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2005 - The Tenth Annual Symposium of Student Scholars

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The Tenth Annual Symposium of Student Scholars

Recognizing Excellence in Student Scholarship

April 8, 2005
Tenth Annual
Symposium of Student Scholars

April 8, 2005

Program

9:30 a.m. Welcome

9:00 a.m. – 12:00 p.m. Posters
Presenters available to discuss their works

Presenters at even-numbered displays will be available from 9:00 – 10:30
Presenters at odd-numbered displays will be available from 10:30 – 12:00

Organizing Committee
Dr. Rolf Schimmrigk, Committee co-chair, Assistant Professor of Physics
Dr. Agatino La Rosa, Committee co-chair, Assistant Professor of Geography
Dr. Mark Patterson, Associate Professor of Geography
Ms. Carol Pope, Assistant Director for disabled Student Support Services,
Advisor for Phi Kappa Phi

Special thanks to:
Phi Kappa Phi for support of the reception and printing of the abstract booklet.
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The mission of the Critical Care Nurse Liaison Program at WellStar Health System is to incorporate the principles of palliative nursing, mental health nursing and ethics into the care of patients and families within the critical care units. Expert communication, education and psychological and social support are provided for the critically ill and dying patients, their families, and staff throughout the course of critical illness, death, and bereavement. For the purposes of program enhancement, validation and possible replication, this descriptive research project was designed to examine the patient and family experience through the lens of the primary family decision maker with focus on the quality of the education, support, and communication received from the Critical Care Nurse Liaison (CCNL).

Family members having had contact with the CCNL that were most intimate with decision-making in the ICU/CCU were contacted no earlier than three months after the death by letter and then by telephone. Each volunteer was asked by a neutral research assistant to participate in a structured interview about his/her experience in the ICU/CCU and with the CCNL.

Answers to the following questions given by 20 family members will be discussed:

- How often did resuscitation events precede death?
- How often did patients have written Living Will and/or Durable Power of Attorney for Health Care?
- To what extent did family members of the critically ill understand choices about treatment?
- To what extent were final wishes of the patient discussed/honored?
- To what extent were patient/family informed about the seriousness of the illness, the progress of the illness and the possibility of death?
- To what extent was the Critical Care Liaison Nurse supportive to patients and their families?

The overwhelming majority were pleased with the services received from the Critical Care Nurse Liaison. There were concerns expressed about having made the right decision and at times the details of the experience were difficult to recollect. This study demonstrated that there is definite value to the use of a designated individual with critical care experience that serves as a palliative care liaison with families in the highly charged, densely emotional and psychologically trying environment of end of life in critical care.
College of Humanities and Social Sciences

Viewing American Poetics through the Lens of Cinema and the Soviet Montage Principle: Jessica Wise* and Dr. David Coberly

Department of Foreign Languages

In a paper written during an independent study in the fall semester of 2004, I examined the American poem from Whitman to "slam". One of the many topics I addressed was the American poet's mimesis of various forms including operatic aria, jazz, personal letters, stylized oratory, standard conversation, and cinema. For this symposium I would like to present my analysis of the mimesis of cinematic techniques, especially montage, in American poetics. Specifically, my presentation develops these cross-medium connections by focusing on the Soviet pioneers of montage theory in order to explore the ways in which an interdisciplinary reading can facilitate the understanding of the poetic work.
Political Correctness and its Impact at Kennesaw State University; Robin Crawford* and Dr. Miriam Boeri

Department of Sociology, Geography, Anthropology and Criminal Justice

“That wasn’t politically correct,” is a phrase echoed in college classrooms around the country. What’s all the fuss about being politically correct? What is political correctness? Why the preoccupation with being politically correct? Political correctness is discussed in books and articles as well as debated in a host of forums with many for and against its presence. Finding a consistent definition for it is like trying to nail jello to a tree – you can’t. Because definitions of political correctness vary dramatically, the concept warrants closer examination. This research addresses aspects of political correctness on a university campus.

How do students feel about political correctness? Has it affected the learning process? The multitude of literature indicates that over the past twenty years, political correctness has become an integral part of society. A review of the data in the form of discussions, lectures, publications, periodicals, and documented research, shows that it is hard to deny the impact of political correctness on higher education. Many researchers have attempted to wade through the rhetoric and define political correctness in simplistic terms while others hold fast to the complexities of this phenomenon. Because political correctness is so pervasive, it warrants examination. In the academic arena, how do students feel about political correctness? A survey instrument was distributed to 103 students who volunteered responses related to political correctness. The participants represented all academic levels studying a wide range of disciplines. Both male and female subjects were surveyed from four age groupings. The survey addressed the university mission, the classroom environment, the role of professors in classes, and political correctness in the classroom.

Of the 103 subjects, 25% disagreed and 18% strongly disagreed with the statement that political correctness allows for critical thinking in the classroom. The results of this research do not overwhelmingly support a negative impact at Kennesaw State University, but it is clear that political correctness has had an impact on the academic environment.
Tourism in Normandy: Trevor Allen* and Dr. Agatino La Rosa

Department of Sociology, Geography, Anthropology and Criminal Justice

Tourists are attracted to this region of France for it's rich blend of history and culture. There are a multitude of historical sites one can visit while traveling through all the beautiful cities of the province. From the beaches of D-Day to the ancient abbeys and castles nestled in the countryside, there is truly something for everyone to enjoy. Visitors can dine on fresh seafood, cheeses, and apple brandy, all of which are delicacies. Normandy is especially known for Joan d'Arc, Monet, and Richard the Lionheart. William the Conqueror visited among this region's many treasures. The Eure county (or department) is excitingly the location of Monet's house and garden in Giverny. Imagine Monet perched in his garden perfecting his talents painting the breathtaking landscape surrounding him. Giverny is a must-see on anyone's itinerary. The countryside throughout Eure contains rolling pastures and grazing cows, to provide milk for the local cheeses. The main attraction in the Manche is the Mont-St-Michel, a colossal monastery founded and built in 96 A.D. by twelve Benedictine monks. It is one of the most treasured locations architecturally and historically in all of France. It was built during the same era as the famed Notre-Dame Cathedral and was a pilgrimage destination for many kings. The Seine-Maritime is also a department bursting with history. Joan of Arc was martyred at la Place de Vieux Marche. Rouen is Seine-Maritime's main city. Tourists here enjoy the scenic Eretat Cliffs on the Alabaster Coast. Rouen is also famous for it's food. The Orne department was famous mainly for its textiles earlier in history. Orne was the lace capitol of Europe some 400 years ago, but today that industry has dwindled considerably due to today's changes in fashion. Tourists know Orne today as the birthplace of Camembert cheese and eat it by the ton daily. Orne also holds the Chateau d'O, a lavish castle located in Argentan built in the 15th Century.
Muffler Men of the Southeast States: Sarah Boos * and Dr. Agatino LaRosa

Department of Sociology, Geography, Anthropology and Criminal Justice

Muffler Men can be seen along major interstates, city streets, and rural roads throughout the US. These giants were originally created in the 1960s by a California fiberglass company for gas station chains in sizes ranging from 18 to 23 feet. The statues' hands were molded to hold mufflers or tires. As establishments closed or changed owners, the lantern-jawed Muffler Men were moved to other locations. They can now be seen holding various objects ranging from food trays to axes or nothing at all. They once attracted customers to gas stations; now they act as nostalgic roadside attractions.

The are four basic types of Muffler Men. The Classic; Gas Station Attendant, Golfer, Hamburger Man, and Cowboy. He is configured with all the basic characteristics, standing 21-22 ft. tall. While shipped clean-shaven, may be customized with a painted mustache or even a beard -- sometimes in the style of the Bunyan model. The Cowboy version always features a removable Stetson. Then there is the Indian; Noble Savage, the Big Chief, or the Brave. His shoes and legs are often the same, but other characteristics of the Indian are further removed from purebred M-Man lineage. The head and arm configuration differ, except in cases where May don a single "Brave" feather or full "Chief" headdress. This category is confused by instances of Classics that have been modified to appear as Indians. There is also the Happy Halfwit; Mortimer Snerd, Alfred E. Neumann, S.F.B. and, Country Bumpkin. The gap-toothed, jug-eared Happy Halfwit is comedy relief among otherwise stern looking M-Men types. This strain shares the M-Man's molded torso/arms and legs/shoes. Sports a straw hat or baseball cap. Original Halfwits were sold in heights as tall as 21 ft. Many of today's survivors are a shorter; neck less variety, closer to 15-18 ft. Finally there is the Bunyan; Lumberjack or Woodsman. He is configured with most of the basic characteristics, standing 20 ft. tall. The Bunyan probably existed before the Classic. Distinguishing features include a head with a molded wool cap, and a heavy beard. Bunyans are frequently sighted brandishing single or double-sided axes. Shirt may be painted in a red plaid pattern. The poster then gives the type of Muffler Man, description, and directions to each Muffler man pin pointed on the poster map and marked with text that corresponds to the paragraph in the poster text.
Pennsylvania Watershed Flood Management: Shannon Davis and Dr. Agatino La Rosa

Department of Sociology, Geography, Anthropology and Criminal Justice

A watershed is an area of land containing a common set of streams and rivers that drain into a single, larger body of water. Topography determines the size and shape of a watershed, as mountain ridges divide and determine the flow of water above and below the surface. In Pennsylvania, the seven major watersheds are the Ohio, Susquehanna, Delaware, Lake Erie, Genesee, Juniata, and Potomac. These large watersheds are broken down into 104 smaller watersheds.

The Susquehanna basin is one of the nation’s most flood-prone areas. The main stem of the Susquehanna River is more prone to ice jams and subsequent flooding than any other river east of the Rocky Mountains. The basin’s topography, geology, and nearly 30,000 miles of streams are some of the contributing factors. The following are two distinct ways that the basin’s topography and geology can cause flooding. The first situation occurs when a section of river is very wide and then is suddenly squeezed into a steep, narrow gorge. During heavy rainfall events, the increased flow of water or ice backs up in the narrow gorge, causing the river to overflow its banks. The second situation occurs when a river flows through an area with very little slope, and shallow banks. During heavy rainfall events, the river quickly swells and overflows its banks.

The Susquehanna River Flood Forecasting and Warning System uses sophisticated radar techniques and a network of rain and stream gages to provide data used by National Weather Service (NWS) river forecast centers for use in forecasting river levels. The system provides its users (communities and businesses) with early flood warnings so they can secure their property and get out of harm’s way. The Susquehanna System completely or partially supports 51 stream and 41 rain gages, automatic data transmission, enhanced computer capabilities, and 24-hour operation at the Middle Atlantic River Forecast Center in State College, Pa.
Arab Maghreb Union: Cynthia Kemp and Dr. Agatino La Rosa

Department of Sociology, Geography, Anthropology and Criminal Justice

The Maghreb or Magrib (Arabic for 'the West') is a region of the Northwestern Africa. It is generally applied to all of Morocco, Algeria, and Tunisia but actually pertains only to the area of the three countries between the high ranges of the Atlas Mountains and the Mediterranean Sea. Some writers also included in this region Spain, especially during its period of Muslim domination. Isolated from the rest of the continent by the Atlas Mountains and the Sahara, the Maghreb is more closely related in terms of climate, landforms, population, economy, and history to the Mediterranean areas than to the rest of Africa. The region was united politically only during the first years of Arab rule (early 8th century), and again under the Almohads (1159–1229).

The Arab Maghreb Union was established in 1989 to promote cooperation and integration among the Arab states of North Africa; its members are Algeria, Libya, Mauritania, Morocco, and Tunisia. Envisioned initially by Muammar al-Qaddafi as an Arab superstate, the organization is expected eventually to function as a North African common market, although economic and political unrest, especially in Algeria, have hindered progress on the union's joint goals.

From the beginning of the cinema, Morocco has always been considered, by the filmmakers, as a very appraised destination, and so for its magnificence and diversity of its light, as well as for the facilities and services offered to the producers. Tunisian cooking is a blend of European, Oriental and desert dweller’s culinary traditions. Its distinctive spicy fieriness comes from neighboring Mediterranean countries and the many civilizations that have ruled Tunisian land -- Phoenician, Roman, Arab, Turkish, French, and the native Berber.

Algeria has made a significant contribution to the popularity of Arab and Berber music. Rai‘ef's rhythmic and tonal universe originates from western Algeria, with its center of gravity lying between Relizane, Saida, Sidi Bel Abbé‘es, Oujda (in Morocco), and Oran. The emergence of rai‘ef is generally associated with the migration into the cities of western Algeria, starting with the world depression in the 1930s.
Eco-Tourism in Kenya: Emily Kimani and Dr. Agatino La Rosa

Department of Sociology, Geography, Anthropology and Criminal Justice

Kenya is the most popular travel destination for safaris in the world! It's one of the few places in the world where you can watch a Lion-kill in the morning, then drift over coral reefs in a glass-bottomed boat off tropical Mombasa in the afternoon; scenic beauty, diverse cultures and abundant wildlife. The coastline and tropical holiday beaches are equally inviting. Wildlife is the prime attraction in safaris that take place in some of Africa's most well known national parks. A Kenya safari contains a mosaic of different cultures and traditions. The people have the natural ability to make every traveler feel at home. 'Karibu' a Swahili word meaning welcome is often heard.

About twenty million years ago, great subterranean forces cleaved Africa. The result was The Great Rift Valley, which separates the grass plains of East Africa from the tropical rainforests of western central Africa. Rift Valley escarpment and views over the valley floor are best seen in Kenya, as the valley is at its narrowest between the Mau Escarpment and the Aberdare mountains.

The island city of Mombasa is the headquarters for Kenya's coastal tourist trade, but has none of the fine beaches to be found to the north and south. Instead, this is a place to savor the history of the East Coast of Africa, a history of slavery, pirates, war and adventure. The Old Town, Fort Jesus and the Old Harbour are fascinating places to while away a few hours, especially the Old Harbour, where you can watch majestic dhows, still sporting ancient rigs, plying their trade as far as Yemen and the Persian Gulf. Mt. Kenya is often obscured by cloud but when it clears a magnificent snowy peak dominates the skyline and permanent glaciers grace its slopes. Today you can take a number of different routes to the top and taking a guide and porter will improve your chances of getting to the top without exhaustion or altitude sickness.
Vacation to the Gulf of Mexico: Melissa Pfiel* and Dr. Agatino La Rosa

Department of Sociology, Geography, Anthropology and Criminal Justice

In 1992, Mississippi State legalized dockside gaming to increase tax revenues, employment and tourism. Located along the beautiful Gulf of Mexico, casinos in this area line up from Biloxi, MS. to Bay St. Louis, MS. There are fabulous hotels and up-scale dining, live entertainment, along with the beautiful history and nature along the coast. Fifty-three million tourist visit the Mississippi coastline each year to play at the casinos. Padre Island is the longest protected stretch of barrier islands in the world, located off the coast of Texas. Approximately 800,000 people visit each year to embrace the wildlife, mostly local residents of Texas coastline. This is one of the few places you can observe sea turtle hatchlings released into the wild. Padre Island is most famous for fishing, windsurfing and camping. It is considered the best place to windsurf in the world due to steady winds, warm waters, and shallow depth. Other activities that tourist adventure are scuba diving, kayaking, boating, bird watching and wildlife viewing. There are many rare, threatened endangered species on the island, as well as a wide variety of flora and fauna. This is a great getaway for people looking to explore and learn barrier islands habitat along the coast of Texas.

New Orleans is not only known for Mardi Gras. It is considered the “Paris of America”. There is so much to do and see and taste, you could never fit it all in one weekend. New Orleans sits right next to the Mississippi River and the Gulf of Mexico. The Garden District is an area that has beautiful historical mansions. You can take the streetcars that run 24 hours from the outside of the city into the different districts. French Quarters is the most well known part of New Orleans. Historical buildings, mansions, and art galleries fill up the neighborhoods along with restaurants and shopping boutiques. Don’t be surprised if you run into a live Dixie Land Jazz Band. They sometimes come out and play for the public. Many people go on the swamp tours outside of the city and learn about the ecology in the area, since New Orleans was initially one big swamp until they drained it. There are beautiful luxurious hotels all over the city with reasonable rates. There is also a Harrah’s Casino downtown. If you’re looking for excitement and multi- culture, this is the place!
Reservations of the Southwestern United States: Benjamin Roberts* and Dr. Agatino Larosa

Department of Sociology, Geography, Anthropology and Criminal Justice

Among the several hundred Native American groups that settled across North America, there existed, and still exists, many different ways of life and worldviews. Each group had distinctive social and political systems, clothing styles, shelters, foods, art forms, musical styles, languages, educational practices, and spiritual and philosophical beliefs. Nevertheless, Native American cultures share certain traits that are common to many indigenous peoples around the world, including strong ties to the land on which they live. Unfortunately, with the expansion of Spanish and American settlers in the past three centuries, most Native American groups were forced onto reservations. These reservations are mainly in the western half of the United States. Five of them are located in the Four Corners region (the intersection of the states of Utah, New Mexico, Arizona, and Colorado). These include the Hopi, Acoma pueblo, Navajo, Jicarilla Apache, and Ute Mountain Ute reservations.

The Apache and Navajo dialects belong to the Athabascan language group, which includes the Eskimo language. A "trail" of tribes with the same Athabascan language roots stretches over 4,000 miles from the states of Sonora and Chihuahua in Northern Mexico to the interior of Alaska, and shores of Hudson Bay, the Bering Sea and the Pacific ocean. This is a diverse diaspora of tribes that speak similar dialects.

Although they lie in close proximity to their Athabaskan-speaking neighbors, the Hopi, Agoma, and Ute dialects all belong to the Uto-Aztecan language group. Anthropologists and Linguists both believe that these dialects originated in Central and Northern Mexico and migrated northward over time. The differences in these two language groups point to the fact that there were several different migrations of Native American populations to the Southwest over a long period of time. This pattern is similar to the migrations of different European language dialects and African languages in other parts of the world.
A Political Economy of Deforestation in the Biobio Watershed, Chile: Katie Surette* and Dr. Agatino La Rosa

Department of Sociology, Geography, Anthropology and Criminal Justice

The Biobio River is the second longest river in Chile, flowing 240 miles from the Andes Mountains to the Pacific Ocean. The watershed of this river is mostly rural in nature and is home to almost 10,000 Mapuche Indians who depend on resources of the land and the river for their livelihood. In the past twenty years, the Biobio watershed has undergone extensive land cover change. In order to study land cover changes, particularly with respect to deforestation, satellite images between the years 1986 and 2000 were used. By analyzing differences in the two images using change detection methods, it became possible to determine the extent and location of deforestation.

This study is grounded in a political economy perspective and has identified several factors that have contributed to deforestation. Government land and resource management policies have been mere platitudes for environmental protection. During the period of this study, forest products have become the country’s fastest growing export, owing to policies that have encouraged timber harvesting. Such policies can inevitably be linked to lobbying pressure from the timber industry. Domestically, energy policies have been geared toward self-sufficiency, which has led to the creation of many hydroelectric projects. Chile’s largest private company, ENDESA, began a massive hydroelectric project along the entire course of the BioBio River. Six dams will be built by the completion of the project, far surpassing the energy needs that the local environmental organizations anticipate, displacing thousands of indigenous people and leading to the deforestation of the most of the remaining forests in the watershed.
The Great Smoky Mountains in the Southeast: Joseph Yankah* and Dr. Agatino La Rosa

Department of Sociology, Geography, Anthropology and Criminal Justice

The South States Region is an area of rolling hills, mountains, ridges, valleys and plains bordered by broad beaches along the Atlantic Ocean and the Gulf of Mexico. Some of the cities of the Southern States include, Jacksonville, Memphis, Nashville, Chattanooga, New Orleans, Atlanta, and Tallahassee. The Ridge and Valley Region consists of the Great Valley in the east and a series of alternating ridges and valleys in the west. The rolling Great Valley is actually a series of valleys, including the Cumberland, Lebanon, and Lehigh Valleys in Pennsylvania; the Shenandoah Valley in Virginia; the Valley of East Tennessee; the Rome Valley in Georgia; and the Great Valley of Alabama. The region has some forests, but other wooded areas have been cleared to take advantage of fertile soil and relatively level land for farming. About 50 dams of the Tennessee River and its branches in the southern Great Valley provide flood control and hydroelectric power.

The Southern landform is also known as the Coastal Lowlands, which extend from southeastern Maine, across the eastern and southern United States to eastern Texas. The region has three subdivisions: (1) the Piedmont (2) the Atlantic Coastal Plain and (3) the Gulf Coastal Plain. The Atlantic Coastal Plain extends eastward from the Piedmont to the Atlantic Ocean. It ranges from a narrow strip of land in New England to a broad belt that covers much of North and South Carolina, Georgia, and Florida. Great Smoky Mountains Natural Parks is one of the largest protected areas in the Eastern United States. It consists of ridge upon ridges of endless forest straddling the border between North Carolina and Tennessee. It is world renowned for the diversity of its plant and animal life, the beauty of its ancient mountains, the quality of its remnants of Southern Appalachian mountain culture, and the depth and integrity of its wilderness sanctuary, the park attracts over nine million visitors each year. Once a part of Cherokee homeland, the Smokies today are a hiker’s paradise with over 800 miles of trails. The Great Smoky Mountain all year long offers breathtaking mountain views, waterfalls, accessible wildlife and rustic landscape.
A FISH Study of the Pericentric Inversion of Human Chromosome 9: Dora Castillo* and Dr. Xueya Hauge

Department of Biological and Physical Sciences

A human chromosome consists of three parts: a short arm, a long arm, and a centromere between the 2 arms. Pericentric inversion is a rearrangement within a chromosome, which is initiated by a breakage of the chromosome in the short arm and a breakage in the long arm. The disconnected segments of the chromosome flip 180° and the segment reunites with the remainder of the short and long arms. Pericentric inversion of human chromosome 9 occurs in 0.95-2% of the general population. In general, a pericentric inversion of a chromosome can cause error in alignment of homologous chromosomes during meiosis, which results in the duplication of a chromosomal segment and the deletion of another segment. It is unclear whether pericentric inversion of chromosome 9 leads to clinical consequences, such as infertility, stillbirth, and repeated abortions. Our goal is to define and compare the breakpoints of inverted 9 individuals with and without infertility. Here we report some preliminary results. We have obtained blood samples from two individuals who are heterozygotes of pericentric inversion of chromosome 9. The metaphase chromosomes were prepared from these blood samples for fluorescence in situ hybridization (FISH). FISH utilizes fluorescently labeled DNA probes to hybridize with chromosomes. Through complementary base pairing, a DNA probe specifically binds to its target sequence on the chromosome, thereby pinpointing the localization of the sequence. We used a fluorescently labeled, chromosome 9 specific alpha-satellite probe to highlight the centromere of chromosome 9 as an internal positive control in FISH. In addition two bacterial artificial chromosome (BAC) clones, RP11-79A9 and RP11-251017 were identified through the genome database search. These clones are localized on either side of the centromere and outside of the repetitive sequence regions, which makes them good candidates for FISH. The BAC DNA was isolated and purified by two different methods. (Supported by Mentor Protégé Program.)
Screening and Locating the Genes for Virulence-associated Enzymes of Aeromonas hydrophila: Jodra Lambert* and Dr. Donald J. McGarey

Department of Biological and Physical Sciences

*Aeromonas hydrophila* is a gram-negative, motile rod-shaped bacterium, which causes the disease known as hemorrhagic septicemia, ulcer disease or red-sore disease in fish. *A. hydrophila* can cause acute bacterial diarrhea, septicemia, meningitis, endocarditis, corneal ulcers, peritonitis and wound infections in humans. It is reported that several factors contribute to the overall virulence of this bacterium. These virulence factors include an external S-layer, pili, extracellular enzymes such as elastase, hyaluronidase and DNAse and toxins including aerolysin and enterotoxin. *A. hydrophila* strains isolated from ulcer-diseased fish have been shown to possess many of these virulence-associated factors including enzymes that degrade host tissues. Because the pathology of this disease included erosion of skin, muscle and cartilage, it was suspected that *A. hydrophila* produced enzymes able to degrade macromolecules that were vital to tissue structure and integrity. The enzymes that were studied were hyaluronidase, chondroitinase, protease and elastase. One objective of this project was to develop plate assays to detect enzyme activity (or lack of) and then use them in a selective assay to screen for “knock-out” (loss of phenotype) mutants after transposon mutagenesis. It was found that *A. hydrophila* expressed hyaluronidase and chondroitinase only in a CO$_2$ (5%) or anaerobic atmosphere, whereas expression of elastase and general protease were not affected by type of atmosphere. Enzyme activity (for all enzymes) occurred at temperature ranges of 15°, 20°, 25°, 30° and 35°C, although slower reactions were measured as temperatures decreased. Elastase activity was highest in late log phase of growth and independent of pH changes in the medium. Mutants demonstrating a loss of enzyme activity were produced by electroporation of the EZ::TN transposome (Epicentre™) into *A. hydrophila* 1135 wild-type. Mutants displaying loss of elastase activity retained general protease, hemolysis, hyaluronidase and chondroitinase activities. Loss of hyaluronidase activity was accompanied by loss in chondroitinase activity (and vise versa) implying a common *Aeromonas* lyase acts upon both chondroitin and hyaluronan, or common regulatory factors. The genes associated with each activity are currently being located, amplified by PCR and sequenced.
The effects of a sealed culture vessel on the development and survival of shell-less chick embryos: Mariyam Durojaiye*, Daina Ngugi*, Folasade Ademosu*, Tosin Olaleye* and Dr. Army Lester

Department of Biological and Physical Sciences

The goal of creating an effective culture vessel for maintaining shell-less chick embryos has been limited by high mortality and poor development. In this study, unincubated chick embryos were removed from their shells and cultured in sealed egg-shaped culture vessels made of plastic wrap. The environment was maintained at 37-38°C, 60% relative humidity and varying partial pressures of oxygen. The sealed vessel was effective in supporting 90% survival for shell-less embryos during the first three days of incubation, when the partial pressure of oxygen was maintained at 450 mmHg. Approximately 70% of the embryos survived until day 13 under similar conditions. Shell-less embryos cultured with no supplementary oxygen experienced high mortality during the first three days of culture, with less than 10% survival at day 13. Development of shell-less embryos maintained under high oxygen was similar to that of in ovo controls during the first ten days of incubation. However, by the 13th day of incubation, shell-less embryos were significantly smaller than controls. These results indicate that a sealed culture vessel may be effective in helping to maintain the survival and development of shell-less embryos by regulating gas exchange and water loss.
A population of *Cypridelidium acaule* (Pink Ladyslippers) at Kennesaw State University: A. Rachel Prakrash* and Dr. Heather Sutton

**Department of Biological and Physical Sciences**

*Cypridelidium acaule* (Pink Ladyslipper) is an orchid species native to eastern North America and is threatened by habitat loss. The Kennesaw State University campus has a forest patch that in the spring of 2004 contained a population of 273 *C. acaule*. As a baseline for a long-term study on this population, mapping of the current population was completed using standard surveying techniques. Each individual was flagged with a number. In addition to the baseline survey, two short-term studies were performed. The objective of the first study was to determine if leaf size influenced flowering. After measuring leaf size for each plant, and noting whether or not it produced a flower, it was shown using a logistic regression that *C. acaule* 's flowering was dependent on leaf size. The second study sought to determine which, if any, abiotic factors influenced the location of growth of individuals within the population. Data collected regarding the individual communities in the population demonstrated, by way of logistic regression, that the location of the orchids was affected by leaf litter depth, but not light, soil temperature or nearby vegetation. Ongoing studies will expand on this research to help preserve an important native plant species.
Phosphoglycoprotein (Pgp) is a transmembrane protein that was first identified in the Chinese hamster ovary cell line. Overexpression of Pgp in tumor cells results in active transport of xenobiotics out of the cells, causing them to be multi-drug resistant (MDR). Other types of molecules, such as lipids and peptides, have also been shown to be transported by Pgp. The effects of Pgp on steroid transport, as well as the effects of adrenocorticotropic hormone (ACTH) and digoxin on protein and RNA expression are of particular interest. Steroid production in the presence and absence of ACTH were examined in the Y-1 mouse adrenocortical cell line. Steroids were extracted using Sep-pak cartridges, and then analyzed by high performance liquid chromatography (hplc). Endogenous steroids produced by the Y-1 cells include progesterone, 11-deoxycorticosterone, corticosterone, 11β-hydroxyprogesterone and 21-hydroxyprogesterone. Various types of columns and mobile phase mixtures were examined to determine the best conditions for complete separation of these compounds. The best conditions found were with a 10 cm C18 column and a mobile phase composed of 35% acetonitrile, 5% methanol, and 60% water. With these conditions only two compounds were not baseline resolved: 11-deoxycorticosterone and 11β-hydroxyprogesterone. Western blotting procedures were done to determine the relative amount of Pgp produced by cells with and without ACTH. Our experiments show that Pgp is found between 116.3 – 200 kDa. However, due to problems with low numbers of cells, a quantitative comparison of Pgp in the presence and absence of ACTH has not yet been achieved. Regulation of the gene expression of Pgp was also investigated. Total RNA was isolated from Y-1 cells and the cDNA was obtained using reverse transcription followed by polymerase chain reaction (RT-PCR). The murine β-actin gene was used as a positive control in the assay to measure the basal level of expression of genes since it is a housekeeping gene and expresses ubiquitously. The β-actin gene also allows us to monitor the contamination of the genomic DNA. A 353 base-pair-long fragment was observed after RT-PCR and gel electrophoresis, which indicated that the amplification was successful and there was no detectable genomic DNA contamination. Next, we designed a pair of primers that are complementary to both the mdr1 and mdr3 gene sequences. The first two experiments failed to detect the amplified mdr1 and/or mdr3 gene products. We intend to design new sets of primers to find the optimal conditions for the RT-PCR. (Supported by Merck Company Foundation.)
Ion Analysis of Wild Type and Cadmium Tolerant Strains of *Ceratopteris richardii*: David Clements\(^1\*\), Dr. Dale Lynn Vogelien\(^1\) and Dr. Marina Koether\(^2\)

Department of Biological and Physical Sciences\(^1\) & Department of Chemistry and Biochemistry\(^2\)

Spores of Cdt1, a recently selected cadmium (Cd) tolerant strain of the fern *Ceratopteris richardii*, demonstrate significantly higher germination frequencies than wild type spores when sown onto media supplemented with increasing levels of Cd (e.g. 15% higher germination is observed at 250 µM Cd relative to wild type spores), but the resulting Cdt1 gametophytes are equally as sensitive as wild type gametophytes. As an initial characterization, the level of Cd and seven essential nutrient cations were examined in wild type and Cdt1 gametophytes exposed to 0, 12.5, 25 and 100 µM Cd (as CdCl\(_2\)). Liquid cultures were initiated by sowing spores into plain nutrient medium, with Cd treatments applied after 18 days of growth for a duration of 3 days. The levels of K, Ca, Cu, Mg, Mn, Fe, Zn, and Cd in gametophyte tissue were determined using atomic absorption spectroscopy. Tissue levels of Cd were similar in both strains and increased gradually as external concentrations of the metal increased. Similarly, the Fe content of gametophyte tissue was found to increase with increasing Cd stress, with similar levels observed in both strains for all treatments. Ca content was approximately two-fold higher in Cdt1 tissue than wild type tissue at all Cd concentrations examined and remained stable as external levels of Cd increased. Conversely, the level of K was two-fold higher in wild type gametophyte tissue, and, like Ca, was similar for all Cd treatments. Tissue levels of Cu, Mg, Mn, and Zn were similar in both strains and were not altered by increasing Cd stress. These results suggest that Cd toxicity in wild type gametophytes is not due to altered accumulation of essential nutrient cations, for excess Cd did not antagonize the accumulation of several essential divalent cations or K. In addition, these results suggest that the low level of tolerance observed in Cdt1 during germination is not likely to be due to reduced Cd accumulation. Rather, tolerance could be associated with higher constitutive levels of Ca. An ion analysis of spores and young gametophyte tissue would be needed to confirm this. However, higher levels of Ca are apparently not enough to confer tolerance to older gametophytes.
Phytotoxicity of monomeric and polymeric aluminum to native wetland species of various growth forms: B.C. Seda$^{2*}$, B.E. Foster$^{1*}$, M.L. Gunter$^{1*}$ and Dr. Heather Sutton$^{1}$

Departments of Biological and Physical Sciences$^1$ & Chemistry and Biochemistry$^2$

The most commonly used coagulant for the treatment of drinking water is aluminum sulfate (alum). The aluminum (Al) species in alum is the monomeric species Al$^{3+}$ (Al(H$_2$O)$_6$$^{3+}$). However, polymeric Al coagulants such as polyaluminum chloride used to treat drinking water may contain up to 10% of the Al as the polymeric species, Al$_{13}^{7+}$ ([AlO$_4$Al$_{12}$(OH)$_{24}$(H$_2$O)$_{12}$]$^{7+}$). These Al species can enter the environment through the land farming of the Al hydroxide sludges produced during the sedimentation process in the treatment of drinking water. Aluminum in these sludges can then enter waterways and wetlands through leaching or runoff. The toxicity of Al$_{13}^{7+}$ in the environment relative to Al$^{3+}$ is in question. The goal of this study was to investigate the relative toxicity of Al$_{13}^{7+}$ as compared to Al$^{3+}$ to wetland plants. Native wetland plant species tested were the floating plant *Lemna gibba* (duckweed), the wetland shrub *Cephalanthus occidentalis* (buttonbush), and a riparian tree *Platanus occidentalis* (sycamore). In addition, the agricultural plant *Lactuca sativa* (lettuce) was tested, as it is one of a number of agricultural species used as a surrogate in place of native plants. Concentrations ranging from 0 to 500mg/L were evaluated. Endpoints measured were shoot and root length and weight, or frond count for *L. gibba*. Uptake of Al into the shoot and root was analyzed. For some plant species, certain endpoints showed a significant difference between the two Al species, while other endpoints did not. Different responses were seen between the various plant species as a result of exposure to Al, however Al$_{13}^{7+}$ was generally found to be more toxic than Al$^{3+}$. 
Simple and speedy synthesis of poly(p-Phenylene Ethynylene)s using Acetylene gas: Kimberly A. Kellett, Daniel R. Durham, Igal Maasen, Dr. Kevin P. Gwaltney and Dr. Uwe H.F. Bunz

Department of Chemistry and Biochemistry & Georgia Institute of Technology

We have further investigated the direct coupling of acetylene and arenes to synthesize poly(p-phenylene ethynylene)s (PPEs). A variety of polymers and copolymers were produced. The monomers, acetylene gas and diiodoaryl compounds, are polymerized by a Pd/Cu catalyst. This method conserves two or more steps, thus is more efficient than the conventional metathesis or coupling methods. In addition, the method allows straightforward synthesis of random copolymers. Dialkyl-PPEs, dialkoxy-PPEs and random copolymers have been synthesized. Copolymers of diiodofluorene with dialky or dialkoxy arenes were also synthesized. Catalyst load, reaction temperature and reaction time were varied. Number average molecular weights, measured by gel permeation chromatography with polystyrene standardization, ranged from 3,000 to 84,000. Degree of polymerization was limited by solubility of the monomers and oligomers. Diiodofluorene provided the most difficulty due to insolubility. Characterization included fluorescence, UV-Vis, $^1$H NMR, $^{13}$C NMR and IR. Microstructuring was performed using the breath figure method creating a hexagonal array of 0.2-10 mm structures.
Growth Parameters for the Mathematical Modeling of *Escherichia coli* and *Pseudomonas aeruginosa*: Kirsten Seufert¹*, Dr. Jerald D. Hendrix¹, Dr. Sean Ellermeyer² and Dr. Jennifer Powers³

*Department of Biological and Physical Sciences¹, Department of Mathematics², and Department of Chemistry and Biochemistry³*

Mathematical models to predict the growth of bacteria under conditions of a single limiting nutrient incorporate parameters that can be empirically determined: the maximum growth rate ($\mu_{\text{max}}$), the substrate concentration at $\frac{1}{2}$ $\mu_{\text{max}}$ ($K_h$), and the time delay between nutrient uptake and production of new biomass ($\tau$). Most existing models of bacterial growth are unstructured, meaning that they do not account for rate-limiting physiological processes. The overall goal of our research is to determine specific rate-limiting processes in different bacterial species and to develop mathematical models that incorporate these processes. In this project, we compared the growth rate parameters ($\mu_{\text{max}}$, $K_h$, and $\tau$) of two different bacterial species, *Escherichia coli* (ATCC 23716) and *Pseudomonas aeruginosa* (ATCC 10145). The bacteria were grown in Davis minimal broth medium with glucose as the sole carbon source and limiting nutrient. The parameters for each species were found to be similar, with estimated values of 0.007 min$^{-1}$ for $\mu_{\text{max}}$, 0.004% for $K_h$, and 20 min for $\tau$. These parameters were used to predict the competition of *E. coli* and *P. aeruginosa* in continuous culture. We also evaluated a colorimetric glucose assay (the hexokinase-glucose 6phosphate dehydrogenase enzymatic assay) for determining glucose concentrations in bacterial cultures. Standard curves for glucose concentration were found to be similar using either spectrophotometer or microtiter plate assays; however, the glucose concentration in bacterial cultures quickly dropped to levels below the sensitivity of the assay. Finally, we evaluated a method for detecting the presence of different sigma factors (transcription regulatory subunits of bacterial RNA polymerase, which play a critical role in regulating bacterial growth rate) in *E. coli* using chemiluminescently-labeled antibodies specific for sigma-70 (the primary sigma factor during exponential growth) and sigma-S (the primary sigma factor during the stationary phase of growth). We were able to detect sigma-70 in *E. coli* RNA polymerase standards. In our future research, we plan to develop methods for differentiating between cells expressing sigma-70 and cells expressing sigma-S.
A comparison of satisfaction levels among high school and undergraduate students taking an online introduction to computer science course: Debra Bass Geist* and Dr. Amy B. Woszczynski

Department of Computer Science and Information Systems

As information technology programs of study continue to experience downturns in enrollment, educators need to search for alternative methods to recruit potential students. One such method is reaching back to high school students that may have an untapped interest in computers and technology. This study describes the delivery of a distance learning introduction to computer science course to high school students in a southeastern state. Further, we describe the student satisfaction with the online experience as well as the learning achieved in the introduction to computer science course. Using a survey based on previous research, we plan to compare the satisfaction levels of high school and undergraduate students taking an online introductory computer science course. We anticipate that high school and undergraduate students will experience similar levels of satisfaction with the distance learning delivery format. Based on the results, we will discuss implications of the study for future partnerships between universities and high schools.
Stirling Numbers of the Second Kind and Primality: Stephan Touset* and Dr. Joe DeMaio

Department of Mathematics

A Stirling number of the second kind is a combinatorial function which yields interesting number theoretic properties with regard to primality. The Stirling number of the second kind, $S(n,k)$, counts the number of partitions of an $n$-element set into $k$ non-empty subsets. A Stirling prime (of the second kind) is a prime $p$ such that $p=S(n,k)$ for some integers $n$ and $k$. The relationship between Mersenne primes and Stirling primes will be shown. Divisibility theorems with regard to primality will be stated and used to devise algorithms for accelerated searching of Stirling primes. Search results for $1<=n<=100,000$ and $1<=k<=6$ will be presented.
Kac-Moody Algebraic Interpretation of Elliptic Hasse-Weil L-Functions: Joseph Tyson$^1$ and Dr. Rolf Schimmrigk$^2$

Department of Mathematics$^1$ and Department of Biological and Physical Sciences$^2$

Let $k$ be a natural number, $\Theta_{l,m}^k$ be Hecke indefinite modular forms defined by Kac and Peterson in terms of the string functions $c_{k,l,m}$. Let $E(a)$ denote the Tate form of elliptic curves, defined for any vector $a=(a_1, a_2, a_3, a_4, a_6)$ as $E(a_1, a_2, a_3, a_4, a_6): y^2 + a_1xy + a_3y = x^3 + a_2x^2 + a_4x + a_6$

Then we consider the following set of elliptic and modular objects

<table>
<thead>
<tr>
<th>Conductor N</th>
<th>Elliptic curve</th>
<th>Modular form</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>(0, -1, 1, -10, -20)</td>
<td>$\Theta_{1,1}^2(\tau)\Theta_{1,1}^2(7\tau)$</td>
</tr>
<tr>
<td>14</td>
<td>(1, 0, 1, 4, -6)</td>
<td>$\Theta_{1,1}^1(2\tau)\Theta_{1,1}^1(10\tau)$</td>
</tr>
<tr>
<td>15</td>
<td>(1, 1, 1, -10, -10)</td>
<td>$\Theta_{1,1}^8(\tau/2)\Theta_{1,1}^8(3\tau/2)$</td>
</tr>
<tr>
<td>20</td>
<td>(0, 1, 0, 4, 4)</td>
<td>$\Theta_{1,1}^1(2\tau)\Theta_{1,1}^1(10\tau)$</td>
</tr>
<tr>
<td>24</td>
<td>(0, -1, 0, -4, 4)</td>
<td>$\Theta_{1,1}^1(2\tau)\Theta_{1,1}^1(6\tau)$</td>
</tr>
<tr>
<td>27</td>
<td>(0, 0, 1, 0, -7)</td>
<td>$\Theta_{1,1}^1(3\tau)\Theta_{1,1}^1(9\tau)$</td>
</tr>
<tr>
<td>32</td>
<td>(0, 0, 0, 4, 0)</td>
<td>$\Theta_{1,1}^2(4\tau)^3$</td>
</tr>
<tr>
<td>36</td>
<td>(0, 0, 0, 0, 1)</td>
<td>$\Theta_{1,1}^1(6\tau)^3$</td>
</tr>
<tr>
<td>48</td>
<td>(0, 1, 0, -4, 4)</td>
<td>$\Theta_{1,1}^1(4\tau)^3\Theta_{1,1}^1(16\tau)$</td>
</tr>
<tr>
<td>80</td>
<td>(0, -1, 0, 4, -4)</td>
<td>$\Theta_{1,1}^1(2\tau)\Theta_{1,1}^1(8\tau)\Theta_{1,1}^1(10\tau)\Theta_{1,1}^1(40\tau)$</td>
</tr>
<tr>
<td>144</td>
<td>(0, 0, 0, 0, -1)</td>
<td>$\Theta_{1,1}^1(12\tau)^6$</td>
</tr>
</tbody>
</table>

Ultimately, we prove the following theorem.

**Theorem.** The modular forms listed in the table above are the Mellin transforms of the Hasse-Weil L-functions of the corresponding elliptic curves $E(a)$. 

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