

UNDERGRADUATE SCIENCE AND MATH SYMPOSIUM

*Thursday, April 17, 2003
12:00 pm - 5:30 pm*

*Greene Hall
State University of New York
College at Geneseo*

*This Symposium is supported by the Office of
Sponsored Research, SUNY Geneseo.*

The logo for Geneseo, featuring the word "Geneseo" in a blue, serif font with a blue underline.

UNDERGRADUATE SCIENCE AND MATH SYMPOSIUM

*Thursday, April 17, 2003
12:00 pm - 5:30 pm*

The Departments of Biology, Chemistry, Computer Sciences, Geological Sciences, Mathematics, and Physics and Astronomy of the State University College of Arts and Sciences at Geneseo welcome you to their twentieth annual Undergraduate Research Symposium. The Symposium offers students the opportunity to give an oral presentation or present a poster on the original research they have carried out in conjunction with Geneseo faculty. This brochure contains the abstracts of their work.

In addition, the Symposium provides an overview of the unique educational opportunities afforded through undergraduate research participation and gives recognition to the remarkable amount of research completed at the College.

2003 Symposium Committee

Doug Baldwin (Computer Science)
William Brennan (Geological Sciences)
Charlie Freeman (Physics and Astronomy)
Gregg Hartvigsen (Biology)
Jeff Johannes (Mathematics)
Chris Leckinger (CIT)
Kazu Yokoyama, Chair (Chemistry)

The Symposium Committee would like to thank all of those who have assisted in preparing for the Symposium this year. Many thanks to all of the participating students and faculty who work with them. In particular, we would also like to thank Dr. Doug Harke for all the support he has given this year and in previous years.

Symposium Schedule

12:00 pm

*Poster Presentations
Greene Hall*

12:45 pm

*Opening Address by Dr. David Meisel
Department of Physics and Astronomy
"Undergraduate Research: The Sky is Not the Limit, but the Frontier"
Newton Hall, Room 214*

1:30 pm

*Oral Presentations
Greene Hall, Rooms 104 and 234*

2:30 pm

*Poster Presentations/Refreshments
Greene Hall*

3:30 pm

*Oral Presentations
Greene Hall, Rooms 104 and 234*

5:00 pm

*Closing Remarks
Greene Hall, Room 104*

UNDERGRADUATE SCIENCE AND MATH SYMPOSIUM

ORAL PRESENTATIONS: Early Afternoon Session Greene 104 and 234

- 1:30** **Greene 104**
BUTTON, Katrina
Department of Biology
MATHEMATICAL MODELING OF A TRI-TROPIC SYSTEM IN CONESUS LAKE
(Gregg Hartvigsen)
- 1:30** **Greene 234**
NOWAK, Tim
Department of Geological Sciences
ERRONEOUS DATES FOR ASH BEDS IN THE GREATER GREEN RIVER BASIN,
WYOMING
(Jeff Over)
- 1:45** **Greene 104**
WALDAUER, Alex
Department of Physics and Astronomy
GRAVITATIONAL LENSING AND LIGHT CONES
(Savi Iyer)
- 1:45** **Greene 234**
LEHANE, James R. and MORTIER, Jeffrey R.
Department of Geological Sciences
POSTGLACIAL AND HISTORIC EROSION RATES ON THE GENESEE RIVER: A DAM
PROBLEM
(Richard A. Young)
- 2:00** **Greene 104**
MARTARANO, Jared
Department of Biology
TUMOR CELL GROWTH INHIBITION BY THE PRESENCE OF ELLAGIC ACID
(Robert O'Donnell)
- 2:00** **Greene 234**
TABACZYNSKI, Alaina
Department of Chemistry
STEPS TOWARD THE SYNTHESIS OF A PHOSPHATE HAPTEN AND THE
CORRESPONDING CARBONATE SUBSTRATE FOR HYDROLYSIS BY POLYCLONAL
CATALYTIC ANTIBODIES
(Eric Helms)
- 2:15** **Greene 104**
JOYNT, Michael
Department of Biology
ETHANOL'S EFFECTS ON THE CELLULAR ADHESION
(Robert O'Donnell)
- 2:15** **Greene 234:** BOEING, Brian; Transcriptional Regulation of E-cadherin by Dexamethasone

***ORAL PRESENTATIONS: Late Afternoon Session
Greene 104 and 234***

- 3:30 Greene 104**
LEHANE, James and STRAUSS, Stephen
Department of Geological Sciences
OLIGOCENE REEF DEVELOPMENT IN SOUTHWESTERN PUERTO RICO
(Jeffery Over)
- 3:30 Greene 234**
KUEBLER, Joseph
Department of Biology
EVIDENCE OF INFLAMMATORY MEDIATORS IN THE DISEASE PATHWAYS OF
VENTILATOR INDUCED LUNG INJURY (VILI)
(Robert O'Donnell)
- 3:45 Greene 104**
BARTLETT, Brent and HAAS, Matthew
Department of Computer Science
CLUSTER COMPUTING & SCIENCES
(Homma Farian and Kirk Anne)
- 3:45 Greene 234**
ZANG, Michael and RENGASAMY, Sharmila
Department of Biology
UNDERSTANDING THE MECHANISM OF RESISTANCE IN A HUMAN LEUKEMIA
CELL LINE
(Robert O'Donnell)
- 4:00 Greene 104**
BARTLETT, Brent
Department of Physics and Astronomy
RECENT ADVANCES IN MICROMETEOR ORBIT DETERMINATION
(David Meisel)
- 4:00 Greene 234**
HOFFMASTER, Richard
Department of Biology
THE ROLE OF THE GLUCOCORTICOID RECEPTOR IN DEX-INDUCED LOSS OF CELL
ADHESION
(Jani Lewis)
- 4:15 Greene 104**
WALRATH, Holly and NAWOJSKI, Timothy
Department of Mathematics
LINKED OR "KNOT"
(Jeff Johannes)
- 4:15 Greene 234**
KORNIENKO, Elena and WONG, Cindy
Department of Computer Science
MATRIX COMPUTATIONS OF DEUTERIUM-TRITIUM FUSION PROBABILITIES
(Douglas Baldwin)

- 4:30** **Greene 104**
GRUBER, Ross
Department of Biology
ACTIVATION OF CHEMOTAXIS IN *ASTREPHOMENE GUBERACULIFERA*
(Harold Hoops)
- 4:30** **Greene 234**
HERRES, Genevieve and WONG, Cindy
Department of Computer Science
CONSTRUCTIVE SOLID GEOMETRY RENDERING WITH TESSELLATORS
(Douglas Baldwin)
- 4:45** **Greene 104**
ERHARDT, Robert
Department of Physics and Astronomy
LABVIEW -CONTROLLED FEEDBACK CIRCUIT FOR MAINTAINING CONSTANT
BEAM CURRENT AT THE GENESEO 2MV VAN DE GRAAFF ACCELERATOR
(Charlie Freeman)
- 4:45** **Greene 234**
ROSSCOE, Steven
Department of Geological Sciences
CONSTRAINT OF THE EIFELIAN-GIVETIAN BOUNDARY IN WESTERN NEW YORK
(Jeffrey Over)
- 5:00** **Greene 104**
Closing Remarks by Provost Dixon

POSTER PRESENTATIONS
Greene 106 and Greene lobby

1. AQUINO, Lauren; DAIR, Laura; GIACOMO, Gabriel; HELMS, James; JOHNSON, Kimberly; and SANDLER, Naomi
Department of Geological Sciences
BREAKING IT DOWN WITH CONODONTS
(Jeffery Over)
2. BALLOW, Michelle; BECK, Jessica; and SANSONE, Jackie
Department of Mathematics
A STUDY OF AMERICAN RED CROSS BLOOD DONATION PROCEDURES
(Chris Leary)
3. BURKE, David
Department of Physics and Astronomy
DEMONSTRATING SUPERLUMINAL VELOCITIES WITH LOW END EQUIPMENT
(James McLean)
4. BURKE, David
Department of Physics and Astronomy
INVESTIGATION OF THE LEVEL STRUCTURE OF NEUTRON RICH TECHNETIUM ISOTOPES USING THE GAMMASPHERE DETECTOR ARRAY
(Charlie Freeman)
5. CAREY, Amy D. and GEBHARDT, Gretchen
Department of Geological Sciences
GREAT SOUTHERN FAULT, PUERTO RICO
(Amy L. Sheldon and Richard B. Hatheway)
6. CARNEY, Jill
Department of Chemistry
EXAMINATION OF THE COMMON MITOCHONDRIAL DNA DELETION IN ATAXIA TELA NGIECTASIA CELLS
(Wendy Pogozelski)
7. CARUANA, Eric
Department of Chemistry
LUMINESCENCE LIFETIME MEASUREMENT OF RU(II) COMPLEX
(Kazushige Yokoyama)
8. CHUNG, Kyung Min and PARK, Guio
Department of Biology
DETECTION OF A PEA DRR206 GENE EXPRES SION IN TRANSGENIC NIAGARA GRAPES
(Ming-Mei Chang)
9. CONSTANTINE, Charles and HOLLAND, Ryan
Department of Chemistry
SYNTHESIS OF NOVEL BIPHENYL-CHOLESTEROL COMPOUNDS AND STUDY OF THEIR GELATION ABILITY
(H. Cristina Geiger)

10. DEPERISIS, Corinne
Department of Biology
ELUCIDATING THE DEPENDENCE OF PLAKOGLOBIN FOR DESMOSOMAL
FORMATION
(Jani Lewis)
11. FISHER, Daniel
Department of Biology
VOLVULINA STEINII DISPLAYS CHEMOATTRACTION TOWARDS ACETATE
(Harold Hoops)
12. FITZGERALD, Katie
Department of Biology
DO ZEBRAFISH (DANIO RERIO) COMMUNICATE BY CHEMICAL SIGNALING?
(Kristina Hannam)
13. FLESZAR, Sara
Department of Chemistry
STEPS TOWARD THE SYNTHESIS OF A PHOSPHATE HAPTEN AND THE
CORRESPONDING CARBONATE SUBSTRATE FOR HYDROLYSIS BY
(Eric Helms)
14. GEBHARDT, Gretchen
Department of Geological Sciences
CONESUS LAKE WATER BUDGET
(Amy L. Sheldon)
15. GERMANI, Christina
Department of Chemistry
THE STUDY OF AN EFFECT OF ELECTRON EJECTION TO CYTOCHROME-C
(Kazushige Yokoyama)
16. HARTIGAN, Adam
Department of Biology
APOPTOSIS INDUCTION IN PROSTATE CANCER CELLS BY 4-AMINOGUAIACOL
(Robert O'Donnell)
17. HOEY, Jaime
Department of Biology
RT-PCR CLONING OF AP1 AND HRAP GENES FROM POTATO
(Ming-Mei Chang)
18. JOHNSON, Bradley
Department of Chemistry
OPTICAL PROPERTY OF RHODAMINE 6G DYE PREPARED IN A SOL-GEL MATRIX
FILM
(Kazushige Yokoyama)
19. LAAKSO, Joseph
Department of Chemistry
SYNTHESIS AND GELATION ABILITIES OF NAPHTHOL-CHOLESTEROL
DERIVATIVES
(H. Cristina Geiger)

20. LANGERLAN, Kent and PLOOF, Tara
Department of Geological Sciences
ANALYSIS OF THE LAPA LAPA PILLOW BASALTS OF SOUTHERN PUERTO RICO
(Richard Hatheway)
21. LAPETER, Danielle and MAURER, Lindsay
Department of Geological Sciences
ANALYSIS OF A PUERTO RICAN DIKE: BERMEJA COMPLEX, SOUTHWEST PR.
(Richard B. Hatheway and Amy L. Sheldon)
22. LIPA, Bethany
Department of Chemistry
COMPARISON OF LEVELS OF MITOCHONDRIAL DNA AND THE 5-KB COMMON
DELETION IN CELL LINES ESTABLISHED FROM TWO SIBLINGS BORN TO A
MOTHER WITH OPHTHALMOPLEGIA
(Wendy Pogozelski)
23. MEIDENBAUER, Julie and STREIT, Bennett
Department of Chemistry
FABRICATION OF DEUTERIUM-RICH ACCELERATOR TARGETS
(Dave Geiger)
24. MILLS, Kathleen
Department of Chemistry
EVALUATION OF SAMPLE PREPARATION METHODS FOR THE HPLC ANALYSIS OF
T-RESVERATROL IN RED WINES
(James Boiani)
25. MROZ, Renee
Department of Biology
APOCYNIN AND 4-AMINOQUAIACOL SUPEROXIDE ANION INHIBITION IN MAT-
LYLU
(Robert O'Donnell)
26. NORTON, Amy and MEDLEY, Sarah
Department of Geological Sciences
COMPOSITION AND ORIGIN OF BEACH SANDS, PUERTO RICO
(Jeffrey Over and Amy Sheldon)
27. PENKE, Nicole
Department of Chemistry
THE EFFECT OF HEAT ON AMYLOID BETA (1-40)-CONGO RED COMPLEX
(Kazu Yokoyama)
28. PIKE, Matthew
Department of Biology
ASTREPHOMENE GUBERNACULIFERA IS CHEMOATTRACTED TO NITRATES
(Harold Hoops)
29. RAINES, Summer
Department of Chemistry
RADIATION CONTRIBUTIONS TO DNA DAMAGE IN THE HUMAN BODY:
DELETION QUANTIFICATION IN IRRADIATED AND LASER-EXPOSED
INDIVIDUALS
(Wendy Pogozelski and Stephen Padalino)

30. RILEY, Dan and PETERS, Chris
Department of Physics and Astronomy
VORTEX DYNAMICS IN TWO-DIMENSIONAL INVISCID FLOW
(Savi Iyer)
31. ROSSI, Karen
Department of Biology
INVESTIGATIONS OF NEW APPROACHES TO BREAST CANCER THERAPY
(Robert O'Donnell)
32. RUDZINSKI, Scott and OLSZEWSKI, Maureen
Department of Biology
QUANTITATIVE DETERMINATION OF E-CADHERIN, P-CADHERIN, AND VIMENTIN
IN SQUAMOUS EPITHELIAL CELLS BASED ON REAL-TIME PCR
(Jani E. Lewis)
33. SCHULTZ, Kevin
Department of Chemistry
SUPEROXIDE'S KRYPTONITE: NADPH OXIDASE INHIBITORS
(David K. Johnson)
34. SILLICK, Craig
Department of Biology
A HIGH RESOLUTION PROFILE OF THE CLIMATE CHANGE OBSERVED DURING
THE TRANSITION FROM THE LATE GLACIAL TO HOLOCENE AT DEER LAKE BOG,
NEW HAMPSHIRE
(Ray Spear)
35. SIMONS, Richard
Department of Physics and Astronomy
PHOTOCHEMICAL PROPERTIES OF RUTHENIUM COMPLEX INTEGRATED WITHIN
SOL-GEL MATRIX
(Kazu Yokoyama)
36. SPAZIANI, Amy and BARRY, Peter
Department of Geological Sciences
GEOLOGY OF THE CERRILLOS BELT, PUERTO RICO: MAKING AND BREAKING
BASIN DEPOSITION
(Amy Sheldon, Jeff Over, and William Brennan)
37. SPINELLI, Amy
Department of Biology
TRACING THE LIFE HISTORY OF LOCAL AMPHIPOD SPECIES
(Kristina Hannam)
38. STORK, Allison
Department of Biology
LATE QUATERNARY CLIMATE CHANGE OF A HIGH ELEVATION BOG
(Ray Spear)
39. SUN, Xiaoyun
Department of Computer Science
DOCUMENT IMAGE ANALYSIS SYSTEM
(Christian Shin)

40. SZALKOWSKI, Veronica
Department of Biology
FINDING THE SEROTONIN RECEPTOR IN THE PEDAL MUSCLES OF APLYSIA
BRASILIANA
(Duane McPherson)
41. TEO, Tracy
Department of Biology
CELL ADHESION MOLECULES ASSOCIATED WITH LENS ADHERENS JUNCTIONS
(Jani Lewis)
42. THOMPSON, Kimberly and CERVELLO, Kimberly
Department of Mathematics
CORRELATIONS BETWEEN STUDENTS' EXPERIENCES IN HIGH SCHOOL AND IN
CALCULUS I
(Andrzej Kedzierawski)
43. WELCHONS, Daniel
Department of Chemistry
THE EFFECT OF HEAT ON OVALBUMIN-CONGO RED COMPLEX
(Kazushige Yokoyama)
44. ZINNI, Bethany
Department of Geological Sciences
SALTY COWS, THE DEVELOPMENT OF A METHOD TO QUANTIFY AMOUNTS OF
AIR-BORNE SEDIMENT
(Amy Sheldon)

Post-Deadline Abstracts:

45. ZINNI, Bethany and MAGUFFIN, Scott
Department of Chemistry
SALTY COWS AND BRINE SHRIMP: A COMPARATIVE STUDY OF SALT MINING
46. BRUZA, Mirela and GEWANDTER, Jennifer
Department of Chemistry
STABILITY STUDIES OF 4-AMINOGUAIACOL
(David Johnson)

ABSTRACTS

AQUINO, Lauren; DAIR, Laura; GIACOMO, Gabriel; HELMS, James; JOHNSON, Kimberly; SANDLER, Naomi; SIDLAUSKAS, Steve; and VIVENZIO, Rachel

Department of Geological Sciences

BREAKING IT DOWN WITH CONODONTS

(Jeffery Over)

In an introduction to the geological research methods in the study of conodonts, the freshmen geology majors at SUNY Geneseo traveled to the Seneca Stone Co. quarry, Seneca Falls, New York where the Cherry Valley Limestone of the Marcellus Formation was collected. Samples from the 390 million year old rock were processed to recover conodonts. Conodonts are the phosphatic remains of an ancient eel-like organism. The specimens studied were separated from the matrix rock by crushing, dissolution in buffered 10% formic acid, sieving, and picking through the residue with a fine paintbrush. 33 conodont elements were recovered from 1.5 kg of rock, most being robust forms indicating postmortem sorting. The conodonts are identified as *Polygnathus linguiformis* and *Icriodus nodosus* that occur in the lower Middle Devonian.

(Poster Presentation)

BALLOW, Michelle; BECK, Jessica; SANSONE, Jackie; and RENGASAMY, Sharmila

Department of Mathematics

A STUDY OF AMERICAN RED CROSS BLOOD DONATION PROCEDURES

(Chris Leary)

While many people understand the importance of blood donation, they choose not to donate simply because they feel the donation process takes too long. Through attending several local blood drives and gathering data on the blood donation procedures we have gained a more precise understanding of the actual wait time and have used Queuing theory software to construct a model of a blood drive. We analyzed that model and our data and will give a report to the New York-Penn Region of the American Red Cross. In our report we plan to suggest ways to better allocate Red Cross resources in a manner that would enable donors to flow through a blood drive more efficiently, thereby shortening the time spent waiting. We will also provide the Red Cross with a method to more accurately estimate how long it will take to donate. We believe that this will give the donors a more positive experience, leading to more blood donations over time.

(Poster Presentation)

BARTLETT, Brent
Department of Physics and Astronomy
RECENT ADVANCES IN MICROMETEOR ORBIT DETERMINATION
(David Meisel)

Dust sized particles are produced from many different sources both inside our solar system as well as from the outside. As the particles pass through they are subjected to many perturbing factors from our sun and the planets until we observe their demise in Earth's atmosphere. The Arecibo UHF radar has been used to observe micrometeor head echos as these dust particles burn up at roughly 100 kilometers high going at velocities from about 11 km/s to 90 km/s. Using a recently revised C program that handles all aspects of the dust orbit calculations, we have analyzed over 40,000 events to obtain heliocentric orbits for the interplanetary dust particles (IDPs). In this large sample there is also a much smaller group of extrasolar particles (ESPs) some of which are true interstellar particles (ISPs). Various ways to visualize this data have been explored. In this talk energy and angular momenta correlations will be used to infer some aspects of particle thermal evolution when they pass close to the sun. Details of an important celestial mechanics algorithm that made the discovery of an important new class of IDP orbits is discussed.

(Oral Presentation)

BARTLETT, Brent and HAAS, Matthew
Department of Computer Science
CLUSTER COMPUTING & SCIENCES
(Homma Farian and Kirk Anne)

Distributed Systems/Distributed Computing is a state-of-the-art field of Computer Science that helps make concurrent execution of programs possible and thus significantly reduces the runtime of such programs. There are many scientific problems which can take advantage of this approach and produce results that otherwise would be either impossible or would take an incredibly long amount of time to calculate. In this presentation, we will first describe our work in the distributed lab, where we have created a distributed system in the form of a cluster of 24 machines, networked together to give users the impression of a single virtual machine. We will then present the parallel solutions, derived by us to calculate orbits for micrometeors to assist an ongoing research project in the physics department. The execution times from this parallel solution will be shown in comparison to the execution times from a sequential solution of the same problem. The speed with which we have been able to produce results with a concurrent implementation of orbit determination has enabled us to process much larger data sets and consequently arrive at more accurate and interesting interpretations of the results.

(Oral Presentation)

BURKE, David

Department of Physics and Astronomy

DEMONSTRATING SUPERLUMINAL VELOCITIES WITH LOW END EQUIPMENT

(James McLean)

The intention of this work is to demonstrate group velocities in excess of c , the speed of light in a vacuum, using fairly simple equipment. A photonic crystal was constructed out of two varieties of coaxial cable. Due to interference effects, a transmission forbidden region exists for certain frequencies. A signal is sent through the crystal with a certain "carrier frequency", chosen to be at the edge of this forbidden region. A lower, "modulation frequency" is used to distinguish between successive peaks of the carrier signal. A signal traveling through the crystal is output onto an oscilloscope and compared with a signal sent directly from the function generator. The results will demonstrate that the carrier signal has a group velocity greater than c . These speeds theoretically allow the group velocity to be negative, causing the pulse peak to leave the crystal before it has entered.

(Poster Presentation)

BURKE, David

Department of Physics and Astronomy

INVESTIGATION OF THE LEVEL STRUCTURE OF NEUTRON RICH TECHNETIUM ISOTOPES USING THE GAMMASPHERE DETECTOR ARRAY

(Charlie Freeman)

Just as the electrons in atoms can be excited, nuclei can also exist in excited states. Nuclear excitation energies are typically orders of magnitude larger than their atomic counterparts, and the photons emitted as excited nuclei decay to their ground state lie in the gamma-ray region of the electromagnetic spectrum. By studying the gamma rays emitted by a particular nuclear species, we can deduce many important properties of its nuclear structure. Recent advances in gamma-ray detector technologies have expanded our ability to study the gamma ray spectrum of nuclei far from the valley of stability. One of the most powerful gamma ray detectors in the world, Gammasphere, consists of an array of 72 Compton-suppressed Ge detectors which provide nearly 4π of solid angle coverage. Using Gammasphere in conjunction with the highly segmented heavy-ion detector array CHICO allows each gamma ray to be traced back to the nucleus from which it originated. Furthermore, CHICO allows for Doppler-shift corrections to be made to the gamma rays on an event-by-event basis. We have been analyzing data obtained using Gammasphere and CHICO at the 88 inch cyclotron laboratory at Lawrence Berkeley National Laboratory. In this poster we report on the preliminary finding of new levels in the neutron-rich isotope Tc-105 produced in $^{238}\text{U}(\alpha, f)$ fusion-fission reactions.

(Poster Presentation)

BUTTON, Katrina
Department of Biology
MATHEMATICAL MODELING OF A TRI-TROPIC SYSTEM IN CONESUS LAKE
(Gregg Hartvigsen)

Daphnia populations in Conesus Lake have been wiped out due to predation by alewife. Daphnia are an important control of algae in lakes. It has been suggested that introducing walleye to Conesus Lake could offer a means of controlling the alewife populations and possibly allowing the Daphnia populations to rebound. I built a model to investigate this tri-trophic relationship between Daphnia, alewife and walleye. The model is an extension of the traditional Lotka-Volterra model, with populations of herbivores, predators and top predators. The model suggests that introducing a large population of walleye into Conesus Lake could control the alewife population.

(Oral Presentation)

CAREY, Amy D. and GEBHARDT, Gretchen
Department of Geological Sciences
GREAT SOUTHERN FAULT, PUERTO RICO
(Amy L. Sheldon and Richard B. Hatheway)

The Great Southern Fault Zone is an extensive network of faults that separates the central and southwestern provinces of Puerto Rico. Rock samples from the fault zone were examined to determine if and how the movement along the fault altered the fabric of the surrounding rocks. Samples were collected from an exposure of the fault near the city of Rincon, on the west coast of the island. The samples were analyzed using a petrographic and scanning electron microscope. The petrographic microscope was used to identify microscopic features indicative of deformation due to faulting. Chemical analysis (SEM) was used to compare rock sample compositions within the shear zone to those proximal to the fault. This research provides insight into the structural deformation of this segment of the Great Southern Fault.

(Poster Presentation)

CARNEY, Jill
Department of Chemistry
EXAMINATION OF THE COMMON MITOCHONDRIAL DNA DELETION IN ATAXIA
TELANGIECTASIA CELLS
(Wendy Pogozelski)

Ataxia telangiectasia (A-T) is a rare genetic neurological disorder, which first appears during childhood. This multisystem recessive disease is characterized by progressive neurological problems, abnormalities of balance, serious sinus and respiratory infections, and an increased risk of developing cancer primarily from leukemias and lymphomas. A-T patients possess increased sensitivity to ionizing radiation, the type found in X-rays. They also display the same symptoms as patients with known mtDNA deletions, such as Bloom's syndrome, indicating the possibility of a similar deletion within A-T DNA. A cell line derived from a patient with A-T was irradiated with gamma rays at Georgetown University. The DNA was extracted and real-time polymerase chain reaction was utilized to measure a 4,977 base pair deletion in mitochondrial DNA. Fifteen mitochondrial DNA samples were analyzed, quantifying the total mtDNA and deletion mtDNA levels. A radiation dependent elevation in the 4,977 base pair deletion was not detected. Further research is underway to detect the possibility of other deletions.

(Poster Presentation)

CARUANA, Eric
Department of Chemistry
LUMINESCENCE LIFETIME MEASUREMENT OF RU(II) COMPLEX
(Kazushige Yokoyama)

Ruthenium complexes are currently under extensive investigation due to their possible applications as light-harvesting molecules in dye-sensitized solar cells. Their photochemical dynamics is a great interest in order to understand electron transfer and energy transfer mechanisms under excitation. The relaxation dynamics of the electronically excited ruthenium (II) complex, Ru[bpy]3Cl2*6H2O (tris -2,2'-bipyridaldichlororuthenium (II) hexahydrate) prepared in a .1 M HCl solution. A nanosecond pulse laser (Nd:YAG pumped optical parametric oscillator) was also used as an excitation light source. The pulse duration of the output is 20 nanoseconds, the pulse power is approximately .5 mJ/pulse with a repetition rate of 10 Hz. A sample was excited at 450 nm, and fluorescence was monitored at 600 nm. The luminescence decay was collected for solutions with various FeCl3 concentrations ranging from 0 to 1 mM. We have confirmed a shortening of lifetime as a quencher concentration increases. The Fe3+ ion acts as a quencher of the electronically excited state of Ruthenium complex. The inverse of lifetime was plotted as a function of quencher concentration, and the data exhibited clear linearity and a quenching rate constant was obtained from this plot. Currently we are investigating the temperature dependence of luminescence lifetime.

(Poster Presentation)

CHUNG, Kyung Min and PARK, Guio
Department of Biology
DETECTION OF A PEA DRR206 GENE EXPRESSION IN TRANSGENIC NIAGARA GRAPES
(Ming-Mei Chang)

In our previous studies, different pea disease resistance response (Drr) genes were inserted into Niagara grapes using Agrobacterium-mediated transformation. The leaves from the Drr206 transgenic plants were used to detect the expression of the inserted gene. The procedures included total RNA isolation, reverse transcription (RT), and polymerase chain reaction (PCR). Total RNAs were isolated from the grape leaves. Messenger RNAs in the total RNAs extracted were reverse-transcribed to synthesize the first strand cDNA. The PCR was used to synthesize the second strand cDNA and amplify the resulting dsDNA. The expression of Drr206 gene was confirmed by gel electrophoresis of PCR products in a 1.1% agarose gel. The results showed that the pea Drr206 gene was properly expressed in leaves of transgenic Niagara Grapes.

(Poster Presentation)

CONSTANTINE, Charles and HOLLAND, Ryan

Department of Chemistry

SYNTHESIS OF NOVEL BIPHENYL-CHOLESTEROL COMPOUNDS AND STUDY OF THEIR GELATION ABILITY

(H. Cristina Geiger)

We have synthesized several biphenyl fatty acids connected to a cholesterol moiety by an ester link. These compounds have the ability to form gels in different organic solvents. Their gelation ability, stability of the gels formed, phase transition temperatures and photophysical behavior is presented here. To gain a better understanding of structure/gelation relationship, we have synthesized biphenyl-cholesterol compounds with S and R configuration at C3 on the cholesterol moiety. In some compounds the biphenyl is connected directly to the cholesterol, in other compounds, there are several methylene groups in between the two units. By molecular modeling simulations, we observe different packing arrangements for these compounds. We have attempted to correlate the molecular modeling findings with the nature of the aggregates formed, by analyzing the emission, absorption, and circular dichroism spectra of the gels

(Poster Presentation)

DEPERSIS, Corinne

Department of Biology

ELUCIDATING THE DEPENDENCE OF PLAKOGLOBIN FOR DESMOSOMAL FORMATION

(Jani Lewis)

Progression to a malignant carcinoma often involves an epithelial-to-mesenchymal transition (EMT). This transition is characterized by a loss of an epithelial morphology and gain of fibroblastic morphology characteristic of mesenchymal cells. It is often accompanied by loss of epithelial cadherin (E-cadherin) and subsequently adherens junctions and desmosomes. Treatment of the polyclonal squamous epithelial cell line A431 with the glucocorticoid analogue, dexamethasone produced the subclone A431D. This cell line no longer expresses E-cadherin, does not form adherens junctions, and in spite of the presence of desmosomal proteins, does not form desmosomes. These cells also display a fibroblastic morphology indicative of an EMT. It was found previously that adherens junctions can be artificially re-established when E-cadherin is exogenously expressed. However, the transfected cells did not establish desmosomes. Transfection of an E-cadherin-plakoglobin chimeric gene, however, did result in desmosome formation. From these previous results it was concluded that desmosomes are dependent upon signaling from plakoglobin while it is associated with the intracellular component of E-cadherin in adherens junctions. To elucidate the dependence upon plakoglobin for desmosome formation, different portions of the plakoglobin gene were combined with the E-cadherin gene and transfected into A431D cells. These studies are presently underway.

(Poster Presentation)

ERHARDT, Robert

Department of Physics and Astronomy

LABVIEW-CONTROLLED FEEDBACK CIRCUIT FOR MAINTAINING CONSTANT BEAM CURRENT AT THE GENESEO 2MV VAN DE GRAAFF ACCELERATOR

(Charlie Freeman)

Van de Graaff particle accelerators are designed to produce nearly mono-energetic beams of particles but are not as well-suited for producing constant beam currents. We have designed a negative feedback circuit for use at the Geneseo 2MV Van de Graaff accelerator that will be used to hold the beam current constant. The beam passes through a set of quadrupole focusing magnets and is incident on a collimator. The beam current passing through the collimator is measured by an electrometer, which sends a signal to LabVIEW data acquisition software. The LabVIEW program processes this signal and sends an output to one of the quadrupoles to focus or defocus the beam. Appropriately focusing or defocusing the beam with the quadrupoles can compensate for any fluctuations in beam current coming out of the accelerator. This allows a constant beam current to pass through the collimator. This feedback circuit will be used to increase the accuracy and greatly decrease the time needed to calibrate the set of thin foil plasma calorimeters. These calorimeters are used to study direct drive inertial confinement fusion reactions at the Laboratory for Laser Energetics.

(Oral Presentation)

FISHER, Daniel

Department of Biology

VOLVULINA STEINII DISPLAYS CHEMOATTRACTION TOWARDS ACETATE

(Harold Hoops)

Astrephomene gubernaculifera, a colonial green alga, displays chemoaccumulation towards acetate. Our laboratory had tested several other taxa of colonial green algae without finding another species with a similar behavioral response. I decided to test the colonial green alga *Volvulina steinii* for a possible chemoresponse to acetate because previous workers found that *A. gubernaculifera* and *V. steinii* are often in the same collections, suggesting that they have similar growth and habitat requirements. I modeled the test methods on those used to show chemoaccumulation of *A. gubernaculifera* to acetate. *Volvulina steinii* was grown in HESA media, washed and resuspended into HESnoA and placed into petri plates. Ten μ L aliquots of 100mM, 10mM, 1mM, 0.1mM, and 0.01mM acetate and control aliquots of HESnoA were placed into the algal suspension. A definite accumulation was noted to the highest three concentrations of acetate and a borderline response was observed to 0.1 mM acetate. Thus, *V. steinii* is the second species of colonial green alga known to displays chemoattraction towards acetate.

(Poster Presentation)

FITZGERALD, Katie

Department of Biology

DO ZEBRAFISH (DANIO RERIO) COMMUNICATE BY CHEMICAL SIGNALING?

(Kristina Hannam)

Many organisms, including numerous fish in the minnow family, release chemical signals known as pheromones. Many pheromones have been detected to have discernible effects on the behavior and physiology of fishes. Chemical communication functions in attraction and recognition of individuals, the opposite sex, offspring or parents. Chemical communication also maintains hierarchies and schools. Aquatic environments have been proven to be excellent mediums in which to study chemical signaling because they are better suited to conduct signals than terrestrial environments. Also, understanding chemical signaling in aquatic ecosystems has become more important than ever as humans continue to change existing aquatic ecosystems. The purpose of this research project is to determine whether or not chemical signaling by itself is enough to induce particular behaviors in zebrafish (*Danio rerio*). This experiment is being carried out in three parts, two of which have already been performed. In part one, each fish was placed in a bowl with a fish of the opposite sex and behaviors were recorded. In part two, each fish was placed in a bowl containing water from the bowl of a fish of the opposite sex and behaviors were recorded. All behaviors were observed and quantified. Twenty trials have been run, in which male/female interactions were observed. The data collected from these trials will be used to compare behaviors in the final experiment.

(Poster Presentation)

FLESZAR, Sara

Department of Chemistry

**STEPS TOWARD THE SYNTHESIS OF A PHOSPHATE HAPTEN AND THE
CORRESPONDING CARBONATE SUBSTRATE FOR HYDROLYSIS BY**

(Eric Helms)

The overall goal of the project is to show that a polyclonal catalytic antibody preparation can be produced that will effect the stereoselective hydrolysis of a chiral aryl alkyl carbonate substrate. A tyrosine-based phosphate hapten and the corresponding carbonate substrate have been designed which will provide nonpolar, ionic, and chiral qualities that should all play a role in enhancing the specificity of the polyclonal antibodies. Synthesis of the hapten will involve using a protected dichlorophosphite with enantiomeric tyrosine derivatives. The corresponding carbonate substrate will be synthesized using triphosgene chemistry.

(Poster Presentation)

GEBHARDT, Gretchen
Department of Geological Sciences
CONESUS LAKE WATER BUDGET
(Amy L. Sheldon)

The ecology and water chemistry of Conesus Lake have been the focus of numerous recent studies aimed at understanding the dynamics within the lake and its water quality. A quantitative understanding of the sources of water entering into and exiting out of the lake (a water budget or water mass balance) will be useful to this understanding. A water budget is done by performing a mass balance of the water in the lake that considers all sources of input to the lake (precipitation, stream discharge, and groundwater), output from the lake (evaporation and stream discharge) and change in storage of the lake (change in lake volume). Currently, data has been collected from various sources and the calculation of the mass balance is underway. The results will be compared to an initial water budget determined for the lake in the 1970s.

(Poster Presentation)

GERMANI, Christina
Department of Chemistry
THE STUDY OF AN EFFECT OF ELECTRON EJECTION TO CYTOCHROME-C
(Kazushige Yokoyama)

Cytochrome-c has a four-helix-bundle heme protein and is reported to have the slowest folding rate of its structural class. Our goal is to observe a folding process taking place in a microsecond time range. We are currently seeking a method to optically initiate this folding process. When over 2M of GuHCl is present, the cytochrome-c (Fe(III)) is stable as an unfolded structure, whereas cytochrome-c(Fe(II)) is stable as a folded structure until GuHCl concentration is increased up to 4M or more. Therefore, if the heme part of protein is reduced by an electron transfer under 2M GuHCl, it is able to control a transformation from an unfolded form to a folded form of cytochrome-c. We are investigating spectroscopically how the electronically excited state of cytochrome-c is affected by an electron ejection. We have utilized Fe(II) - complex ferro-cyanide as an electron sensitizer to eject electrons. When potassium ferro-cyanide solution is excited at 260 nm, it ejects an electron through an ionization process of Fe(II) into Fe(III). The fluorescence spectra of cytochrome-c at excitation of 260 nm was observed with a presence of ferro-cyanide ion, and no fluorescence was observed when the concentration of ferro-cyanide was increased up to 0.4 mM. This observation indicates that the ferro-cyanide ion or electron ejected from this ion caused a structural change in the protein in a way to cause a non-radiative decay. We are currently investigating the Ru(II)-complex as an alternative electron sensitizer, in which we are able to excite solution at visible wavelength (450 nm) in order to cause an electron ejection.

(Poster Presentation)

GRUBER, Ross

Department of Biology

ACTIVATION OF CHEMOTAXIS IN *ASTREPHOMENE GUBERACULIFERA*

(Harold Hoops)

A. guberaculifera is a multicellular green alga that can display chemoaccumulation to acetate. In some trials the response is well developed, but in other trials the response is weak or nonexistent. I tested the hypothesis that the chemoresponse is activated at some point during the growth cycle. Cultures were started with 600 colonies/mL. After 12 hours the colony count was 9,500 colonies/mL, and the colonies did not show chemoaccumulation to acetate. The colonies began to show a chemoresponse at 24 hrs and a colony count of 46,000 colonies/mL. The colonies displayed the maximal chemoresponse at 36-48 hrs, where the colony count was between 79,000 and 124,000 colonies/mL. At 60 hrs. and 135,000 colonies/mL the response was less well developed. Thus, the maximal response is present at late log or early stationary phase of the cell cycle. The particular factor or factors that result in the activation of the chemoresponse with culture age are unknown, but we are presently testing the hypothesis that they are related to the depletion of acetate in the growth media.

(Oral Presentation)

HARTIGAN, Adam

Department of Biology

APOPTOSIS INDUCTION IN PROSTATE CANCER CELLS BY 4-AMINOGUAIACOL

(Robert O'Donnell)

Apoptosis is programmed cell death. Cells undergo apoptosis for one of two reasons. One is for proper development, cells are destroyed when they are no longer useful or are detrimental to an organism. The second reason is to avoid inflammation at sites where cells are recycled. Understanding this latter property of programmed cell death may ultimately lead to more effective eradication of cancer cells, which resist apoptosis. In preliminary experiments, it was determined that prostate cancer cell line PC-3, when exposed to 4-aminoguaiacol for twenty-four hours showed significant cell death over a range of drug concentrations. To determine if the cells' death could be attributed to apoptosis, a fluorometric assay was used to detect mono- and oligonucleosomes, after a twenty-four hour incubation with 4-aminoguaiacol. In addition drug treated cells and normal cells were then tested for the presence of Bcl-2, an inhibitor of apoptosis, via a western blot. The fluorometric assay confirmed the hypothesis that 4-aminoguaiacol causes apoptosis in PC-3 cells, and the western blot only showed the presence of Bcl-2 in the untreated cancer cells. These results show that in vitro 4-aminoguaiacol is a potent anticancer drug. A

(Poster Presentation)

HERRES, Genevieve and WONG, Cindy

Department of Computer Science

CONSTRUCTIVE SOLID GEOMETRY RENDERING WITH TESSELLATORS

(Douglas Baldwin)

Constructive Solid Geometry (CSG) represents complex 3-dimensional objects as boolean set combinations (unions, intersections, and differences) of small simple objects, called primitives. While simple in concept, the computations involved in rendering a CSG model are difficult to do in real time on a computer system. Our research seeks to adapt a CSG rendering algorithm from Fang and Liao ("Fast Volumetric CSG Modeling Using Standard Graphics System," p204-211, Proceedings Solid Modeling 2002) for use as a module in a larger program. The first step is to slice the CSG object by parallel planes and then perform the set operations on the planes. Each plane is rendered into a buffer which then forms one plane within a 3-dimensional texture map. Our contribution is to use polygon tessellation algorithms to perform the set operations within each of the planes. We expect that the tessellation algorithm will simplify the computation of the set operations relative to the approach taken by Fang and Liao. The presentation will discuss the current status of the ongoing research.

(Oral Presentation)

HOEY, Jaime

Department of Biology

RT-PCR CLONING OF AP1 AND HRAP GENES FROM POTATO

(Ming-Mei Chang)

A hypersensitive response (HR) in plants is a rapid collapse and localized death of tissue in response to an invading pathogen. Proteins have been isolated from plants that elicit an HR including amphipathic protein 1 (AP1) and HR assisting protein (HRAP). In previous studies, ap1 and hrap genes were found in sweet pepper, tobacco, tomato, and petunia. In our present study, a homologue of the ap1 gene was found in the potato using reverse transcription-polymerase chain reaction (RT-PCR) analysis. The Reverse transcription procedure is used to synthesize the first strand cDNA using oligo-dT-purified mRNAs as templates. The second strand of cDNA was then synthesized and the resulting dsDNA were amplified using PCR. After agarose gel electrophoresis, a 384 bp fragment corresponding to the ap1 gene was obtained. Future study will include cloning the 5' upstream of the ap1 gene using Rapid Amplification of cDNA Ends (RACE). Although the RT-PCR result for the hrap gene so far has been inconclusive, further investigation of its presence in the potato is underway.

(Poster Presentation)

HOFFMASTER, Richard

Department of Biology

THE ROLE OF THE GLUCOCORTICOID RECEPTOR IN DEX-INDUCED LOSS OF CELL ADHESION

(Jani Lewis)

The loss of cellular adhesion in tumor cells is a critical step toward malignancy. In the squamous epithelial tumor cell line A431, treatment with the glucocorticoid analogue dexamethasone (DEX) has been shown to cause a loss of cellular adhesion and an epithelial-to-mesenchymal type transition through an unknown mechanism. Cell hybridization studies have begun to elucidate this mechanism, however, the glucocorticoid receptor (GR) remains of particular interest in this system as it marks the first step in cell signaling by DEX. To analyze the role of this receptor in the heterogeneous cell line A431, we will analyze the receptor's activity in these cells by transfecting the gene encoding green fluorescent protein (GFP) downstream from a GR-sensitive promoter. We predict that both DEX-sensitive and DEX-resistant subpopulations of A431 will demonstrate an active GR, indicating post-transcriptional regulation in the DEX signaling pathway leading to a loss of cellular adhesion.

(Oral Presentation)

JOHNSON, Bradley

Department of Chemistry

OPTICAL PROPERTY OF RHODAMINE 6G DYE PREPARED IN A SOL-GEL MATRIX FILM

(Kazushige Yokoyama)

Optical Property of Rhodamine 6G Dye Prepared in a Sol-Gel Matrix Film ABSTRACT The focus of our research is to understand the physical and chemical properties of a guest molecule entrapped in a sol-gel matrix. In this study, we utilized an organic dye molecule, as the subject, entrapped in a silica gel medium. A Rhodamine 6G dye (R6G) has a high quantum yield and its aqueous solution absorbs around 520 nm and fluoresces at 570 nm. The R6G dye is useful in monitoring the environment it is surrounded by. A dye laser is commonly used to excite the R6G dye, and its resulting fluorescence spectrum shows its sensitivity to its suspending matrix. It is still unclear, however, exactly how a given dye is trapped in a sol-gel medium. We are concerned in this study that the dye may be surrounded with either too significant an amount of solvent, so that it is allowed to diffuse freely, or that it is bound to the suspending matrix and has too small a degree of freedom. With this respect, the sol-gel matrix is quite a unique host material that permits us to study the mobility of the trapped molecule. An R6G dye solution was prepared in a silica gel by a sol-gel method. A dye containing a sol-gel complex is placed on a cover glass slip by either a dip-coating or a spin-coating method, and is dried on the slip in the form of a thin film. A significant amount of dye concentration was necessary in order to form a thin film which can exhibit a reasonable optical signal. An absorption and fluorescence spectrum was obtained and the surrounding environment has been studied by comparing different bulk solutions.

(Poster Presentation)

JOYNT, Michael
Department of Biology
ETHANOL'S EFFECTS ON THE CELLULAR ADHESION
(Robert O'Donnell)

Ethanol has been shown to inhibit the adhesion of neurons during development. Cells not exposed to ethanol show increased self-adhesion as compared to ethanol treated cell lines. Ethanol is thought to interact with the hydrophobic pocket within the L1-CAM molecule, a neural cell surface protein that is imperative to cell-cell adhesions, as well as axon growth, fasciculation, and neural migration. In order to investigate the inhibiting effects that ethanol is proposed to show on intercellular adhesion, experiments were begun using CCL-131 cells as a model system. CCL-131 is a neuroblastoma cell line which shows many of the in vitro properties of nerve cells, itself possessing the L1-CAM molecule. Preliminary experiments showed that these cells could grow in concentrations of ethanol less than 175 mM, with no morphological changes being observed. The expression of L1 was confirmed by flow cytometry, and was not affected by a 30 minute incubation in ethanol. Preliminary aggregation assays show that ethanol inhibits cell to cell adhesion in CCL-131 cells, but not in a bladder cancer cell line. Further experiments are planned to understand how alcohol affects cell adhesion, possibly providing insight into the relationship, on the cellular level, that alcohol has with fetal alcohol syndrome, and other alcohol related diseases.

(Oral Presentation)

KORNIENKO, Elena and WONG, Cindy
Department of Computer Science
MATRIX COMPUTATIONS OF DEUTERIUM-TRITIUM FUSION PROBABILITIES
(Douglas Baldwin)

In collaboration with a team from the physics department, we are constructing a computational model of the interaction between a beam of tritium nuclei and a deuterated polyethylene film. Our goal is to know the distribution of energies through the film in order to compute the probabilities of tritium fusing with deuterium. We model the film as a series of thin layers. The probabilities of fusion do not change across each layer. The change in energy distributions of the tritons passing through one layer is generated using Trim, a program that models the interaction of ions within matter, and Trim3D, a particle visualization and statistics program. We model the "change in distribution" function as a matrix transform. The effect of multiple layers can be modeled by composing this transform with itself, which can be done by repeated matrix multiplication. Well known algorithms for matrices can be used to do this. The results of our calculations will be used by the physics team for comparison with the results of the experiments that they are currently running at the Laboratory for Laser Energetics. Our presentation will include a more in-depth explanation of our model as well as preliminary computational results.

(Oral Presentation)

KUEBLER, Joseph

Department of Biology

EVIDENCE OF INFLAMMATORY MEDIATORS IN THE DISEASE PATHWAYS OF VENTILATOR INDUCED LUNG INJURY (VILI)

(Robert O'Donnell)

Mechanical ventilation is a common procedure used to sustain breathing in patients undergoing surgery or after trauma that shuts down respiration. Despite its benefits, mechanical ventilation may contribute to the worsening condition of the patient and possibly death. Injury to the lungs occurs when lung alveoli are stretched to abnormal levels causing the deactivation of the surfactant. Once the surfactant is deactivated, the alveoli will collapse. This injury caused to the lungs is termed Ventilator-induced Lung Injury (VILI). It is thought that the injury resulting from artificial ventilation is accomplished by the production of various cytokines in the inflammatory pathway. The main cytokine of interest is interleukin-8 (IL-8) due to its importance in neutrophil recruitment. In order to study the disease mechanisms of VILI, an in vivo male rat model was utilized by collaborators at SUNY Upstate Medical Center in Syracuse. Blood and bronchoalveolar lavage (BAL) samples collected from these rats by the collaborators are to be analyzed for the increase in cytokine production using an enzyme-linked immunosorbent assay (ELISA). Samples will also be tested for the presence of proteases using gelatin zymography. Preliminary testing of the first two rat blood samples subjected to mechanical ventilation showed increases in IL-8 concentration. Baseline blood samples at a dilution of 1:10 had an IL-8 concentration of 22.86 pg/mL, while IL-8 concentrations of end blood samples at a dilution of 1:10 had concentrations > 300 pg/mL. Additional testing of fluid samples and the results of the gelatin zymography will provide further insight as to the pathogenesis of VILI.

(Oral Presentation)

LAAKSO, Joseph

Department of Chemistry

SYNTHESIS AND GELATION ABILITIES OF NAPHTHOL-CHOLESTEROL DERIVATIVES

(H. Cristina Geiger)

In an effort to probe the relative importance of the different factors which may control the self-assembly of aromatic amphiphiles and therefore gelation ability in some organic solvents, we have focused our studies on naphthol and styrylnaphthalene chromophores. Both alpha and beta styrylnaphthalene fatty acid derivatives investigated have similar absorption spectra and photophysics in dilute solutions, monomeric form. From simple modeling considerations we recognized that amphiphiles constructed by attaching a fatty acid chain to the para position of the phenyl ring of alpha and beta trans-styrylnaphthalene derivatives should result in molecules having very different shapes. The alpha-isomer would be anticipated to exist preferentially in an extended configuration. In contrast, the beta-isomer would be anticipated to have a bent shape. Our studies focus on the synthesis and photophysical characterization of a series of naphthol-cholesterol and styrylnaphthalene derivatives in gel and isotropic state, to gain a better understanding of structure/gelation relationship. The positioning of the carbon chain separating the naphthol and cholesterol moieties has been modified to observe its effect as well.

(Poster Presentation)

LANGERLAN, Kent and PLOOF, Tara

Department of Geological Sciences

ANALYSIS OF THE LAPA LAPA PILLOW BASALTS OF SOUTHERN PUERTO RICO

(Richard Hatheway)

The Lapa Lava is basaltic lava which formed during the Late Cretaceous time in southern Puerto Rico. These basalts formed pillows because they originated from a submerged volcano. Samples collected from a road-cut on Route 52 near Guayama were characteristic of the outer margin and core of the pillow basalts. Petrographic analysis indicates that the outer margin of the pillow is aphanitic due to rapid cooling. The core of the pillow has large feldspar phenocrysts in a finer grained groundmass. Scanning Electron Microscope analysis reveals differences in chemical composition between the margin and core of the pillows.

(Poster Presentation)

LAPETER, Danielle and MAURER, Lindsay

Department of Geological Sciences

ANALYSIS OF A PUERTO RICAN DIKE: BERMEJA COMPLEX, SOUTHWEST PR.

(Richard B. Hatheway and Amy L. Sheldon)

The Bermeja complex contains the oldest rocks of the Southwestern Igneous Province of Puerto Rico, which are Late Jurassic in age. It is composed of chert layers in serpentinite, metabasalts, and numerous Late Cretaceous, to Early Tertiary igneous intrusions. One such igneous intrusion occurs in the form of a dike near Mayaguez, Puerto Rico. Samples were collected across the thickness of the dike, from its outer margin where it is in contact with the country rock to its interior. A petrographic analysis of the dike is used to describe the degree of magmatic differentiation. The mineralogic composition, texture and degree of metamorphism suggests the intrusive dike originated from an island arc magma or molten oceanic crust.

(Poster Presentation)

LEHANE, James R. and MORTIER, Jeffrey R.

Department of Geological Sciences

POSTGLACIAL AND HISTORIC EROSION RATES ON THE GENESEE RIVER: A DAM PROBLEM

(Richard A. Young)

A digital record of 3500 images for 65 miles of the Genesee River channel between Mt Morris and Rochester has been coordinated with GPS satellite mapping and 50 new radiocarbon samples to extend the record of channel meander behavior back to 12,000 years BP (before present). Preliminary results demonstrate that prehistoric erosion rates were slow in comparison with post-dam channel migration. Upstream erosion of farmland is severe along several reaches near Geneseo and contributes to sedimentation problems at the river mouth. The study will correlate stream discharge records with periods of maximum channel erosion (aerial photography) and with streambank characteristics to identify the variables that are associated with severe erosion episodes from 1950 to the present. Dam construction generally is associated with longer periods of bank-full discharge, which accelerates bank erosion. Prevention of overbank flooding also creates greater in-channel sediment loading. Suspended and bedload sediment moves erratically downstream and changes long-term dynamic equilibrium. The purpose of these studies is to provide information to the US Corps of Engineers that may be used to modify dam flood-discharge practices and to improve downstream harbor sedimentation remediation. A practical result for agricultural interests will be recommendations for streambank remediation measures.

(Oral Presentation)

LEHANE, James and STRAUSS, Stephen

Department of Geological Sciences

OLIGOCENE REEF DEVELOPMENT IN SOUTHWESTERN PUERTO RICO

(Jeffery Over)

Oligocene reef development in southwestern Puerto Rico Samples collected near Guayanilla, southwestern Puerto Rico, from Upper Oligocene carbonate strata that overlie the Juana Diaz Formation consists of large foraminifera and coral fragments in a mud matrix. The foraminifera *Lepidocyclina* is indicative of deposition in 20-30 meters of water in a deep fore reef environment. The strata represent the second cycle of a series of complex reef tract developments. This reef development is in contrast with the reef tract development on the northern coast of Puerto Rico in the time equivalent Lares Formation, which was deposited in a gentle sloping shelf environment. It is comparable to modern day reef development in steep shelf environments

(Oral Presentation)

LIPA, Bethany

Department of Chemistry

COMPARISON OF LEVELS OF MITOCHONDRIAL DNA AND THE 5-KB COMMON DELETION IN CELL LINES ESTABLISHED FROM TWO SIBLINGS BORN TO A MOTHER WITH OPTHALMOPLÉGIA

(Wendy Pogozelski)

We are studying mitochondrial DNA (mtDNA) using real-time polymerase chain reaction (PCR). PCR is a fast and quantitative technique that is utilized to measure a 4,977 base deletion in mtDNA. This deletion, often referred as the common deletion or Δ mtDNA4977, is the cause of numerous mitochondrial diseases. We are studying a family in whom mitochondrial disease, due to Δ mtDNA4977, has been diagnosed. The son was diagnosed with Pearsons marrow/pancreas syndrome due to elevated levels of Δ mtDNA4977 as shown by Southern blotting. Measurement of total mtDNA and deletion mtDNA levels via real-time PCR confirm this elevation. Low levels of the common deletion in the asymptomatic daughter were also confirmed by real-time PCR quantification. Our results reinforce that increased levels of mtDNA with the common deletion directly correspond to mitochondrial

(Poster Presentation)

MARTARANO, Jared

Department of Biology

TUMOR CELL GROWTH INHIBITION BY THE PRESENCE OF ELLAGIC ACID

(Robert O'Donnell)

Ellagic acid is a phenol compound that has suggestive anti-cancerous properties through the inhibition of carcinogen metabolism as well as the prevention of chemically induced tumors. A derivative of a plant phenol, Ellagic acid contains chemopreventative qualities to include acting as a scavenger by binding to cancer-causing chemicals and making them inactive. In addition, it has been shown to be a DNA topoisomerase (I and II) and PKC inhibitor. The effects of Ellagic acid were tested on three tumor cell lines to determine if the drug was cytotoxic or cytostatic for tumor cell growth and whether it could inhibit free radical production. Preliminary results showed that Ellagic acid is not cytotoxic to MatLyLu, MCF-7, or PC-3 cell lines and cytostatic capabilities are yet to be determined. MatLyLu and MCF-7, however, showed a decrease in free radical production when incubated with Ellagic acid for 48 hours. The results of the series of experiments conducted will help to determine if Ellagic acid has the potential to be an effective chemopreventative agent.

(Oral Presentation)

MEIDENBAUER, Julie and STREIT, Bennett

Department of Chemistry

FABRICATION OF DEUTERIUM-RICH ACCELERATOR TARGETS

(Dave Geiger)

We have fabricated deuterated polyethylene (DPE) films with various thicknesses and have developed a spectroscopic method for estimating the mass per area. We have also performed the polymerization of deuterated benzene to form deuterated para-polyphenyl (DPP), in high yields. DPP films are then prepared via vapor deposition in SUNY Geneseo's Thin Films Laboratory. Finally, we have developed a high yield synthesis of polystyrene and plan to polymerize deuterated styrene to prepare deuterated polystyrene (DPS). We are developing methodology for the preparation of DPS films.

(Poster Presentation)

MILLS, Kathleen

Department of Chemistry

EVALUATION OF SAMPLE PREPARATION METHODS FOR THE HPLC ANALYSIS OF T-RESVERATROL IN RED WINES

(James Boiani)

Coronary Heart Disease (CHD) is one of the leading health problems affecting people around the world. Studies have shown that red wine consumption may help in preventing this disease. The compound found in red wines that may be the basis of this prevention is known as t-resveratrol. However, wines are complex mixtures containing many components similar to t-resveratrol, which makes analysis for t-resveratrol difficult. Because of this, wine samples must be prepared before HPLC analysis to effectively extract and analyze the t-resveratrol found in the wine. There are two types of methods that may give efficient analysis results, and they are Solid Phase Extraction (SPE) and Solid Phase Micro-Extraction (SPME). This project will compare the efficiency of the two methods. The results will be presented and discussed.

(Poster Presentation)

MROZ, Renee

Department of Biology

APOCYNIN AND 4-AMINOGUAIACOL SUPEROXIDE ANION INHIBITION IN MAT-LYLU

(Robert O'Donnell)

Although usually associated with immune cells and endothelial cells, NADPH oxidase which is responsible for free radical production is also present in many other cell types, including cancer cells. In earlier studies, it was shown that two NADPH oxidase inhibitors, apocynin and 4-aminoguaiacol, were cytotoxic and caused apoptosis in a variety of cell types. In this study, we planned to determine whether these two drugs were inhibitors of NADPH dependent superoxide anion production in Mat-LyLu cells. Both drugs were tested at a variety of concentrations and superoxide anion inhibition was measured using a fluorescent assay for free radicals. Inhibition was seen with both drugs but the results were very inconsistent between trials. Experiments are currently underway to investigate the variation observed each week and between the varying concentrations of apocynin and 4-aminoguaiacol.

(Poster Presentation)

NORTON, Amy and MEDLEY, Sarah

Department of Geological Sciences

COMPOSITION AND ORIGIN OF BEACH SANDS, PUERTO RICO

(Jeffrey Over and Amy Sheldon)

Sand was collected from swash zones of beaches near Punta Tuna, San Juan, Isabela, and Rincon in Puerto Rico, and Mona Island. An analysis of grain size, mineralogy, and fauna was performed on the sand. Grain size analysis reflects the energy of the depositional environment. The majority of samples were coarse grained and moderately well sorted, indicative of a moderate to high energy level. The mineralogy is consistent with the regional source terrains, which include carbonate and igneous bedrock. Sand from Mona Island is dominated by biotic fragments, while the sands from the beaches around Puerto Rico are largely lithic and quartz dominated. Fragments of corals, mollusks, echinoderms, and foraminifera are the most common biotic sand sized particles in all of the samples. These sands represent varying lithologies and changes in wave energy around the island of Puerto Rico.

(Poster Presentation)

NOWAK, Tim

Department of Geological Sciences

ERRONEOUS DATES FOR ASH BEDS IN THE GREATER GREEN RIVER BASIN, WYOMING

(Jeff Over)

Zircon phenocrysts were recovered from ash beds from two tongues of the Green River Formation. A suite of phenocrysts from the ash beds was also collected for geochemical comparison to a possibly time equivalent rhyolitic tuff. Isotopic concentrations of Pb and U within the Zircon phenocrysts were measured using an ion microprobe at UCLA. The measured concentrations of $^{206}\text{Pb}/^{238}\text{U}$ versus $^{207}\text{Pb}/^{235}\text{U}$ were plotted on a concordia diagram. The plots for isotopic Pb and U concentrations of Zircons from the Luman and Tipton tongues yielded dates indicative of genesis in the Cretaceous period. These tongues are Eocene in age based on the presence of specific mammal fossils. The recovered Zircon phenocrysts were likely incorporated in the ash beds as a result of remixing and contamination of Zircon from older rocks.

(Oral Presentation)

PENKE, Nicole

Department of Chemistry

THE EFFECT OF HEAT ON AMYLOID BETA (1-40)-CONGO RED COMPLEX

(Kazu Yokoyama)

When proteins are damaged or denatured by internal or external factor, it curls up in various fashions. In some cases, the way it folds can create a serious problem for a human being, such as neurological diseases. For example, if the protein Amyloid b-peptide (Ab) misfolds, it can lead to Alzheimer's disease. We would like to study the mechanism of protein folding and why they fold in order to contribute toward the prevention of protein misfolding. One factor of protein denaturing is created by a temperature increase. We studied an aggregation or denaturing of amyloid -beta 1-40 through absorption and fluorescence spectroscopy. In this experiment, the congo red dye was used to probe the structural change (folding or aggregation of the protein).

(Poster Presentation)

PIKE, Matthew

Department of Biology

ASTREPHOMENE GUBERNACULIFERA IS CHEMOATTRACTED TO NITRATES

(Harold Hoops)

Motile organisms can often sense and respond to potential nutrients in their environment. In chemoattraction assays monitored by eye, our lab has shown that *Astrephomene gubernaculifera* (Chlorophyceae) displays chemoattraction to acetate, an energy source for this alga. Here we show that *A. gubernaculifera* also displays chemoattraction to nitrate using the same assay. Nitrate was chosen as a potential chemoattractant because organic nitrogen is often a rate-limiting nutrient for algae, and therefore the ability to respond to it might confer a selective advantage. The chemoattraction responses to acetate and nitrate appear to be different. When 1mM of acetate is present in the medium, the entire culture moves into a "cheetah spotted" pattern, forming rough circular clumps and delays the chemoresponse to nitrate significantly. *A. gubernaculifera* does not form a similar pattern when nitrate is present in the medium and the chemoattraction response to acetate is not affected by the presence of nitrate. So far, we have not determined what initiates the chemoresponses to either nitrate or acetate. The behavioral response to nitrate is not present at all stages of the cell culture, but is maximal at 50 hrs under our culture conditions. At this time, more than half of the original nitrate is left in the medium, so it does not appear as if nitrate depletion triggers the nitrate chemoresponse

(Poster Presentation)

RAINES , Summer

Department of Chemistry

**RADIATION CONTRIBUTIONS TO DNA DAMAGE IN THE HUMAN BODY: DELETION
QUANTIFICATION IN IRRADIATED AND LASER-EXPOSED INDIVIDUALS**

(Wendy Pogozielski and Stephen Padalino)

A reactive oxygen species called the free radical has been shown to significantly damage the phosphate-sugar backbone of DNA (1). Energy-rich processes often cause water molecules to split into these radicals, and are therefore an increasing area of interest in DNA breakage and repair. This project studies how two such processes, gamma irradiation and laser exposure, damage mitochondrial and nuclear DNA, respectively. Human cells are sub-lethally irradiated or shot with a neutron laser at lethal levels. Electrophoresis and densitometry are used to determine breakage position and relative quantity readings, while Real-time Taqman Polymerase Chain Reaction (PCR) is used to simultaneously amplify and quantify the DNA sequence of interest in cell suspensions. Current data is primarily qualitative, showing a correlation between the deleted:total mitochondrial DNA (mtDNA) ratio and increased irradiation dosage, as well as a greater quantity of linearized nuclear DNA as the level of laser exposure increases. However, long-extension PCR, bacterial cloning, and plasmid purification techniques were recently employed and will be used to produce a Real-time fluorescence standard curve for deletion quantification in the near future. This work has implications in both disease and terrorism prevention. Mitochondrial organelles function to produce energy for body cells, and deletions in mtDNA have been linked to diseases such as HIV, diabetes, Parkinson's, and autism (2). Specifically, mtDNA has important consequences for cancer therapy, as understanding the effects of radiation on mtDNA may result in the ability to fine-tune radiation doses to individual patients, thus decreasing the fatigue-related side effects commonly seen among radiotherapy patients. With terrorism a looming threat, it would be beneficial to understand the mechanisms and severity of DNA damage due to both irradiation and high-energy lasers. 1 Nicotera, T.M. et al. Cancer Research 1993, 53,5104-5107. 2 Schon, E.A. Trends in the Biochemical Sciences 2000, 25, 555-600.

(Poster Presentation)

RILEY, Dan and PETERS, Chris

Department of Physics and Astronomy

VORTEX DYNAMICS IN TWO-DIMENSIONAL INVISCID FLOW

(Savi Iyer)

Two-dimensional inviscid flow is governed by the Euler equations, which are essentially Newton's laws applied to fluid motion. Our goal is to model two and three dimensional flow by studying statistical properties. We will attempt to achieve this by means of computer simulations using the Geneseo Computer Cluster. The mathematical modeling we will be using is the standard approach where the flow space is divided into regions and a vorticity vector is assigned to each cell. This vector field will then be let to evolve via the Euler equations. We hope to see specific characteristics in the fluid flow that can be identified with physical phenomena.

(Poster Presentation)

ROSSCOE, Steven

Department of Geological Sciences

CONSTRAINT OF THE EIFELIAN-GIVETIAN BOUNDARY IN WESTERN NEW YORK

(Jeffrey Over)

The Middle Devonian Series is divided into the Eifelian and Givetian stages. In western New York the boundary between these stages has been poorly constrained within two formations of the lower Hamilton Group. The presence of a Givetian conodont, *Polygnathus linguiformis linguiformis* (epsilon morphotype), in the lower Levanna Shale of the Skaneateles Formation indicates that a previous correlation placed the stage boundary too high in western New York State. Based on the conodont fauna of the Oatka Creek Formation and the overlying Skaneateles Formation, the boundary is constrained between the Berne Member of the Oatka Creek Formation and the basal Levanna Member of the Skaneateles Formation. The position of this boundary is critical to correlation of eustatic sea level fluctuations of the Devonian sea in western New York and to other regions.

(Oral Presentation)

ROSSI, Karen

Department of Biology

INVESTIGATIONS OF NEW APPROACHES TO BREAST CANCER THERAPY

(Robert O'Donnell)

The Fas Ligand/Fas Receptor (Fas-L/Fas-R) pathway functions to control immune activity and is a means of immune escape by tumor cells. In their interaction with immune cells, some tumor cells can signal apoptosis (programmed cellular death) in the Fas-R bearing activated immune cells. Unstimulated MCF-7 cells do not express Fas-L or Fas-R as shown in my preliminary experiment and by others. However, estrogen stimulates the secretion of Fas-L by estrogen receptor positive MCF-7 cells, and long term estrogen deprivation (LTED) induces the expression of Fas-R on the surface of these cells. Since tamoxifen (TAM) at a concentration of 2ug/ml and retinoic acid (RA) at a concentration of 2 uM have been shown to reduce the growth of MCF-7 cells, experiments are being done to determine if TAM + RA can provide conditions similar to estrogen deprivation. In preliminary experiments, TAM + RA at the above concentrations killed the MCF-7 cells. Because of this toxicity, experiments are underway to determine the highest tolerable dose that still allows sufficient growth for maintenance of the culture. When the cells are plated for 48 hours in TAM [0.50 ug/ml] and RA [0.50 uM] growth was partially inhibited. Experiments are currently underway to determine if cells maintained under these conditions will up regulate Fas-R expression and if estrogen can stimulate Fas-L secretion.

(Poster Presentation)

RUDZINSKI, Scott and OLSZEWSKI, Maureen

Department of Biology

QUANTITATIVE DETERMINATION OF E-CADHERIN, P-CADHERIN, AND VIMENTIN IN SQUAMOUS EPITHELIAL CELLS BASED ON REAL-TIME PCR

(Jani E. Lewis)

Progression to a malignant carcinoma often involves an epithelial to mesenchymal transition. The characteristics of this transition are the downregulation of epithelial hallmark proteins, such as E-cadherin and P-cadherin, and the upregulation of fibroblastic proteins including vimentin. Real time PCR is used to better quantify the downregulation of E- and P- cadherin and the upregulation of vimentin in A2P2 cells, a subclone of squamous epithelial carcinoma cell line A431, by indirectly measuring the amount of the respective protein's mRNA. Cells that have been treated with dexamethasone at the concentration of 10^{-7} M have shown a trend in decreasing levels of E- and P-cadherin mRNA dependent on time, and increasing levels of vimentin mRNA.

(Poster Presentation)

SCHULTZ, Kevin

Department of Chemistry

SUPEROXIDE'S KRYPTONITE: NADPH OXIDASE INHIBITORS

(David K. Johnson)

NADPH oxidase is an electron transport system in the endothelial cells (EC) that is involved in the generation of superoxide (O_2^-). Several ortho-methoxy-substituted catechols, are known NADPH oxidase inhibitors. These compounds inhibit the release of the superoxide anion (O_2^-), by preventing the assembly of a functional NADPH oxidase complex. 4-Aminoguaiacol and 2,4-dimethoxyphenol were investigated as NADPH oxidase inhibitors. Both have an electron donating group at the C4 position which has been proven to increase the compounds inhibition activity. In aqueous conditions, 4-Aminoguaiacol forms an unstable zwitterion. 2,4-Dimethoxyphenol, however, prevents ionization due to the C4 methoxy group. 2,4-Dimethoxyphenol was synthesized and its dimer prepared. Presently, we are in the process of isolating the dimer, determining its exact inhibition activity and comparing its activity to that of 4-aminoguaiacol.

(Poster Presentation)

SILLICK, Craig

Department of Biology

A HIGH RESOLUTION PROFILE OF THE CLIMATE CHANGE OBSERVED DURING THE TRANSITION FROM THE LATE GLACIAL TO HOLOCENE AT DEER LAKE BOG, NEW HAMPSHIRE

(Ray Spear)

To better understand the currently changing climate, it is important to first examine previous natural climate fluctuations. Past terrestrial climate change events can be observed in a number of ways, including the study of freshwater sediment cores. One such core was collected during the summer of 2002 from Deer Lake Bog, New Hampshire, located at an elevation of ~4,200 ft in the White Mountains. This site is currently located just below the tree line on a mountain slope, making it a particularly sensitive location to climate change. This ecological sensitivity should allow for the detection of small climate changes that are difficult to observe in other ecosystems. This core will be analyzed for the purpose of creating a high-resolution profile of the climate transition experienced as the late glacial period gave way to the Holocene. Analyzing the sediment core's organic matter percentages, pollen contents, and chironomid contents at the 1.0-cm intervals will allow us to infer information regarding the local temperatures and forest composition of Deer Lake Bog over this time period. The age of these sediment depths can then be determined by radiocarbon dating, allowing for the creation of this profile.

(Poster Presentation)

SIMONS, Richard

Department of Physics and Astronomy

PHOTOCHEMICAL PROPERTIES OF RUTHENIUM COMPLEX INTEGRATED WITHIN SOL-GEL MATRIX

(Kazu Yokoyama)

Samples of silica gel were formed using a hydrolyzed tetraethoxysilane solution doped with Ru(bpy)₃²⁺. Cover slides were then prepared by a dip-coating technique to obtain a thin film for analysis. Optical absorption spectra of the Ru(bpy)₃²⁺ doped silica gel on a clean cover slide displayed an intense peak at 450 nm. Using a 20 ns pulse laser apparatus the emission decay of the ruthenium complex in a sol-gel matrix was found to possess two distinct time components (200 nanosecond and 1 microsecond time constants). Each of the curves differed from the emission decays acknowledged for the ruthenium complex present in solution, and were used to determine the lifetime of the ruthenium complex immersed in the sol-gel matrix. The ruthenium sol-gel complex was then purged with N₂ and the emission decays were measured. However, we did not find significant effect on the lifetime of the Ru(bpy)₃²⁺ in the sol-gel matrix.

(Poster Presentation)

SPAZIANI, Amy and BARRY, Peter

Department of Geological Sciences

GEOLOGY OF THE CERRILLOS BELT, PUERTO RICO: MAKING AND BREAKING BASIN DEPOSITION

(Amy Sheldon, Jeff Over, and William Brennan)

The Cerrillos Belt is a 110 km long sedimentary belt that stretches southeast from the northwest portion of Puerto Rico near the Rincon Penninsula to Ponce. The Cerrillos Belt is comprised of three formations, the Rio Culebrinas Formation in the northwest, the Anon Formation in the center of the island, and the Monserrate-Rio Descalabrado Formation in the southeast, all of which are Eocene in age. Emphasis is placed on the Rio Culebrinas and Monserrate Formations which are composed of clastics, epiclastic and volcanoclastic sediments. Turbidites as well as extensive folding and faulting are common in these formations. Strike and dip measurements obtained in the field describe the degree of folding and northeast plunge of an outcrop north of Ponce. Turbidite sequences and marine fauna identified in samples obtained from outcrops located near the Rincon Penninsula and Ponce indicate basinal marine deposition. The mineralogy of the sediments indicates possible volcanic source areas.

(Poster Presentation)

SPINELLI, Amy

Department of Biology

TRACING THE LIFE HISTORY OF LOCAL AMPHIPOD SPECIES

(Kristina Hannam)

Little is known about the local life history of the amphipod species *Gammarus Pseudolimneus*. This species is prevalent throughout Caledonia, New York's Spring Brook. Recent interests have been shown for this species due to its potential as an indicator species. Its ability to be a good indicator lay in the fact that it survives in a narrow range of Dissolved Oxygen levels, so fluctuations in DO levels can be monitored by this species. This indication can lead to preventative measures that can be taken so that other organisms found in the creek community will not be harmed by these fluctuations. Preliminary research has begun in tracing the life history of the particular species keyed out in Caledonia's Spring Brook. An amphipod sample has been collected every six weeks using a randomly placed 0.5meter quadrat. Several measurements consisting of temperature, water depth, water flow rate dissolved oxygen will be taken at each sampling. Through a careful process amphipods are removed from rocks found inside the quadrat and transferred back to the laboratory where they will be analyzed. They will be keyed to species, and their sex and length will be noted. Other characteristics such as mate pairing, presence of parasites, presence of eggs will also be observed. This has been compiled every eight weeks and will continue to be throughout the semester. This descriptive data will enable us to formulate hypotheses about the basic ecology and behavior of local amphipods, and answer questions dealing with reproductive success, competition, and host-parasite interactions.

(Poster Presentation)

STORK, Allison

Department of Biology

LATE QUATERNARY CLIMATE CHANGE OF A HIGH ELEVATION BOG

(Ray Spear)

The purpose of this project is to reconstruct environmental changes, especially climate variation, at the transition from Late-glacial to the Holocene in a high elevation bog, Deer Lake Bog, New Hampshire, elevation 4200 feet. Sediment cores were extracted for analysis, and to begin, each core was sliced at 0.5 cm intervals, and from each slice, subsamples were taken for loss on ignition (LOI), chironomid assemblage, and pollen assemblage. These are paleoenvironmental indicators used to assess the environmental changes. LOI analysis involves the weighing and burning of volumetric sediment samples to obtain the relative percentage of organic material in each subsample. This in turn can be correlated to a base level climate pattern. Chironomid analysis is the identification of the assemblage of chironomid species in each subsample. Using a transfer function, the species assemblage can be converted into climate data. Utilizing pollen assemblage data, relative climate information may also be inferred. By comparing plant assemblages in the bog to plant assemblages found in different climatic regions today, one can deduce what the climate was like in the past. This paleo-climatic data is fundamental to understanding climate patterns and their variations in the world today.

(Poster Presentation)

SUN, Xiaoyun

Department of Computer Science

DOCUMENT IMAGE ANALYSIS SYSTEM

(Christian Shin)

Despite the trend that documents increasingly originate on the computer, it has not decreased the amount of paper documents in an office environment. Documents are still printed out for reading, dissemination, and markup. Advances in document image analysis and recognition have resulted in systems that are able to effectively store, manipulate, and retrieve documents from archives of scanned document images. These systems require fundamental document image processing techniques to be able to extract information that can be used for effective document management. We have surveyed document image analysis techniques, and developed a system that implemented a set of fundamental document image processing techniques. The techniques we implemented include the basic morphological operations for noise reduction: erosion and dilation, the connected component analysis, the Hough transform for the detection of document skew and interline spacing, the projection-profile to assist rapid and reliable top-down segmentation into text lines and blocks as well as graphics and halftone image blocks, the page segmentation and classification, layout and logical structure analysis. We implemented our system on the Sun SparcStation running Solaris 7 operating system using the object-oriented programming language, Java, with Java Development Kit (JDK) 1.4.1 with the Java Advanced Image (JAI) package.

(Poster Presentation)

SZALKOWSKI, Veronica

Department of Biology

**FINDING THE SEROTONIN RECEPTOR IN THE PEDAL MUSCLES OF APLYSIA
BRASILIANA**

(Duane McPherson)

Serotonin (5-HT) is known to modulate the effects of motoneurons on the pedal muscles of *Aplysia brasiliana*. It causes an increase in muscle contraction, contraction rhythm, muscle relaxation rate and the concentration levels of cAMP. It is believed that the increased cAMP level is caused by a G-linked protein and may be linked to the increased muscle relaxation rate. At this time, we are primarily interested in labeling and classifying this receptor with future plans to map out this signal pathway. Thus far, the effects of mianserin, buspirone and ketanserin, 5-HT receptor antagonists, on cAMP levels have been measured in an attempt to identify which 5-HT receptor is involved in muscle relaxation.

(Poster Presentation)

TABACZYNSKI, Alaina

Department of Chemistry

**STEPS TOWARD THE SYNTHESIS OF A PHOSPHATE HAPTEN AND THE
CORRESPONDING CARBONATE SUBSTRATE FOR HYDROLYSIS BY POLYCLONAL
CATALYTIC ANTIBODIES**

(Eric Helms)

Over the past summer and the past two semesters, our lab has focused on the organic synthesis of a novel chiral molecule with the long-term goal of raising a polyclonal antibody preparation capable of catalyzing the hydrolysis of this synthesized molecule. Synthesis of both the substrate and the hapten is imperative before analysis of catalysis with the antibodies may be carried out. The hapten is a stable molecule that closely mimics the structure of a high-energy intermediate present during the hydrolysis of the substrate. This is the molecule injected into an animal as a foreign particle in order to produce the immune response eliciting antibodies specific for the hapten. Once we have successfully made and purified both compounds, a kinetic analysis of the uncatalyzed hydrolysis of the substrate will be performed. This rate of hydrolysis will later be the basis in determining whether the polyclonal antibody preparation is capable of catalyzing the reaction. Currently, our work consists of designing a substrate and hapten and mapping out the steps involved in synthesizing each. The wide array of possible molecules has proven the difficulty in deciding which will serve as the best candidate for antibody catalysis. Several attempts have been made for the synthesis of various haptens, which has narrowed down the plethora of options with the current attempt looking hopeful.

(Oral Presentation)

TEO, Tracy

Department of Biology

CELL ADHESION MOLECULES ASSOCIATED WITH LENS ADHERENS JUNCTIONS

(Jani Lewis)

The dynamic changes in cellular relationships during the course of lens development and the maintenance of proper intracellular relationships in the mature lens are likely to be dependent on cell-cell interactions mediated by cell adhesion molecules. Lenses that failed to establish or maintain proper fiber cell organization may be a cause of age-onset cataracts. Components of cell adhesion molecules that were commonly detected in the lens include N-cadherins, α -, β -, and γ -catenins. We are interested in quantifying these components of adherens junctions, and correlate their interactions and expression levels over time. This will be done by immunohistological examination of these proteins in the developing chick lens over time.

(Poster Presentation)

THOMPSON, Kimberly and CERVELLO, Kimberly

Department of Mathematics

CORRELATIONS BETWEEN STUDENTS' EXPERIENCES IN HIGH SCHOOL AND IN CALCULUS I

(Andrzej Kedzierawski)

Based on the survey of students enrolled in four sections of Calculus I in the fall of 2002 at SUNY Geneseo, we found correlations between the educational experiences of the students in high school and their performances in Calculus I. Our results may lead to better predictions of students' successes in Calculus I and provide information for efficient assistance to students.

(Poster Presentation)

WALDAUER, Alex

Department of Physics and Astronomy

GRAVITATIONAL LENSING AND LIGHT CONES

(Savi Iyer)

One of the classical tests of general relativity is the experimental evidence of bending of light in a gravitational field as predicted by the theory. The geodesic path of light in four dimensional (3 space- and 1 time- dimensions) when projected into the three spatial dimensions results in a "non-straight" path for light. The amount of bending from a straight path is related to the strength of the gravitational field. When light from an extended object traverses a strong field region the lights rays are bent much like in geometrical optics. This is called gravitational lensing. We will present some basic ideas related to a new approach in general relativity to understand gravitational lensing.

(Oral Presentation)

WALRATH, Holly and NAWOJSKI ,Timothy
Department of Mathematics
LINKED OR "KNOT"
(Jeff Johannes)

When you think about knots, you often think of taking a piece of string and forming many different shapes with it. What happens when you add more strings together? We looked at the planar graphs of certain types of knots and found that the Borromean rings form a special type of planar graph. By looking at the graphs we can construct knots that are linked with one or more components. We will examine the Borromean rings and planar graphs that form a "cycle".

(Oral Presentation)

WELCHONS, Daniel
Department of Chemistry
THE EFFECT OF HEAT ON OVALBUMIN-CONGO RED COMPLEX
(Kazushige Yokoyama)

The heat denaturation in ovalbumin was considered to cause a beta-sheet formation, and the protein aggregation may be caused by intermolecular interaction of cross beta-sheet. The Congo Red dye (CR) has a tendency to bind with the aggregated form of proteins, so we used CR as a probe to detect a beta-sheet formation or aggregation. We investigated a formation of the ovalbumin-CR complex, a possible aggregation condition, and a certain bond leading to protein aggregation. We confirmed that heat treated ovalbumin forms beta-sheet and our result suggests that the heat treated form of ovalbumin is bound to the azo group of CR and is conducive to aggregation. The femtosecond transient transmission study conducted on the CR and CR-ovalbumin complex, and the effect of heat in relaxation dynamics of the complex was studied. In our study, no significant difference in dynamics between the CR and CR-ovalbumin complex was observed. We found through fluorescence and absorption spectrums that the CR-ovalbumin complex exhibited conformational changes at a temperature over 60 degrees Celsius.

(Poster Presentation)

ZANG, Michael and RENGASAMY, Sharmila
Department of Biology
UNDERSTANDING THE MECHANISM OF RESISTANCE IN A HUMAN LEUKEMIA CELL LINE
(Robert O'Donnell)

Chemotherapy has proven to be a relatively successful method in treating acute promyeloid leukemia. Doxorubicin is one of the numerous chemotherapeutic agents used to fight this cancer type. A major problem in using chemotherapeutic drugs is achieving elimination of all cancer cells due to the onset of a resistant phenotype. In order to better understand the mechanism utilized by the resistant phenotype, an in vitro model of resistance was established in the HL-60 leukemia cell line and maintained at .00015 mg/ml. Preliminary experimentation comparing the control and resistant cell lines has indicated no up-regulation of the transmembrane protein MRP-1 and no gene amplification at the chromosomal level in the resistant cell line. Current studies are underway to look for differences in protein content as well as differences in dye up-take between the two cell populations. Understanding the mechanism of HL-60 resistance will help to better define cancer cell resistance and may indicate methods for circumventing the phenotype.

(Oral Presentation)

ZINNI, Bethany

Department of Geological Sciences

SALTY COWS, THE DEVELOPMENT OF A METHOD TO QUANTIFY AMOUNTS OF AIR-BORNE SEDIMENT

(Amy Sheldon)

An airborne sediment collection method was designed to evaluate the dispersal of salt from an outdoor uncovered storage pile at the American Rock Salt Hampton Corners mine site. Dry-sediment samplers were created using wooden rings fitted with cheesecloth that was coated with a thin layer of silicon grease. Samplers deployed in the field were mounted on wooden stakes perpendicular to the prevailing wind direction for several days. After collection the cloth was soaked and rinsed with distilled water. The resulting solution was allowed to evaporate, thereby precipitating the salt. Laboratory tests indicate that the majority of salt originally collected by the sampler was recovered by this technique. This method was applied in a study examining the dispersal of salt from American Rock Salt's Hampton Corners mine. Eight field-sampling locations were chosen, four downwind of the storage pile and four distal to the site. The samplers were deployed on three separate occasions over varying lengths of time and climatic conditions. The results will be compared to evaluate the distribution of air-borne sediment in the area.

(Poster Presentation)

Post-deadline abstracts

Salty Cows and Brine Shrimp: A Comparative Study of Salt Mining

By Bethany Zinni and Scott Maguffin

Salt is mined using three general techniques: evaporation, underground cavern mining, and solution mining. Underground mining of a 420 million year old salt lens in western New York State utilizes cavern mining and solution mines. Evaporation involves isolation of sea water in natural or artificial pans where salts are concentrated from solution. This technique is currently employed on the southern coast of Puerto Rico at Caba Rojo. These salt techniques have different environmental impacts and may produce salts of differing chemical compositions. We plan to analyze these compositions with a scanning electron microscope.

Transcriptional regulation of E-cadherin by Dexamethasone

Brian Boeing

E-cadherin, an essential protein for the architecture and maintenance of epithelial tissues, is often down-regulated during metastasis at the late stages of epithelial tumor progression. In the vulvar carcinoma cell line A431, E-cadherin is downregulated by the synthetic glucocorticoid dexamethasone. Expression of the transcription factors Snail, SIP1 and STAT5, have been correlated with E-cadherin downregulation. To investigate if any of these factors play a role in the downregulation of E-cadherin by dexamethasone, we will test for the presence and levels of these factors before and after treatment with dexamethasone. This is will accomplished using rt-PCR and northern blot analysis.

Stability Studies of 4-Aminoguaiacol

Mirela Bruza, Jennifer Gewandter

Advisor: David Johnson

NADPH oxidase is an electron transport system in the endothelial cells (EC), which results in the generation of superoxide (O_2^-). Because NADPH oxidase form O_2^- species, which causes an increase in low density lipoprotein (LDL) uptake into the intima, it has been found to play a critical role in the development of atherosclerosis. An increase in the LDL concentration increases the activity of NADPH oxidase, and therefore reactive oxygen species (ROS). This in turn propagates a vicious circle of increased LDL uptake and NADPH oxidase activity. 4-Aminoguaiacol has been studied as a powerful NADPH inhibitor. The reaction of 4-aminoguaiacol with NADPH oxidase subunits prevents the subunits from assembling and forming the active complex. The purpose of our research is to explore the stability of 4-aminoguaiacol. These studies were analyzed using HPLC and NMR analysis. The results showed that the 4-aminoguaiacol dimer was stable, while the standard solution was not. Further analysis determined that the decomposition of 4-aminoguaiacol standard was the formation of a zwitter ion.