market's numerous fluctuations and volatility. Compiling and analyzing the data yields the standard deviation, change in price, and normal distribution to enhance the analysis of the Standard & Poor's 500 Index. The statistical analysis of the S & P 500 allows for a clear understanding of how the market is capable of fluctuating over a period of time.

THE FAT BODY DURING FROG DEVELOPMENT

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Fat bodies are a mass of fatty tissue located within the abdominal cavity in many amphibians, including the frogs and toads. These fat bodies can be found in both juveniles and adults. The fat is found as triglycerides stored in adipose tissue. The main purpose of the fat is to serve as a source of stored energy and in some mammals, as an insulator. Adipose tissue however carries out other routine functions, such as secreting the hormone leptin and providing energy for reproduction. It is also known that different environmental factors, such as day length and temperature, affect the rate at which fat bodies are utilized by amphibians. Our laboratory is interested in fat bodies in the anuran tadpole since there have been few studies of these organs during larval stages. As tadpoles undergo climax many changes occur both externally and internally. The emerging of the front legs through the gill chamber, rapid metamorphic changes of the mouth, absorption of the tail, truncation of the gut, and formation of the lungs are just a few of these physiological changes. It is during this time that the tadpole stops eating, generally around stage XX, as it undergoes the necessary changes from being predominantly an herbivore to solely a carnivore. Results to date indicate that there is a significant increase in fat body size just prior to larval climax, then extensive shrinking during late metamorphic climax. Leptin is a satiety indicator secreted by fat stores. Our findings suggest that the increased size of the fat bodies, and consequent increase in leptin, could trigger the cessation of feeding at the onset of metamorphic climax, while the decrease in fat body size during climax might indicate use of the fat stores during this starvation period. This work has been funded by NFS Grant IBN-0236251.

AN ASSESSMENT OF COMPUTER PLUG-LOADS IN THE CENTER FOR NATURAL SCIENCES AT ITHACA COLLEGE

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The purpose of this study was to determine the amount of energy used by computers in the Center for Natural Sciences building at Ithaca College. Also, computer behavioral patterns were observed to determine if people generally turned their computers off when they left for the day and if people had their computers "power managed" (set to go into a lower power state after a period of inactivity). To investigate both of these questions, all the computers in the building were turned 'on' over the course of one weekend and then turned 'off' the following weekend. The difference in electricity draw between these two experimental periods yielded the total amount of energy used by computers within the building. During the 'on' experiment, the number of computers that were power managed was observed. Using an online calculator, the total potential financial and ecological savings (if all machines were power managed) was determined.

SCENE PERCEPTION & PERCEPTUAL BLINDNESS

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Individuals commonly believe that they accurately perceive and detect the visual features of their environments. However, previous research (Mack & Rock, 1998) has shown that people rarely see what they are looking at, unless they direct their full attention to a stimulus/scene. In addition, research has also shown that individuals commonly fail to recognize both unexpected and expected changes in their visual environments. This phenomenon has been labeled *Change Blindness*. Most of the research conducted on Change Blindness has

manipulated the change while the participant's visual field has been obstructed. The current study consisted of three separate experiments, designed to measure the effects of change blindness when the visual field is not obstructed. The first experiment assessed the amount of change in a stimulus that is necessary for participants to reliably detect a change. The second experiment was designed to investigate the influence of instructions on change detection. The third experiment was designed to probe memory for the initial, pre-changing stimulus. Results revealed that individuals require a substantial amount of change in an initial stimulus in order to detect changes in the post-changing stimulus. However, even when participants reported that the figures were different, evidence for Change Blindness was still found. Results also showed that individuals could be primed to detect changes based on the nature of the instructions. Finally, results also suggest that Change Blindness occurs as a result of the failure to compare pre- and post-changing images.

SPEECH-GESTURE SYNCHRONY IN MOTHER-TO-INFANT WORD PRESENTATION

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This study explores the synchronous nature of parents' gestures and speech when teaching names of objects to young infants. In a laboratory setting, the experimenter provided mothers of infant children with a novel object/novel word pairing and instructed each mother to hold the object in her dominant hand and teach the object's name to her child. Using a three-dimensional real-time motion-tracking system, a microphone headset, and conventional video recording equipment, the experimenter recorded each mother's movements and analyzed them in relation to her stream of speech. Given past research on infant word learning, we expect to find temporal synchrony between the mother's speech and movement, particularly when indicating the object's name. Gogate et al. (2000) have conducted an exploration on the concept of temporal synchrony between speech and gesture, but their research lacked the ability to quantify actual movement in the manner that computer motion-tracking allows. This research also builds upon the infant-based work on synchronous gesture's role in increasing infant word comprehension that has been conducted by researchers such as Zukow-Goldring, Rader, and Cain (2000). Findings will increase our understanding of infant word learning by elucidating the role that parents may play in linking speech with referent objects through gesture. Data collection is still in progress.

CHONDROCYTE-PRODUCED TGF β REGULATES EARLY STAGES OF OSTEOBLAST DIFFERENTIATION.

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Our lab has shown that hypertrophic chondrocytes produce large quantities of activated TGF β . To determine whether TGF β produced and activated by hypertrophic chondrocytes promotes osteoblast differentiation, hypertrophic chondrocytes were isolated from avian sterna and placed in serum-free alginate cultures. Pre-osteoblasts (HOB-03-C5; POB) and early mature osteoblasts (HOB-03-CE6; EMOB) were treated for 2, 6 and 12 hours with conditioned media (CM) obtained from day 5 chondrocyte cultures. A transient stimulation of osteopontin (OP) expression was noted after 6 hours treatment in both osteoblast populations. Expression of osterix (OSTX) was inhibited as early as 2 hours CM treatment in both osteoblast populations. Inclusion of pan-specific neutralizing antibody to TGF β (nAb) in the 6hour treatment with CM returned expression of OP in the POBs and OSTX expression in both POB and EMOB to control levels. Chondrocyte-produced TGF β was depleted from day 5 chondrocyte CM by passage over a strep-avidin micro-bead column containing biotin-labeled polyclonal antibody to TGF β . OP expression in both OB populations was returned to control; however, OSTX expression remained unchanged. Since nAb blocks activity of all TGF β present, but depletion of the CM only removed chondrocyte-produced TGF β , these data suggest that OB-specific gene responses at the chondro-osseous border are highly dose dependent and indicate at least a partial role for chondrocyte-produced TGF β in early OB differentiation.

GENETICALLY MAPPING THE FRIZZY MUTATION ON MOUSE CHROMOSOME 7.

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In previous work, we have shown that the rat *fuzzy* and *hairless* mutations are defects in the same gene (on rat Chromosome 1), and are likely orthologues of mouse *frizzy* (on mouse Chromosome 7). Furthermore, since the rat mutations appeared to map very near *Fgfr2*, a gene known to be expressed in hair follicles, we suggested that all

three variants might be due to defects in *Fgfr2*. To test this hypothesis, we crossed *fr/fr* mice (from the inbred FS strain) with mice that carry a knock-out mutation in *Fgfr2*. Mice shown to be heterozygous for both mutations were phenotypically normal, indicating that *fr* is not an allele of *Fgfr2*.

To map *fr* with respect to *Fgfr2* (and other genes and markers on mouse Chromosome 7) we backcrossed these hybrid mice (or F1 mice made from crossing strain FS with the wild-type B6 strain) to the FS strain. Backcross progeny were typed for a variety of visible, behavioral, and molecular markers to determine the order of and genetic distances between these linked loci. We anticipate that the genetic map we produce for the *fr* region will support a future attempt at positionally cloning the *fr* gene. With the cloned gene in hand, it will finally be possible to determine if mouse *frizzy* and rat *fuzzy/hairless* are really defects in the same gene.

A POTENTIAL ROLE FOR IMP (IGF-II MRNA BINDING PROTEIN) IN THE GERMLINE OF ELONGATING SPERMATID CYSTS.

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GFP-tagged protein traps uncovering the *Imp* (IGF-II mRNA binding protein) gene reveal expression of *Imp* protein toward the tail end of elongating spermatid cysts, suggesting a role for *Imp* in spermatid elongation. To investigate this possibility, an *Imp* mutation was generated by P-element mobilization. While testes from *Imp*¹⁵⁴ mutant males reveal no obvious defects, *Imp*¹⁵⁴ mutant males are sterile, suggesting an as yet undefined role for *Imp* during spermatogenesis. Interestingly, the *Imp*¹⁵⁴ mutation, similar to *Imp* mutant mice, also exhibits a viability defect, along with a host of neuromuscular symptoms, suggesting that the sterility of *Imp*¹⁵⁴ mutant males may not be the direct result of a failure in spermatogenesis. In parallel to studies on the *Imp*¹⁵⁴ mutant, studies were also conducted to precisely elucidate the expression pattern of the *Imp* gene. Enhancer trap analysis reveals that *Imp* is transcribed in early stage germ cells, while immunolocalization against cyst cell markers reveal that *Imp* protein is expressed in the germline cytoplasm of elongating cysts, suggesting that the translation of *Imp* mRNA is delayed until spermatid elongation. Taken together, the expression pattern of *Imp* in the testis, combined with the male-sterile phenotype of the *Imp*¹⁵⁴ mutation suggests that *Imp* may play a direct role in late-stage spermatogenesis. Alternatively, since *Imp* protein has been previously shown to bind and localize α -actin mRNA to the leading edge of filopodia in migrating cells and dendrites, the sterility of *Imp*¹⁵⁴ mutant males may be an indirect consequence of neuromuscular defects.

EYE MOVEMENTS, ATTENTION, AND MEMORY: EXAMINING PLEASANT, NEUTRAL, AND UNPLEASANT PHOTOGRAPHS IN A COLLAGE

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Many people believe that memory for events that have happened in ones life are accurate. However, when presented with stimuli of a scene, researchers have found that often times the participants' memory is distorted, biased, or inaccurate. In order to better understand why this occurs, it is important to also evaluate attention, and how emotionality affects attention. In this study, participants were placed in one of three emotional content conditions (pleasant, neutral, unpleasant) in which they are presented with a collage of photographs. The participants' eye movements were tracked in order to determine if there is a difference in how they view a collage that contains either a pleasant photograph, a unpleasant photograph, or a neutral photograph. It was found that participants were better able to recognize the emotional photographs than the neutral photographs. Also, participants spent more time fixating on the emotional images in the collages as compared to the neutral photographs. Emotional content influences attention as measured by eye movements.

QUANTUM STATES AND ENERGY LEVELS OF MULTIPLE COUPLED JOSEPHSON JUNCTION QUBITS

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We derive the quantum states and energy levels in a system consisting of three Josephson junction qubits capacitively coupled to each other. These qubits are biased with currents close to their critical currents so that only two to three distinct energy levels appear within their potential wells. In this limit, we apply the cubic approximation to the Washboard Potential, and treat the new Hamiltonian as a collection of harmonic oscillators with perturbations. This method, if generalized appropriately, can be applied to obtain N-coupled junctions system.

ENHANCER TRAPPING REVEALS CANDIDATE SOMATIC REGULATORS OF POST-MEIOTIC SPERMATOGENESIS.

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The male germline develops in close association with supporting somatic cells in virtually all animal species. In *Drosophila*, two somatic cyst cells remain closely associated with the developing sperm throughout the duration of spermatogenesis, suggesting critical signaling events between the soma and the germline. Whereas numerous critical soma-to-germline signaling events have been identified during early, pre-meiotic spermatogenesis, relatively little is known about the role of the somatic cyst cells during the later, post-meiotic stages. Using previously generated P-element enhancer-detector lines (Gönczy and DiNardo, 1992), three candidate somatic regulators of post-meiotic spermatogenesis have been uncovered. The first enhancer trap, expressed in mature head and tail cyst cells, is an insertion into the large intron of the *tacc* (transforming acidic coiled-coil protein) gene. Interestingly, Tacc is a centrosomal protein involved in microtubule organization and nuclear migration, suggesting a role for *tacc* in the elongation of the somatic cyst cells and/or the positioning of the cyst cell nuclei. A second enhancer trap, also expressed in head and tail cyst cells, is an insertion into *CG9520*, which encodes a protein with putative glycosyl transferase activity. This suggests a role for protein amino acid glycosylation in late-stage cyst cells. Lastly, a third enhancer trap expressed in the head cyst cells and the hub, is an insertion into *CG13512*, which has no known function. Interestingly, however, the insertion site is in the vicinity of a number of genes involved in both the defense response and steroid metabolism, along with one gene implicated in spermatogenesis. Taken together, these results reveal new roles for at least three genes in the somatic cyst cells that encase late-stage spermatids. In the future, we hope to obtain and/or generate mutations in these genes to elucidate their functions in spermatogenesis

MECHANICAL STRESSES OF PRIMARY BRANCHES:A SURVEY OF 40 WOODY TREE AND SHRUB SPECIES

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Land plants have evolved a large number of definitive, growth forms. Clearly, each plant species has a unique morphology. Main stems serve the function of vertical growth so individual trees can compete effectively with neighboring plants for sunlight for photosynthesis. In contrast, primary and higher order branches are responsible for lateral growth for greater light inception. Each tree and shrub species has its specific branching pattern. Are there any mechanical constants regarding tree/shrub morphology and branching that impact overall plant form and function? Here we show that primary branches of 40 tree and shrub species all exhibited constant bending stresses of 10 MPa. In addition, we show that primary branches without secondary branches (i) had the same bending moment distributions as tapered cantilever beams and that these bending moment distributions were proportional to branch length to the 4th power, (ii) exhibited constant values of stress versus length among all species, and (iii) exhibited both constant density and constant taper among all species. Thus, we conclude that the constant stress of 10 MPa of primary branches was due solely to the numbers, weights, and distributions of secondary branches and associated higher order branches along primary branches for the 40 plant species. So, although plants show a wide variety of forms, bending stresses of all species are constant and that this constant bending stress is controlled by the numbers, weights, and arrangements of smaller branches along primary branches. To our knowledge, this is the first publication that shows a unifying mechanical constant for trees/shrubs.

ANT COLONY OPTIMIZATION: HOW MANY ANTS ARE ENOUGH?

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In this presentation, we will discuss a relatively new solution approach to computationally complex problems that is based on the behavior of biological ant colonies. Specifically, we will talk about how ant colony optimization (ACO), i.e., computer techniques based on the foraging behavior of biological ants, can be used to solve the computationally complex Traveling Salesperson Problem. After briefly reviewing previous research done on this topic, we will discuss our current research and provide some empirical results.

THE EFFECT OF LANGUAGE ON INFANT LOOKING BEHAVIOR

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This study explores the effect of language on infant looking behavior. Using three different scripts, I am comparing the eye tracking behavior of 9-14 month old infants raised in English speaking homes. In this within-subjects design, each participant views three videos: one in English, one in Spanish, and one without an audio track. In each video the speaker holds a novel object and names it using a nonce word. The objects and script pairings are counterbalanced across subjects. Through comparing the eye tracking patterns across the videos I will be able to see if there is a difference in attention in response to the nature of the script. I predict that the pattern of looking behavior during the English video will be different from those during the Spanish narration and no audio track. Based on current research in the lab, I anticipate infants will look back and forth between the speaker and the object in the English script condition, but will show an irregular pattern of looking in the Spanish and no language conditions. Data are currently being collected and this hypothesis will be analyzed using a within-subject one-way analysis of variance.

METAL INTERACTIONS WITH SLUG GLUE PROTEINS

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Terrestrial snails and slugs secrete a natural adhesive that allows them to interact with a variety of different surfaces. Evidence suggests that the glue secreted by these animals is composed of giant polymers and smaller glue proteins. The interactions between the proteins that make up this bio adhesive, however, are largely unknown. It was hypothesized that different metals could play a role in glue protein interactions. Tests were done using iron, calcium and other metals to determine if metals could influence the binding properties of slug and snail glue. Experiments included precipitation tests, western blotting, dot blotting and gel electrophoresis. The results from these experiments provided strong evidence that slug and snail glue proteins have the ability to form specific interactions with different metals. Other experiments were done to test for the initial presence of metals in the glue. The glue was treated with an iron chelator, deferoxamine mesylate, which produced a visible effect on protein solubility. The presence of metal appears to be an essential component of protein interactions. Understanding the role that metals play in slug and snail glues helps provide insight as to the mechanics of different bio adhesives.

WORD PROCESSING VERSUS PENMANSHIP IN EMPLOYEE HIRING DECISION MAKING

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Psychology

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Career Counselors recommend sending follow-up thank-you letters after interviews as a means to enhance the probability of receiving a job offer. There is some question as to whether the letter should be prepared as a word processed or handwritten document. The current study compares 2 well written letters of different but equal quality in word processed and handwritten forms. Student participants were first trained in their position of "role-playing" a hiring committee chairperson and were instructed to determine what candidate they would extend a job offer to in terms of the follow-up interview thank-you letter. Acceptance rates for both formats were compared using statistical analysis.