

STUDENT RESEARCH DAY

April 26, 2004

Schedule of Presentations

Red Dragon Theater

- 2:00** **Opening Remarks.**
Eileen Morgan-Zayachek, Chair of Senate Committee on Research
- 2:10** **Dr. F. Daniel Larkin, Provost**
- 2:15** **Problems and Approaches to Game Development.**
Students: Ryan Laytham, Charles Gavett, Matthew Weinell |
Faculty: Don Allison, Dennis Higgins
- 2:30** **Claimsmaking by Postcitizenship Movements: The Case of
the Tobacco Control and the Animal Rights Movements.**
Student: Kelly Lamb | Faculty: Brian Lowe
- 2:45** **Benthic Macroinvertebrates as Water Quality Indicators in Streams
of the Central Adirondacks.**
Student: Caitlin E. Stewart | Faculty: Tracy Allen
- 3:00** **Guest Presentation: Kelly (Milunich) Matri**
- 3:15** **Break for Poster Sessions, Union Square.**
- 4:00** **The Design, Construction, and Harmonic Analysis of the
Dinh Pa.**
Student: Julie Arrighi | Faculty: Paul French

- 4:15 Changing the “Nature” of Fairy Tales: A Survey of Henry Beston’s Fairy Tales, Influences, and Naturalist Perspectives.**
Students: Andrea L. Braunius, Justine LaMantia |
Faculty: Daniel Payne
- 4:30 Field Evidence Indicated Substantial Subglacial Water Erosion on An Outwash Substrate, Bering Glacier, Alaska.**
Student: Samuel McTavey | Faculty: P. Jay Fleisher
- 4:45 Two Newly Discovered Human Genes May Encode Proteins Associated with the Proteasome.**
Student: Neville Campbell | Faculty: Nancy J. Bachman
- 5:00 Dr. Alan B. Donovan, President**
- 5:10 Effect of Land Use and Geologic Setting on Surface-water Chemistry and Drinking-water Quality.**
Students: Fred Krone, Jeremy Silverman | Faculty: Arthur Palmer
- 5:30 The RGB Color Cube.**
Students: Dannel Gomiller, Fawad Shahid | Faculty: Thomas Sakoulas, James Ryder
- 5:45 I Am the Land: Myth and Ritual in the Evolution of John Steinbeck.**
Student: Sarah E. Courtney | Faculty: Patrick Meanor
- 6:00 Construction of Reporter Luciferase Genes to Assess NOC4 Gene Expression.**
Student: Nicholas Simon | Faculty: Nancy Bachman

6:15 Break for Poster Sessions, Union Square.

**Student Research Day Presentations
(in order of delivery)**

Problems and Approaches to Game Development

Students: Ryan Laytham, Charles Gavett, Matthew Weinell
Faculty: Don Allison, Dennis Higgins

For this student research grant we explored techniques for development of interactive (computer-based) tools and games. We encountered many unexpected pitfalls, particularly with regard to exporting files from one format to another. A few of these were successfully resolved. We completed a model of Fitzelle Hall which included chairs, computers, tables, lights and many other objects. We explored a number of game formats and directions for this model, including campus tours, interactive directions. Within Computer Science, we sparked interested in this project and hope to staff an ongoing game development project with undergraduates next year. We have also pursued interdisciplinary collaborations, particularly with Computer Art.

Claimsmaking by Postcitizenship Movements: The Case of the Tobacco Control and the Animal Rights Movements

Student: Kelly Lamb

Faculty: Brian Lowe

Scholars of social movements in post-industrial societies have noted that a commonality shared by these movements is that they attempt to persuade both members and potential sympathizers of the legitimacy of their claims through circulating visual and printed media that is often emotionally charged. Another goal of these movements, besides attempting to gain legitimacy for their own claims, is to challenge the credibility of their opponents: what Joseph Gusfield (1986) termed "status politics".

The focus of our research has been to explore the various tactics employed by social movements to both advance their own causes, and to challenge the legitimacy of their opposition within the literature produced by these movements for members and potential sympathizers. We have acquired a variety of materials, including visual, audio, and printed literature, representative of the animal rights and tobacco control movements in order to conduct a content analysis of how these two movements have attempted to shape communications that bolster the movements and weaken their opposition. Our analysis demonstrates that both movements utilize a combination of scientific data and emotional appeals to advance their claims and weaken the counterclaims of opponents. These "reasonably emotional" appeals appear to encourage positive emotions towards the objects of concern (such as animals) without appearing overly emotional and encourage a negative emotional reaction towards opponents.

Benthic Macroinvertebrates as Water Quality Indicators in Streams of the Central Adirondacks

Student: Caitlin E. Stewart

Faculty: Tracy H. Allen

Streams of the Central Adirondack region of New York were assessed by collecting, identifying, and quantifying benthic macroinvertebrates. These organisms are excellent water quality indicators because they cannot migrate to different locations when they are in their early life stage forms, and therefore, can be used to determine site-specific stream conditions. Specific taxa, such as mayflies, stoneflies, and caddisflies, cannot tolerate aquatic pollution, need large amounts of dissolved oxygen in order to survive, and are indicators of good water quality. Leaches, aquatic worms, and midges are able to survive in more polluted environments, require small amounts of dissolved oxygen to live, and are indicators of poor water quality. Benthic macroinvertebrates were collected from fifty streams throughout the Central Adirondacks. Macroinvertebrates from each sample were identified and counted. For comparison and

accuracy assessment purposes, other water quality parameters, including pH, conductivity, and turbidity, were measured with electronic monitoring equipment. In order to make accurate observations and comparisons, three pristine control streams (Beaver Creek, Sucker Brooke, and Mill Stream) were chosen far from human development and impact. The study concluded that 36 sample sites had excellent Biological Index values, 8 streams had good Biological Index values, 4 streams had fair Biological Index values, and 2 streams had poor Biological Index values. Percent Model Affinity indicated a range in water quality from excellent (5 streams) to good (12 streams) to fair (15 streams) to poor (18 streams). In most cases, mayflies, stoneflies, or caddisflies were the dominant species, indicating overall excellent water health. A comparison of known water quality standards to sample macroinvertebrates revealed that water quality can be accurately evaluated by analyzing the composition, number, and order of macroinvertebrates.

**Invited Presentation by
Kelly Matri
Class of 1993**

I'm a native upstate New Yorker who earned a BS in Geology from SUNY College at Oneonta in 1993. I also earned my MA in Earth Science from SUNY Oneonta in 1999. I moved to New Jersey in 1995 and began working for Handex Environmental as a hydrogeologist. After four years with Handex, I left and worked for a year with Groundwater and Environmental Services (GES), also as a hydrogeologist. While working for GES, I taught Introductory Geology as a part-time adjunct professor for William Patterson University in Wayne, NJ. I enjoyed teaching so much that I decided to switch careers and teach full time. In September of 2000 I began teaching Geophysical Science at Middletown High School South in Middletown, New Jersey. I'm still teaching in Middletown and achieved tenure this past fall.

The Design, Construction, and Harmonic Analysis of the Dinh Pa

Student: Julie Arrighi
Faculty: Paul French

The dinh pa is a traditional Vietnamese resonant pipe instrument made of bamboo and tuned to the pentatonic scale. A chromatic two-octave instrument has been built from PVC pipe and mounted on three separate wooden stands. Design issues of sound quality, dynamic range, versatility, portability, durability, storage, and ergonomics were considered when choosing tuning reference, tuning method, range, pipe diameter and wall thickness, mallet design, and stand design. The harmonic analysis yielded these results:

- The lower notes have sharper peaks and display up to eight distinct harmonics above the fundamental frequency, while the upper notes are limited to one or two harmonics.
- Note duration decreases with frequency. The duration of individual harmonics within a note also decreases with frequency.
- An electronic tuner was found to give better tuning information than the Fast Fourier Transform analysis.
- The upper frequency limit decreases with pipe diameter.
- The ratios of the harmonics to the fundamental frequency are slightly less than the integral ratios predicted by simple acoustic theory.
- The end correction (departure of fundamental frequency from that predicted by simple theory) appears to increase with pipe diameter.

Changing the "Nature" of Fairy Tales: A Survey of Henry Beston's Fairy Tales, Influences, and Naturalist Perspectives

Students: Andrea Braunius, Justine LaMantia
Faculty: Daniel Payne

Henry Beston (1888-1968), best known as a nature writer (*The Outermost House*), was also a recognized author of children's stories—the most notable of which are *The Starlight Wonder Book*, *The Firelight Fairy Book*, and *Henry Beston's Fairy Tales*. Beston first undertook the authorship of fairy tales as personal therapy upon his return from World War I. Beston's fairy tales are free of any 'grue' which would serve to frighten children unnecessarily; he was a firm believer in presenting children with life-realities without subjecting them to the materials of nightmares (unlike the tales of the brothers Grimm and certain of Perrault's stories). Beston's stories are notable for their emphasis on the natural world, their humorous imagination, their adventurous spirit, and the moralistic philosophies Beston held to be most valuable (unity, appreciation of nature, independence of spirit, determination, service, etc.). Beston's naturalist philosophies, as expressed in his nature writing, are inseparable from his children's writing.

Field Evidence Indicated Substantial Subglacial Water Erosion on An Outwash Substrate, Bering Glacier, Alaska

Student: Samuel McTavey
Faculty: P. Jay Fleisher

Outwash terrain overridden during the 1993-95 surge on the eastern ice front of the Bering piedmont lobe is now being uncovered by rapid retreat. Two recently exposed subglacial basins that did not exist prior to the surge, the largest being 0.75 km², project a minimum of 15m downward into the pre-surge landscape. They are located immediately up glacier from the 1995 surge-limit moraine and in the vicinity of outburst sites and extensive sandar on Weeping Peat Island. Topographic information gathered prior to the surge is compared with post-surge landforms, with specific focus on formative processes leading to an assessment of the relative significance of erosion of ice versus water.

The dominate effects of overriding ice include the formation of fluted drumlinoid hills, deposition of a new till, and construction of a semi-continuous push moraine. Substrate glacial erosion appears limited to the truncation of outwash bedding beneath streamlined slopes. Basins cut in outwash do not appear gouged by ice. Annual field observations of retreat indicate that ice marginal streams were not a factor in basin formation. Instead the basins appear to have been scoured by pressurized, subglacial meltwater moving through conduits toward outburst sites. The erosional effects of this process working on an unconsolidated substrate appear to far exceed that of the overriding ice.

Two Newly Discovered Human Genes May Encode Proteins Associated with the Proteasome

Student: Neville Campbell

Faculty: Nancy Bachman

The human genome project has led to the discovery of novel genes. Our lab has been characterizing two such genes. Neighbor of COX4 (*NOC4*) is a gene found in close proximity to cytochrome oxidase subunit IV, a component of the mitochondrial respiratory chain enzyme. We have also identified a gene for a second protein, CGI-112, closely related to *NOC4*, which is 40% identical in amino acid sequence. The CGI-112 gene is located on chromosome 14 in close proximity to genes encoding subunits of the PA28 (11S) proteasome regulator. The proteasome is an essential protein degrading complex. The PA28 alpha and beta subunits comprise a regulatory complex important for antigen processing in the immune system. We have examined the subcellular localization patterns of Green Fluorescent fusion proteins of *NOC4* and CGI-112. Both proteins are widely distributed in the cell, and are found in both the nucleus and the cytoplasm. This pattern of localization is distinct from that observed for cytochrome oxidase IV and mitochondrial marker dyes. The pattern of subcellular localization observed for *NOC4* and CGI-112 proteins are strikingly similar to that observed for components of the proteasome. This has led us to develop a working hypothesis that these proteins may be associated with the proteasome, for example in its structure, assembly or regulation. Experiments are in progress to test for colocalization of *NOC4* and CGI-112 Green Fluorescent Proteins with components of the proteasome, such as the PA28 regulatory subunits. This research seeks to establish a link between protein turnover and mitochondrial energy metabolism, both of which are significant in understanding diabetes and neurodegenerative disorders.

Effect of Land Use and Geologic Setting on Surface-water Chemistry

and Drinking-Water Quality

Students: Fred Krone, Jeremy Silverman

Faculty: Arthur Palmer

The quality of our drinking water depends on the types of material through which the water flows, and the types of land use. We examined these issues in three different areas: Middleville, New York, Roxbury, New York, and West Paris, Maine. Using EPA guidelines to determine the effects of different geological settings as well as land use conditions on surface-water quality, we identified potentially harmful levels of different elements and their typical settings. The dissolved components related to geologic setting were calcium, magnesium, iron, lead, and arsenic. The components related to different land uses were selenium, nitrates, cadmium, and turbidity. Sample locations based on geologic setting included the siliciclastic Catskill Mountain terrain, the Carbonate terrain of the Mohawk Valley, and complex igneous terrain in Southwest Maine. Types of land use included active agricultural lands, woodlands, an old dump site, and an old strip mine.

Levels of selenium, lead, zinc, cadmium, arsenic, and iron were determined with an Inductively Coupled Plasma – Atomic Emission Spectroscopy unit. Levels of calcium and magnesium were measured by titration, and levels of nitrates, turbidity, manganese, and fluoride were determined using a HACH DR3000 spectrophotometer. Our results were calculated in parts per million (mg/L), and the different locations were compared.

The most sensitive indicators of the influence of bedrock were magnesium and calcium which attained concentrations up to 25 times greater in carbonate environments than in siliciclastic and igneous regions. The most sensitive indicators of land use variations included nitrate levels attributed to farming and, potentially, selenium levels attributed to an old dump. In summary, we have investigated fourteen different water quality parameters and identified six different concerns affecting the quality of the water. These concerns arise primarily from the changes in land use, not the changes in the bedrock in our sample area.

The RGB Color Cube

Students: Dannel Gomiller, Fawad Shahid

Faculty: Thomas Sakoulas, James Ryder

Color plays a role in many disciplines. We propose to build an Red-Green-Blue color cube to be used to gain greater understanding of the RGB color space, its relationship to other color models, and to steganography when applied to least significant bit (LSB) color palette replacement algorithms. The RGB color space is used to generate colors on computer displays. The method used to generate colors varies. Printers, for example, use the Cyan-Magenta-Yellow-Intensity (CMYK) color space. When a graphic image on a computer monitor is printed, a conversion must take place from RGB to CMYK in order for the image to be printed by an inkjet printer. When mixing colors, the CMYK color space is used. There is a relationship between the two color spaces is sometimes not obvious. However, it is virtually impossible to find a cube that

breaks into pieces for further inspection. This cross-discipline endeavor, between art and computer science, has created one such RGB color cube that can be broken into sixty-four distinct sub-cubes with each face displaying the color gradient for that two-dimensional range.

I Am the Land: Myth and Ritual in the Evolution of John Steinbeck

Student: Sarah E. Courtney
Faculty: Patrick Meanor

Traditionally, American writers hold an inherent preoccupation with the land, and John Steinbeck is no exception. In fact, in a letter addressed to his former Stanford roommate, Steinbeck articulated his conception of the integral relationship between individuals and the land: "Each figure is a population, and the stones, the trees, the muscled mountains of the world-but not the world apart from man-the world and man-the one indescribable unit man plus his environment." Steinbeck's view of the natural world had great significance for his writing. As critic Robert DeMott explains, Steinbeck recorded the lives of people in his novels so that they would serve as a means of expressing the rooted part of the elements out of which they came. My research investigates further this reciprocity, this profound blending in Steinbeck's work of human characters with the environments they originated from, and invariably return. I suggest how Steinbeck's work and aesthetic present his understanding of the individual's paradoxical sense of separateness despite his being thoroughly enmeshed in the world beyond the self.

Construction of Reporter Luciferase Genes to Assess NOC4 Gene Expression

Student: Nicholas Simon
Faculty Sponsor: Nancy Bachman

For each gene to be expressed, the central dogma must be applied. That is, the DNA must be transcribed to RNA and then translated from RNA to a protein. The enzyme that starts DNA transcription is called RNA polymerase. RNA polymerase can't initiate the transcription of the gene by itself. Instead it needs a small sequence in the immediate vicinity of the gene, called a promoter, which acts as a recognition signal for the transcription factors to bind to the DNA, in order to guide the polymerase. Vectors are one of the most useful tools used to study promoter sites. Vectors have four features: they are able to replicate, they have selectable markers, foreign DNA can be inserted in them and finally, they often carry a reporter gene.

To find the promoter in the human gene, Neighbor of COX4 (NOC4), involves mutating different regions next to the gene. The project involves two phases. The first involves designing the mutants and will include probability calculations and genetic software. Probability calculations enable us to increase the chances of finding the promoter site. The genetics software will help us so the site that we mutate will not cause any additional changes to our vector or the promoter region. In the second step of the experiment, we will mutate the promoter. This will

involve the synthesis of a DNA copy of the template primed with the mutant primer, followed by introduction of the vector into *E. coli*. Once inserted in *E. coli*, the mutants will need to be characterized to make sure that the mutations of the promoter region are where we planned them to be. After characterizing the mutations we will introduce the mutant DNAs into HeLa cells (human cervical cancer cells) to examine the reporter gene expression. Once the cells have expressed the reporter genes, the cells can be collected, lysed, and luciferase activity can be measured. Measuring the luciferase activity will allow us to find out which of the regions that we mutated is the promoter.

Posters

(listed alphabetically by project title):

B Cell Responses in Large Mouth Bass (*Micropterus salmoides*)

Student: Brandon Smith

Faculty: Vicky Lentz

The fish immune system has some fundamental differences from the mammalian immune system. However, the fish immune system may be an example of a model that the mammalian immune system evolved from. Studies in various species of fish have shown that the spleen and head kidney are major locations of immunological activity. The relative importance of these two organs varies among different species. Previous studies have demonstrated that the head kidney is a major source of lymphocytes (including B cells) in Bluegill (*Lepomis macrochirus*) by using a hemolytic plaque assay. Since no work has been conducted on Large Mouth Bass, the goal of this project is to determine the relative importance of the head kidney and spleen during an immunological response to sheep red blood cells.

Chick Embryo Primary Cell Culture

Student: Erin Shultz

Faculty: Vicky Lentz

Primary cell cultures are often used to allow examination of different cell types from multicellular organisms. Mixed cell cultures of chick embryo were used to study the growth of cells under various conditions. Chick embryo cells were prepared by treating a chicken embryo with versene to disperse the cells. The dissociated cells were allowed to grow for several generations, after which they were propagated onto coverslips and allowed to form monolayers. The cells were then analyzed by standard cell staining techniques that allowed comparisons between nuclear and cytoplasmic materials of fibroblasts, myoblasts, and neuroblasts. Several

different growth media and culture conditions are being compared to determine the effects on rate of growth and viability of the cells.

Concentrations of Mercury in Tuna Fish, Perch, Fresh Water Clams, and Cat Food

Faculty: John Schaumlöffel
Student: Kelly Adams

Inductively coupled plasma-atomic emission spectroscopy (ICP-AES) was used to determine mercury concentrations in canned tuna and pet food as well as samples collected directly from the environment. Mercury content in fish has been under scrutiny in the press within the past 6 months largely due to FDA advisories. Perch and fresh water clams were collected from a remote lake located in the Adirondack Mountains and were analyzed along with the commercially obtained products. Samples were digested using nitric acid and microwave-assisted digestion, converting all mercury to mercury (II) ion, a prerequisite for routine ICP-AES

measurement of mercury. A summary of the results, including statistical evaluation of the data and method validation, will be presented.

Corrosive Effects of Rock Salt on Common Building Materials

Students (Enrolled in SCIN 390): Ashley Heins, Amanda Schulz
Faculty: Paul J. Bischoff, Arthur Palmer, Peggy Palmer

This study investigated the corrosive effects of rock salt dissolved in water on building materials found on the SUNY Oneonta campus. These materials include brass, aluminum, steel, granite, shale, brick, and concrete. Corrosiveness was determined by loss of mass, visual deterioration, and presence of ions in the resulting solution. Complete data analysis, results and discussion of the project are presented.

Could Rear-End Collisions with Vehicles Stopped Out of the Traffic Lane be a Function of an Illusion?

Students: Noah Borris, Joseph Hladis, Jo Ellen Tarbox, Melissa Donohue
Faculty: Lawrence T. Guzy

A life-threatening collision may occur when a vehicle is stopped on the soft shoulder. A driver of an approaching vehicle may crash into the back of the stopped vehicle. Dash-mounted cameras on police vehicles have provided stunning videos of this type of accident. An interesting effect called lateral displacement showed that when obstacles were placed on the right soft shoulder, drivers laterally displaced their vehicles slightly away from the obstruction when it was near the right white line marking the side of the road. The underlying reason for this lateral shift is unknown. It could be the case that the driver correctly perceived the stationary object's position and as a precautionary measure steered slightly away from the obstruction. In some

instances, it could also be the case that the approaching driver may have misperceived the object as being in the road, and this resulted in corrective action to steer clear. Under certain conditions, not only is the stopped vehicle misperceived as being in the roadway, it may also be misperceived as moving; otherwise it would be off the road. In this scenario, the driver would unwittingly follow the stopped vehicle off of the road and at the worst, collide with it.

Purpose: We conducted a laboratory experiment to verify that an illusion indeed, existed. The purpose of this research was to identify the possibility that this illusory effect was associated with the monocular depth cue of linear perspective. This cue is commonly found when looking down any road surface. The sides of the road contain two parallel lines, but the image on the retinal forms a converging angle. If an obstacle is placed just beyond the visible linear perspective cue will the obstacle be misperceived?

Method: Fifteen men and women volunteered their participation. The target stimulus, 2 cm W x 2.54 cm H, was located 6.4 m in front of the participant. The participants were instructed to move the vertically oriented target, to the left and right until it appeared to be a continuation of the white fog line that was placed approximately 2 m to the right of the participant and aligned along his/her sagittal plane. The white line and target track formed a "T." The target was placed either 1.9 cm or 12 cm above the fog line. The 5.5 m L x 2cm W white fog line was occluded 1.9, 25, or 48 cm in front of the target. The participant pulled on one of two ropes to align the target with the white line. The target and the white fog line were made from electroluminescent material.

Results: A 2 x 3 Within Subjects ANOVA (Height of Target x White Fog Line Occlusion) showed a significant main effect for target height above the white line, $F(1, 14) 31.04, p < .0001$. The higher target produced the largest misperception to the left of the stationary white line with an average misalignment error of 6.0 cm. The lower target produced a misalignment error of 1.5 cm. From Figure 2, white fog line occlusion was found to be significant, $F(2, 28) 5.20, p = .012$. The target was misplaced for all three occlusions. The strongest illusory effect ($M = 4.5$ cm) was found with the smallest occlusion of the fog line.

Implications: The hypothesis was supported. When the target was perceived to be at the end of the white line it was actually misplaced well to the left of the line. Further, a higher target produced a stronger illusory effect than did a lower target. These findings are consistent with the assumption that stopped vehicles off of the roadway may be viewed as in the roadway.

Determination of Selected Elements in Drinking Water of SUNY Oneonta Faculty, Staff, and Selected Campus Sources

Students: Kelly Adams, Jennifer Fusco, Luther Mahoney
Faculty: John Schaumlöffel

Recommended dietary guidelines often suggest consuming ~1.8 L water per day. Therefore, the composition of water can have a significant impact on human health in addition to aesthetic effects such as color, taste, etc. As part of our CHEM 362 project, faculty and staff were offered the opportunity to have their drinking water tested. Additional samples from around the

SUNY Oneonta campus were collected. Concentrations of zinc, iron, copper, calcium, magnesium, lead, and mercury were determined in these samples by inductively coupled plasma-atomic emission spectroscopy (ICP-AES). A summary of the results, including evaluating the conditions of participants' water supplies (e.g. municipal versus well, copper versus galvanized pipes) will be presented.

The Effect of Wastewater Effluents on Dissolved Oxygen, Temperature, and pH in the Susquehanna River Near Oneonta, New York

Student (Enrolled in SCIN 390): Robert DeMarco, Peter Carofano
Faculty: Paul J. Bischoff, Thomas G. Horvath

This research project focuses on dissolved oxygen levels in the Susquehanna River near the Oneonta wastewater treatment plant. We tested for dissolved oxygen, temperature, and pH at 8 locations near the treatment plant. The first site was upstream of the input, the second was at the input, and the remaining six were downstream from the input. Our hypotheses were that the dissolved oxygen concentrations would be lowest at the input site and increase incrementally with distance, and correlations would exist between oxygen, pH, and temperature variables. Preliminary data analysis confirms our predictions. Detailed analysis of data and conclusions with respect to EPA recommendations are discussed.

The Effects of an Acidic Environment on the Growth of three Terrestrial Bacteria- *E. coli*, *Bacillus subtilis*, and *Lactobacillus acidophilus*

Student (Enrolled in SCIN 390): Jessica Baldwin, Richard D'Alsace
Faculty: Paul J. Bischoff, Fred Zalatan

The objectives of this experiment were to observe the effects of varying pH media environments (pH 5.5, 5.0, 4.5, 4.0, 3.5, and 3.0) on the growth of three terrestrial bacteria (*E. coli*, *Bacillus subtilis*, and *Lactobacillus acidophilus*) over a short period of time. The study was conducted because the data will help us more fully understand tolerance levels of bacteria, and because our environment is changing (i.e., acid rain) and it is important to investigate how those changes are likely to impact the terrestrial microbes. The data was collected by taking the absorbency reading (O.D. 600) using a spectrophotometer every hour for ½ day. Media was first diluted to get initial readings at .05 nm to .1 nm in order to allow for a long enough sampling period. Experiments were repeated in duplicate and means were calculated. Data analysis, results and discussions are presented.

The Effects of the Southside Economy Road Salt on the Susquehanna River

Student (Enrolled in SCIN 390): Judyth Barnett, Alyson Feiser, Sherry Pieringer
Faculty: Paul J. Bischoff, Arthur Palmer, Peggy Palmer

The purpose of our study is to investigate the chloride levels in the Susquehanna River, before, at, and after the drainage system from the Southside economy. It is anticipated that the deposition of road salts will only have a localized effect on the chloride and pH levels in the Susquehanna River. This study is important because chloride levels negatively affect the water quality and the aquatic ecology. Samples were taken at four different locations along the river and then titrated with mercuric nitrate to determine the localized chloride level changes. Acidity level measurements were recorded in the laboratory. Data analysis, results, and implications are presented and discussed.

Exploring Lichen and Oak Tree Bark as Amoebae Habitats

Students (Enrolled in SCIN 390): Kristen DiBattista, Jessica Inman
Faculty: Paul J. Bischoff

This study investigates the small scale spatial distribution of amoebae within lichen colonies and within the immediately adjacent oak bark. Amoebae are single celled protozoan that play important roles in the microbial ecology of aquatic and terrestrial ecosystem, and studies identifying their preferred habitats tell more about where they fit in ecological systems. Treatment (lichen) and control (bark) samples were cultured in the laboratory, observed with a light microscope and enumerated for amoebae abundances. Data analysis and conclusions will be discussed.

**Exploring the Effects of Linoleic Acid on the Growth of the bacterium
*Caulobacter crescentus***

Student (Enrolled in SCIN 390): Michelle Davis
Faculty: Paul J. Bischoff, Fred Zalatan

The objectives of this study are to determine the inhibitory and fatal concentrations of linoleic acid in the growth of *Caulobacter crescentus*. The study was conducted in order to more fully understand the growth patterns and tolerance levels of *Caulobacter crescentus*. An overnight culture was created and then diluted to achieve initial absorbance readings of 0.01 nm. The effects of varying concentrations of linoleic acid (0 mM, 1mM, 2mM, and 4mM) on *Caulobacter crescentus* was observed through hourly spectrophotometer readings (O.D. 600),

for five hours. The data from these readings were then taken and plotted to create a standard growth curve and evaluated for treatment effects. Detailed data analysis, results and conclusions are presented.

**Hematological Parameters of Largemouth Bass (*Micropterus salmoides*)
determined from Peripheral Blood Smears**

Student: Tammy Hagadorn
Faculty: Vicky Lentz

Largemouth bass (*Micropterus salmoides*) were obtained from a local fish farm for use in hematological studies. Blood was taken from each fish after being anesthetized, weighed and measured. A mean percentage of white blood cells, red blood cells and thrombocytes were obtained and a blood smear differential for each fish was examined to determine the mean values for the various leukocytes observed. The results were then compared with published data from striped bass and tilapia. Differences were observed in the number of eosinophils and thrombocytes. The largemouth bass had increased numbers of eosinophils present in the circulating blood compared to normally low numbers in striped bass and tilapia. These results may be indicative of underlying parasitic infections or the influence of stress caused by the recent transfer from hatchery conditions.

Investigating the Common Ion Effect of Gypsum in Selected Soils

Students (Enrolled in SCIN 390): Kate Curran, William Pickett
Faculty: Paul J. Bischoff, Arthur Palmer, Peggy Palmer

The purpose of the study was to examine whether or not gypsum (a mineral commonly found in arid soils) generates ions in solution that inhibit the soils capacity to generate other soil specific ions. This process whereby one substance releases ions that minimize the capacity of another to generate ions is referred to as the "common ion effect. The study is important because gypsum is abundant in arid soils and its geochemical impact on soil systems is poorly understood. Initial data analysis reveals that gypsum does generate ions which limit some soils capacity to release other ions. Detailed data analysis and implications are presented.

**New York Native Americans and Their Experiences at
Carlisle Indian Industrial School**

Student: Angie Erway
Faculty: Susan Bernardin

The possibility of educating Indians needs no further demonstration. The question now is of method. To prevent mistakes or failures we need to know of any special difficulties that we may know how to meet them. There are four. 1. The wildness of the Indian; 2. His lack of independent personality; 3. His religion; 4. His language" (*The Morning Star*, 5,2 (1884), p. 3).

This was the general consensus of our nation in regards to Indian affairs at the turn of the 20th Century. In 1879, Richard Henry Pratt, in an attempt to "educate" the Indian, founded the Carlisle Indian Industrial School in Carlisle, Pennsylvania. Carlisle was the flagship boarding school, and paved the way for an era of "whitewashing" the Native children in America through attempted assimilation. Native children left the familiarity of their homes and were shipped to a "foreign" place to begin their new lives, and become victim to the ways of the white world; a world much different than their own.

Boarding School historiography has become a vital and thriving area in Native American Studies for historians. My research conducted on the Carlisle Indian Industrial School, is focused on the experiences of Natives from New York. There have been few studies conducted based on regional or tribal affiliations in New York State. My goal is to reveal the experiences of members of the New York tribes, mainly the Oneida. In doing so, I am setting out to tell the story of the boarding school experience through a different lens; through the eyes of the students, not just the white man. I will explore how the Oneida students were affected by their experiences at Carlisle. Through archival research, I obtained several articles from newspapers which were published at Carlisle over the span of a decade. These articles provide insight into the students' lives at Carlisle, as well as updates on them after their departure. The newspapers offer insight on the assimilation of the Native children, as well as some of the failures of the Carlisle agenda; to whitewash the Indian, and make him a true American.

The boarding school experience is a vital part of American history. My goal is to tell how the Oneida and other New York Natives fit into this story and of the legacy they have left behind.

Production of Monoclonal Antibodies Against Large Mouth Bass (*Micropterus salmoides*) Immunoglobulins

Student: Nicole Feldman

Faculty: Vicky Lentz

While much is known about the immune systems of mammals, very little is known about the immune systems of fish. Limited research has been done on a small number of fish species. Fish have an acquired immune system that resembles that of mammals but at a reduced scale. In addition, studies have shown that there is a great deal of variation in the immune systems of fish. It has also been shown that the immunologic reagents are not cross-reactive and therefore it is necessary to generate species-specific reagents as new types of fish are studied. Largemouth bass (*Micropterus salmoides*), have not been the subject of immunologic studies. These fish are an important sport fish and are becoming popular with aquaculturists as a commercial food fish. This project proposes to study the immune system of largemouth bass by focusing on production and purification of fish antibodies.

Project Erde

Students: Emmon Johnson, Matthew Becker, Chris Spahn
Faculty: James W. Ryder, James R. Ebert

We are designing a program that will be able to identify minerals, rocks, and fossils based on information that the user inputs into the program. We are calling this program Erde MRFD (Mineral, Rock, Fossil Database) after Erde, the Germanic goddess of the Earth. The program will have specific search criteria for each type of search. The mineral, rock, and fossil databases will be upgradeable so that if a new mineral, rock, or fossil is discovered the user will be able to add it to that appropriate database.

For minerals, the program will ask for the mineral color, streak color, luster, transparency, cleavage, fracture, crystal system, hardness, and whether or not it reacts to acid (acid test). The report would contain mineral colors, streak color, luster, transparency, cleavage, fracture, crystal system, hardness, chemical composition, and whether or not it reacts to acid (acid test), pictures of the different crystal systems and colors, and a crystal wire frame of the different crystal structures. For rocks, the program will ask for the rock color, type of rock (sedimentary, igneous, or metamorphic), grain size, layering, acid test, texture, luster, folding, and mineralogy of the rock. The report would contain the rock color, type of rock (sedimentary, igneous, or metamorphic), if there is a mixture of grain sizes, grain size, layering, acid test, and mineralogy of the rock, a picture of the rock, and a thin section of the rock. For the fossil search, the program will ask for the type of fossil (shell, coral, plant, animal), and environment. The report would contain a picture of the fossil, the environment and era that that species lived in.

Purification of Human CGI-112 Protein from *E. coli* Expression Systems

Student: Justin Siebert
Faculty: Nancy Bachman

The human genome project has lead to the discovery of many new genes. Comparative Gene

Identification isolate 112 (CGI-112) encodes a protein that was discovered by using the Basic Local Alignment Search Tool (BLAST). CGI-112 and another protein, NOC4, are 40% identical in amino acid sequence, and comprise a novel protein family. The location of the CGI-112 gene is between the α and β subunits of the P28 proteasome regulator on human chromosome 14. The function of the CGI-112 protein is unknown, but its location might indicate a possible function for the CGI-112/NOC4 protein family. Proteasomes are macromolecular complexes that specialize in the degradation of damaged proteins, or proteins that are no longer needed. Proteasomes are essential during an immune response; they are responsible for antigen processing by macrophages. In order to study the CGI-112 protein, identifying its cellular location and function, we need to create a set of immunoreagents specific for the CGI-112 protein. Creation of rabbit anti-CGI-112 antibodies will require the production and purification of about a milligram of CGI-112 protein. Producing the CGI-112 protein requires us to clone the CGI-112 coding sequence into bacterial plasmids, and incorporate these modified plasmids into *E. coli* expression systems. The first expression system we used is the pET expression system. This system incorporates the pETBlue2 plasmid, with the CGI-112 cDNA inserted into the plasmid at the *EcoRV* restriction site. This system also adds a polyhistidine fusion tag to our protein. This fusion tag will allow the CGI-112 protein to be purified by Ni^{2+} affinity chromatography. The second system, the Glutathione S-transferase system (GST), creates a fusion gene, by inserting the CGI-112 cDNA into the pGEX6P-I vector. *E. coli* containing this plasmid then produces a CGI-112-GST fusion protein. The GST system allows us to purify the CGI-112 fusion protein through Glutathione agarose affinity chromatography. To determine the levels of CGI-112 protein expression, the *E. coli* was grown, induced, lysed and the proteins harvested. Samples were analyzed using the Bradford protein assay, SDS-Polyacrylamide gel electrophoresis, and western blot. Analysis of our expression systems showed several induced *E. coli* proteins, including proteins corresponding to the his-tagged CGI-112 protein and the CGI-112-GST fusion protein. Analysis of yields of the his-tagged CGI-112 protein (pET system) suggests that the CGI-112 protein is being produced in quantities large enough for practical immunoreagent creation.

A Simple Apparatus for Dynamic Modeling of Paired Convection Cells

Students: Laura Hurteau and Amanda Schulz, Adolescence Education Earth Science Majors
Faculty: James R. Ebert, Nancy A. Elliott

Students must understand the fundamental process of convection if they are to grasp a wide variety of Earth processes, which may seem abstract owing to the scales on which they operate. Many teachers use simple models that employ differences in temperature and density to help students visualize convection. However, most of these models are incomplete or merely hint at convective circulation, rather than modeling it. A simple, inexpensive apparatus for modeling paired convection cells has been developed and constructed from inexpensive, readily available materials: a bread pan, vegetable oil, mylar gift wrap, a hot plate, metal bars, glass plates and cardboard. The model, which maintains dynamic circulation of two, adjacent, convecting cells, can be used to model high and low pressure systems in the atmosphere, convective circulation in

Earth's mantle and the motion of lithospheric plates by floating small pieces of cardboard on the oil.

The need for better models of Earth processes, including a dynamic, multi-cell convection model, was brought to our attention by veteran earth science teachers. We realized that the time constraints of teaching at the secondary level largely precluded these talented teachers from developing and testing such models. Through this project, we have demonstrated that pre-service teachers (science education majors) represent an untapped pool of expertise that can develop models, test them, refine them for scientific accuracy and share them with in-service teachers. We have done just that by presenting the dynamic convection model at the 2003 Annual Conference of the Science Teachers Association of NY State, and submitting a manuscript describing the model to *The Science Teacher*, a journal of the National Science Teachers Association.

Testing for Total Phosphorus within the Oneonta Region of the Susquehanna River

Student (Enrolled in SCIN 390): Matthew Kaszubski
Faculty: Paul J. Bischoff, John C. Schaumloffel

This study investigates the total phosphorus concentration above, at and downstream from the city of Oneonta wastewater treatment plant. Phosphorus compounds likely originate from detergents, agricultural waste and fertilizers. Even minute concentrations of phosphorus compounds in aquatic environments have been associated with eutrophication. Samples were collected and analyzed using the *Hach* ascorbic acid method for total phosphorus concentrations. Results will be presented, compared to EPA standards and discussed.

Recognition of Grant Recipients

Student Research Day showcases research and creative projects by students across campus. Listed below are the students who received funding from the Faculty Senate Committee on Research in the past two semesters. (Their projects' names, at the time of their grant applications, have been used here.)

Fall '03 Grant Recipients:

Arrighi, Julie. "The Design, Construction, and Harmonic Analysis of the Dinh Pa." Faculty advisor: Paul French.

Campbell, Neville. "Use of Green Fluorescent Protein Reporters to Assess the Localization of a Novel Protein in Human Cells." Faculty advisor: Nancy Bachman.

Courtney, Sarah. "I Am the Land: Myth and Ritual in the Evolution of John Steinbeck."

Faculty advisor: Patrick Meanor.

Gomiller, Dannel, and Fawad Shahidan. "The RGB Color Cube." Faculty advisors: James Ryder and Thomas Sakoulas.

Horvath, Sirkka. "The Influence of German Immigrants on the Culture and Spoken Language of Valdiva, Chile." Faculty advisor: Alix Camacho.

Hurley, Shaun. "The Physics Hidden Behind the High Jump." Faculty advisor: Paul French.

Johnson, Emmon, Matthew Becker, and Chris Spahn. "Project Erde." Faculty advisors: James Ryder and James Ebert.

Krone, Fred, and Jeremy Silverman. "Examining the Effects of Rock Type on Groundwater Chemistry." Faculty advisor: Arthur Palmer.

Lamb, Kelly. "Claimsmaking by Postcitizenship Movements: The Cases of Animal Rights, Tobacco Control and Compassionate Conservatism." Faculty advisor: Brian Lowe.

Larson, Erik (graduate student). "Transforming the Tablescape: Melamine Dinnerware, 1960-2003." Faculty advisor: Cynthia G. Falk.

McTavey, Samuel, and Matthew Schreiber. "Comparing the Erosional Effects of Ice Versus Pressurized Water on Terrain Overridden During the 1993-95 Surge of Bering Glacier, Alaska: A Report to the Geological Society of America." Faculty advisor: P. Jay Fleisher.

Maust-Blosser, Trisha (graduate student). "Music in Saratoga County Circa 1900: The Lockwood Collection." Faculty advisor: Cynthia G. Falk.

Simon, Nicholas. "Construction of Reporter Luciferase Genes to Assess NOC4 Gene Expression." Faculty advisor: Nancy Bachman.

Stewart, Caitlin. "Benthic Macroinvertebrates as Water Quality Indicators in Streams of the Central Adirondacks." Faculty advisor: Tracy Allen.

Spring '03 Grant Recipients:

Braunius, Andrea L., and Justine LaMantia. "Spanning Time: A Look at the Influences and Elements of Traditional and Modern Fairy Tales from the Brothers Grimm to Henry Beston." Faculty advisor: Daniel Payne.

Dudgeon, Calder. "Research for and Creation of Dramatic Shadow Puppet Imagery for the New and Upcoming Production of 'A Furrow Plowed'." Faculty advisor: Carleton Clay.

Erway, Angie. "New York Native Americans and Their Experiences at Carlisle Indian Industrial School." Faculty advisor: Susan Bernardin.

Hurteau, Laura, and Amanda Schulz. "Conceptualization and Development of New Apparatus for Visualizing Large-Scale Earth Processes and Abstract Concepts: A Service-Learning Pilot Project." Faculty advisors: James Ebert.

Laytham, Ryan, Charles Gavett, and Matthew Weinell. "A Real-Live Video Game." Faculty advisors: Dennis Higgins and Don Allison.

McTavey, Samuel. "A Comparative Analysis of Subglacial Erosional Landforms Produced by Overriding Ice and Tunnel Rivers, Bering Glacier, Alaska. Faculty advisor: P. Jay Fleisher.

Wells, James G. "Heavy Metal Analysis of Tube Layer Stratification in Selected Perennial Conks of the Family Aphylophorales." Faculty advisor: John C. Schaumloffel.