

**2008 National Convention
Sigma Zeta
National Science and Mathematics Honor Society
April 3-5, 2008
University of Indianapolis
Indianapolis, Indiana**



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The Officers and Volunteers of the UIndy Rho Chapter of Sigma Zeta

Schedule of Events
Sigma Zeta National Convention
April 3-5, 2008

Thursday, April 3rd

- 5:00 – 7:00 pm Check-In
 Atrium of Schwitzer Student Center
- 7:00 – 8:30 pm Bowling for the students
- 7:00-10:00 pm Executive meeting for the faculty advisors
 Schwitzer Student Center Lower Level – Room 012
- 7:00 – 8:00 pm Late Check-In
 Atrium of Schwitzer Student Center

Friday, April 4th

- 7:30 – 8:30 am Breakfast
 Main Dining Hall of Schwitzer Student Center
Morning check-in
 Atrium of Schwitzer Student Center
- 8:30 – 9:30 am Opening ceremonies
 Good Hall - Recital Hall (110)
- 9:30 – 10:00 am Presentation preparation time
 Schwitzer Student Center - Lower Level
- 10:00 – 10:20 am Presentation Session #1
 Room 004: Elena M. Davila
 Room 005: Rachel Gaulke
- 10:20 – 10:40 am Presentation Session #2
 Room 004: Melissa Parks
 Room 005: Elizabeth Walther
- 10:40 – 11:10 am Break
10:20-11:30 am Poster Session
 Room 013: John K. Sanders and Joseph C. Whittaker
 Vicky Braun
 Greg Jarvis
 Jennifer Wyatt
- 11:10 – 11:30 am Presentation Session #3
 Room 004: Andrew Dunn
 Room 005: Ben Randel and Laura Boltz

11:30 – 11:50 am Presentation Session #4
 Room 004: Kara Benjamin and Bynthia Anose
 Room 005: Ryan Sanderson

11:50 – 1:00 pm Lunch and changing time
 Schwitzer Student Center Lower Level

1:00 – 1:30 pm Travel Time

1:30 pm Arrive at Indy Motor Speedway
 Arrive at Medical History Museum

2:00 pm Arrive at Dow AgroSciences

4:00 – 6:00 pm Travel and Changing Time

6:00 – 9:30 pm Banquet, Speaker, Awards, and Committee Meetings
 Main Dining Hall of Schwitzer Student Center

Saturday, April 5th

7:30 – 9:00 Breakfast
 Main Dining Hall of Schwitzer Student Center

8:30 – 9:00 Committee Follow Up
 Lower Level of Schwitzer Student Center

9:00 – 9:20 am Presentation Session #1
 Room 004: Stephen H. Gregory
 Room 005: Lindsey Fischer

9:20 – 9:40 am Presentation Session #2
 Room 004: Francis Rogosienski
 Room 005: Jeff Barnes

9:40 – 10:00 am Break

10:00 – 10:20 am Presentation Session #3
 Room 004: Shelli Steffen
 Room 005: Jessica F. Patton

10:20—10:40 am Presentation Session #4
 Room 005: Saint Wesong

11:00 - ?? Closing Business Meeting
 Good Recital Hall

Sigma Zeta National Convention
2008
Schedule of Student Presentations
Schwitzer Student Center – Lower Level

Friday, April 4th

ROOM: 004

- 10:00-10:20 **Elena M. Davila** (Our Lady of the Lake University) Sigma Chapter: “‘CDtrodes’ vs. Traditional Gold Film Electrodes in Determination of a Soil Pollutant”
- 10:20-10:40 **Melissa Parks** (University of Indianapolis) Rho Chapter: “The Effect of Vitamin E Phosphates on Endothelial Nitric Oxide Synthase”
- 11:10-11:30 **Andrew Dunn** (Millikin University) Pi Chapter: “DNA Detection Using Gold Nanoparticles”
- 11:30-11:50 **Kara Benjamin and Bynthia Anose** (Bethel University) Beta-Iota Chapter: “Investigating Potential Control Genes for Standardization of Quantitative Real-Time PCR”

ROOM: 005

- 10:00-10:20 **Rachel Gaulke** (Bethel University) Beta-Iota Chapter: “Lewis Acid-Mediated Copolymerization of Acrylamides and 1-Hexene”
- 10:20-10:40 **Elizabeth Walther** (Our Lady of the Lake University) Sigma Chapter: “Method Development of a Sensitive and Inexpensive Lead Sensing Wipe”
- 11:10-11:30 **Ben Randel and Laura Boltz** (Anderson University) Upsilon Chapter: “Seven-Week Science Program for Local Home Schooled Children”
- 11:30-11:50 **Ryan Sanderson** (University of Indianapolis) Rho Chapter: “Inspiring Third Grade Students in Science Through An After School Club”

Poster Presentations

ROOM: 013

10:20-11:30

John K. Sanders and Joseph C. Whittaker (Pikeville College) Beta-Xi Chapter: “Impact of Mountaintop Removal Reclamation on Small Mammal Communities in Eastern Kentucky”

Vicky Braun (University of Indianapolis) Rho Chapter: “Is *Gallus gallus* an appropriate model for apoptosis studies? Evidence from studies of Poly ADP-ribose polymerase in *Gallus gallus* embryonic cells”

Greg Jarvis (University of Indianapolis) Rho Chapter: “Industrial Waste Water Treatment: Separated Hexavalent Chromium Reduction and Hydroxide Precipitation vs. Combined Treatment”

Jennifer Wyatt (University of Indianapolis) Rho Chapter: “Thioredoxin (TRx) acts like a growth factor for human lens epithelial cells. What is the mechanism by which TRx stimulate the growth of HLE-B3 cells?”

Saturday, April 5th

ROOM: 004

- 9:00-9:20 **Stephen H. Gregory** (McKendree College) Beta Chapter: “Complexomic Gel Electrophoresis Reveals Modulated Protein Expression in 4-Phenylbutyrate Treated Cystic Fibrosis Bronchial Epithelial Cells”
- 9:20-9:40 **Francis Rogosienski** (Bethel University) Beta-Iota Chapter: “The Contractile Effects of Red Raspberry Leaf (*Rubus idaeus*) extract on Mouse Uterine Smooth Muscle in vitro”
- 10:00-10:20 **Shelli Steffen** (University of Indianapolis) Rho Chapter: “Comparison of Crest White Strips Premium and Opalscence as Bleaching Agents on Human and Bovine Teeth”

ROOM: 005

- 9:00-9:20 **Lindsey Fischer** (University of Indianapolis) Rho Chapter: “Research Assistant for Organic Chemistry Mechanistic Term Papers”
- 9:20-9:40 **Jeff Barnes** (Malone College) Alpha-Gamma Chapter: “Elliptic Curves and Factoring Large Integers”
- 10:00-10:20 **Jessica F. Patton** (Bethel University) Beta-Iota Chapter: “The Effects of the Hormone Leptin on Obesity, Metabolism, Body Temperature, and Feeding Behaviors, Using Normal, ob/ob, and db/db Mutant Mice”
- 10:20-10:40 **Saint Wesong** (Malone College) Alpha-Gamma Chapter: “Elliptic Curve Cryptography”

**Sigma Zeta National Convention
2008
Abstracts**

Friday, April 4th

10:00-10:20 Room 004

Elena M Davila and Dr. Charles Smith - Our Lady of the Lake University
"CDtrodes" vs. Traditional Gold Film Electrodes in Determination of a Soil Pollutant

San Antonio has several of the oldest coal burning power plants in the nation. These plants are "grandfathered" with respect to environmental laws because they were built before more stringent environmental laws that govern what these plants may emit into the air. Literature has suggested a link between rates of autism and the locality of a these plants. It has been argued that the increased rates of autism are due to mercury in the environment. Stripping voltammetry from gold electrodes has proven to be a sensitive technique for mercury analyses. A CDtrode is a term coined in the literature for gold electrodes literally cut from commercial gold compact disks. Traditional gold electrodes are prepared by depositing a gold film onto a carbon electrode. The advantages and disadvantages of CDtrodes will be presented along with the results of the search for mercury in the soil in the San Antonio region.

10:00-10:20 Room 005

Rachel Gaulke and Dr. Megan Nagel - Bethel University
Lewis Acid-Mediated Copolymerization of Acrylamides and 1-Hexene

Controlled radical copolymerization of acrylamides and 1-hexene using the Lewis acids, Al₂O₃ and Sc(OTf)₃, is expected to give copolymers with macroscopic properties that are unique when compared to the homopolymers. This research studies the effect of the Lewis acid, Lewis acid concentration, and temperature on copolymer conversion and composition of each comonomer. Characterization of the copolymers is achieved using ¹H NMR to determine copolymer composition, and GPC is used to analyze molecular weights and molecular weight distribution. It was found that temperature affects acrylamide copolymer conversion while the use of Al₂O₃ as a Lewis acid did not. However, Sc(OTf)₃ was shown to increase copolymer conversion and significantly increase molecular weight of copolymers. The use of Sc(OTf)₃ also showed an increase of 1-hexene incorporation while simultaneously affecting the tacticity of the copolymer.

10:20-10:40 Room 004

Melissa Parks - University of Indianapolis
The Effect of Vitamin E Phosphates on Endothelial Nitric Oxide Synthase

Atherosclerosis, the process in which fatty materials collect along the arterial walls, is commonly associated with reduced bioactivity of nitric oxide and is synonymous with endothelial dysfunction. Endothelial nitric oxide synthase (eNOS) is a low output enzyme found in endothelial cells responsible for the synthesis of nitric oxide. A new form of vitamin E, known as tocopheryl phosphate, has been hypothesized to reverse endothelial dysfunction, thereby reducing the risk of atherosclerosis. Using human aortic endothelial cells, 50% of eNOS activity was inhibited using 10 ng/mL of TNF α inducing endothelial dysfunction. 50 μ M and 100 μ M doses of α -tocopheryl phosphate and γ -tocopheryl phosphate were used to treat the endothelial cells. Using 100 μ M of tocopheryl phosphate significantly improved endothelial dysfunction more than the 50 μ M dose of tocopheryl phosphate. Furthermore, γ -tocopheryl phosphate was more potent in improving endothelial dysfunction than α -tocopheryl phosphate.

10:20-10:40 Room 005

Dr. Charles Smith and Elizabeth Walther - Our Lady of the Lakes University
Method Development of a Sensitive and Inexpensive Lead Sensing Wipe

Of the overexposures to harmful materials in industry, lead is one of the most common and is a leading cause of workplace illness. There are many ways in which humans are exposed to lead: air, drinking water, food contaminated soil, deteriorating paint, and dust. Old lead-based paint is the most significant source of lead exposure in the U.S. today. In August 2004, the San Antonio Express News published an article that stated a five-year-old living in the Alazan-Apache apartments had high amounts of lead in his blood. The objective of our project was to develop a lead sensing pad that would change color in the presence of lead. It was planned that his pad would allow simple and direct tests for the current residents of Alazan-Apache apartments. A lead sensing pad was prepared that can detect concentrations of lead arguably below 10ppm.

11:10-11:30 Room 004**Andrew Dunn and Anne Rammelsberg, PhD - Millikin University****DNA Detection Using Gold Nanoparticles**

In this study we examined gold nanoparticle stability in the presence of biological molecules. To test this we used dilute solutions of the amino acids L-leucine, L-aspartic acid, L-glutamic acid, L-proline, L-histidine and L-glycine. We also used two proteins: bovine serum albumin and trypsin. Our results show that L-leucine, L-proline, L-glycine, L-histidine, bovine serum albumin and trypsin do not cause gold nanoparticle aggregation. L-aspartic acid and L-glutamic acid did interact with gold nanoparticles causing aggregation. Despite the aggregation in the absence of DNA, L-aspartic did not interfere with the gold nanoparticles ability to detect ssDNA. These results provide a foundation for continued research in this area. This technique can be used in small undergraduate universities and high schools.

11:10-11:30 Room 005**Kristin Wesseling, Laura Boltz, Benjamin Randel, Rebekah Petter, Bonnie Sorensen, Eddie Desko, Scott Carr, Chad Wallace - Anderson University****Seven-Week Science Program for Local Home Schooled Children**

A seven-week program covering fundamental concepts and experiences in biology, chemistry, mathematics and physics for local home schooled children has been developed and implemented for the past two years by Anderson University's Upsilon chapter. This talk will discuss the start up process, advertising, lesson plans, group involvement and financial aspects. Over the course of seven weeks, up to 40 home schooled children utilized the university's laboratory space for a day and were instructed by Sigma Zeta members and other volunteers. The students were divided into two groups based on grade level and would spend either one or two weeks/sessions on a particular subject. For example, on any given week one group may be doing chemistry and the other group could be working on biology. During that session, student-generated lab experiments or exercises would be performed lasting up to an hour. This has proven to be rewarding experience for both the university and home schooled students and an effective means to excite elementary students about science.

11:30-11:50 Room 004**Kara Benjamin and Bynthia Anose - Bethel University****Investigating Potential Control Genes for Standardization of Quantitative Real-Time PCR**

Prostate-specific antigen (PSA) has previously been used as a positive control gene for assessing the regulation of human Zinc finger E-box Binding Protein-1 (ZEB-1) expression. ZEB-1 is associated with the progression of prostate cancer, and is a putative biomarker for metastasis of the disease. However, in order to demonstrate conclusively the relationship between ZEB-1 expression and its various regulatory elements, it is critical that a negative control gene be identified to standardize the quantitative techniques. We have identified ribosomal protein L4 as an appropriate negative control gene for such purposes. Additionally, we have shown that beta-glucosidase and beta-tubulin are unacceptable for use as negative control genes. This study focuses on the quantitative real time polymerase chain reaction (RT-PCR), a technique commonly employed in the molecular diagnosis of disease such as malignant neoplasm. Through amplification of cDNA products and subsequent quantification via fluorescent spectroscopy, RT-PCR determines relative gene expression levels. Ribosomal protein L4 will be indispensable as an internal reference in future investigation of the regulation of ZEB-1 expression via quantitative RT-PCR.

11:30-11:50 Room 005**Ryan Sanderson - University of Indianapolis****Inspiring Third Grade Students in Science Through An After School Club**

This Honors project consisted of a community service project taking place at the Honor student's elementary school. A science club was created for twenty third graders, which met twenty times over the course of a school year. The three main goals were to get the students more excited about science, to help the students improve their student skills, and lastly, to improve the students' knowledge in science at a level greater than would be expected of third graders. Lessons were designed based on the Piagetian theory of cognitive development. Third grade students, mostly eight and nine years old, are in the heart of the concrete operational stage. Students at this age are not very proficient at grasping abstract ideas. Much of science deals with abstract concepts, so lessons had to be designed in a way that these abstract ideas become more hands-on. Children are often "pushed" into the next stage of development, the formal operational stage, at the age of eleven or twelve, by instances in which their understanding of the world is challenged. This may occur in science experiments, especially for young students. Experiments were also designed to challenge students' beliefs about the world. To evaluate the students' perceived progress in the area of science, the students, parents and teachers completed surveys both before the beginning of the science club and after the first semester. It was found that there were perceived gains in all sets of questions but one, which remained neutral.

Poster Presentations

10:20-11:30 Room 013

John K. Sanders and Joseph C. Whittaker - Pikeville College

Impact of Mountaintop Removal Reclamation on Small Mammal Communities in Eastern Kentucky

Although mountaintop removal is a common, and controversial, practice in Eastern Kentucky, there have been few studies on the impact of such techniques, especially concerning small mammal communities. In the Midwest United States, small mammal community compositions have shown change due to strip-mining. It is possible that the process of disturbance and reclamation could create new habitat for rare grassland species. The purpose of this study was to document small mammal communities in reclaimed mountaintop removal and valley-fill sites and to compare with small mammal communities in natural, unmined areas as well. We used a total of four different trap types per station in an attempt to maximize trapping success for different species. Mark-recaptured methodology was used to estimate populations. Results were standardized per 100 trap-nights for comparison between sites. In comparing densities and community diversity, there were more individuals captured in natural areas but the reclaimed sites had a higher diversity. However, this result is slightly misleading because two of the three sampled mountaintop sites had only one species of *Peromyscus* present.

Greg Jarvis - University of Indianapolis

Industrial Waste Water Treatment: Separated Hexavalent Chromium Reduction and Hydroxide Precipitation vs.

Combined Treatment Electroplating, powdercoating, and electrocoating operations generate industrial waste water that is necessary to treat before sending to sanitary sewers, as required by federal law. Different techniques and coatings produce different waste streams that are commonly treated separately. Treating multiple waste streams in a single vessel was tested, involving hexavalent chromium reduction and metal hydroxide precipitation in particular. Formerly, these processes took place in separate, conical-bottom tanks and were combined post-treatment. Analyzing the clear supernatant produced after all precipitates (classified F-006 Sludge) were removed gave values well under maximum concentration values for zinc, copper, chromium, and nickel.

Jennifer Wyatt - University of Indianapolis

Thioredoxin (TRx) acts like a growth factor for human lens epithelial cells. What is the mechanism by which TRx stimulate the growth of HLE-B3 cells?

Thioredoxin (TRx) is a small protein found in all prokaryotes and eukaryotes that regulates cellular activity by reducing proteins. TRx is an antioxidant from the oxidoreductase family with a molecular weight of 12 kDa. The only enzyme capable of reducing oxidized TRx is thioredoxin reductase (TR) which has a mass of 55 kDa. Current research focuses on the functions of TRx. TRx is thought to have a role in transcription, growth control, and immune function [1, 2]. Removing the TRx gene from an organism is believed to cause fatality, due to the vital functions of the TRx gene during embryonic development [3]. TRx has been found in the cytosol of plants and in the mitochondria of animals. More specifically, the isoforms TRx-1 and TRx-2 have been located in human [4] and mouse eye lenses [5]. Methods have been developed to clone TRx genes by using plasmids. The recombinant proteins were then purified, and the new TRx genes were used for research purposes.

Vicky Braun - University of Indianapolis

Is *Gallus gallus* an appropriate model for apoptosis studies? Evidence from studies of Poly ADP-ribose polymerase in *Gallus gallus* embryonic cells.

Apoptosis is a natural, genetically programmed mechanism of cell death. During apoptosis, the cell cycle is arrested, nuclear DNA is fragmented, and cells are converted to membrane-bound fragments. There are three known signal transduction pathways responsible for inducing apoptosis. First, is the withdrawal of growth factors, which cause the release of pro-apoptotic proteins that accumulate on the mitochondrion, and lead to a cascade of signaling events that kill the cell. The second method of apoptosis is caused by a cell death ligand binding to a transmembrane protein receptor that activates procaspases and caspases, which then initiate the process of apoptosis. Third, chemically or physically induced DNA damage induces apoptosis by activation of the transcription factor p53, which in turn causes release of cytochrome C from mitochondria followed by activation of caspases. Caspase 3 cleaves the protein Poly (ADP-ribose) polymerase-1 (PARP-1), a DNA-binding zinc finger protein that is known to be responsible for DNA damage repair. By cleaving PARP-1 into 24 and 89 kD peptides, cells are unable to repair the accumulating fragments of DNA that are part of the apoptosis process. Currently, apoptosis pathways are mainly being studied in *Caenorhabditis elegans*, or in transformed mammalian tumor cell lines. Because of my interest in apoptosis in normal cells, I explored the use of embryonic *Gallus gallus* (chicken) cells as a model system to study apoptosis. Chicken embryo fibroblasts (CEF) are easily obtained and maintained in the laboratory as primary cell cultures. Furthermore, chicken embryos are a well-characterized system for developmental biology. Current available antibodies used as probes to study apoptosis in vertebrates are produced using mammalian proteins as antigens. ClustalW comparisons of PARP-1 amino acid sequences from many different organisms showed extensive conservation between all species examined. Therefore, it was hypothesized that goat anti- mouse PARP-1 would likely bind to chicken PARP-1, and allow us to determine if DNA damaging agents such as UV cause caspase-induced PARP-1 cleavage in CEF cells.

Saturday April 5th

9:00-9:20 Room 004

Stephen H. Gregory, Om V. Singh, and Pamela L. Zeitlin - McKendree University

Complexomic Gel Electrophoresis Reveals Modulated Protein Expression in 4-Phenylbutyrate Treated Cystic Fibrosis Bronchial Epithelial Cells

Cystic Fibrosis (CF) is one of the most common autosomal recessive disorders. It is caused by the mutation of a gene coding for a multifunctional transmembrane protein, the cystic fibrosis transmembrane conductance regulator (CFTR). The most common CFTR mutation, F508, results in retention of the misfolded protein in the endoplasmic reticulum (ER), and eventual degradation through the ubiquitin-proteasome pathway. Short chain fatty acid derivatives of butyric acid, including sodium 4-phenylbutyrate (4-PBA), mediate prolonged association of F508-CFTR, sometimes rescuing the protein from ER-associated degradation (ERAD). We hypothesized that 4-PBA treatment alters chaperones that associate with immature F508-CFTR. 2-D BN-PAGE/SDS electrophoresis was performed in order to facilitate the visualization of the modulated proteins associating with the immature mutant protein. The majority of informative proteins belonged to the heat shock protein (HSP) family. Additionally, this investigation documented the first ever visualization and identification of the CFTR protein on a 2D gel with 50% coverage. From these results, we conclude that 4-PBA mediated rescue of CFTR is associated with the changes in the components of native multi-protein complexes that could assist in rescuing F508-CFTR protein from ERAD by interacting as components of the CFTR multi-protein super complex.

9:00-9:20 Room 005

Lindsey Fischer and Katherine W. Stickney - University of Indianapolis

Research Assistant for Organic Chemistry Mechanistic Term Papers

University of Indianapolis Organic Chemistry II students are required to write a term paper in order to deepen their understanding of complex organic chemistry reaction mechanisms. In this assignment, they must search the American Chemical Society database to locate a journal article containing a 5-step organic chemistry reaction, research each step to the level of the mechanism, use a chemical structure drawing program and curly arrows to draw the mechanism for each synthetic step, and use correct technical vocabulary to write a paper describing the transformations observed in each elementary step. This assignment has typically been a large time drain on the professor teaching the course due to lack of student preparation for such a complex assignment. In an effort to reduce the load on the professor, and to improve my understanding of organic chemistry mechanisms, I worked this year as a resource for students to aid in their research process. I answered questions on how to use software, how to research mechanisms, and how to technically describe the mechanistic processes. Over the course of the semester, I discovered many pros and cons to my work, which I will address in my presentation. I will also share ways to improve the abilities of a teacher's assistant to help in the term papers of the organic chemistry students. As future work, I will formulate a package outlining the steps to researching reaction mechanisms for future organic chemistry students.

9:20-9:40 Room 004

Francis Rogosienski - Bethel University

The Contractile Effects of Red Raspberry Leaf (*Rubus idaeus*) extract on Mouse Uterine Smooth Muscle in vitro

The uterus is an essential organ for reproduction in mammals. Despite the importance of the uterus for the fertility and health of women and their offspring, relatively little is known about the effects of natural remedies on this tissue. The intent of this project was to investigate the effects of red raspberry leaf (*Rubus idaeus*) extract on isolated uterine tissue of mice suspended in a smooth muscle bath. The isolated tissues were hung under 1g of tension and bathed in DeJalons buffer. The main questions addressed in this project were: (1) Does *Rubus* extract alone cause a contractile response in isolated mouse uterine tissue? And if so, is it dose-dependent? (2) Does an extract of *Rubus* potentiate the contractile response a) induced by acetylcholine b) or evoked by electrical field stimulation? Results demonstrated that *Rubus* alone elicited a contractile response. However, there was no dependency between doses given and responses elicited. The *Rubus* extract did significantly potentiate contractile responses induced from the acetylcholine and evoked from electrical field stimulation, indicating that *Rubus* may indeed help to facilitate normal contractile responses in the uterus. These results do substantiate the claims that *Rubus*, as an herbal remedy, can induce and may modulate uterine smooth muscle contractions involved in the labor process.

9:20-9:40 Room 005

Jeff Barnes - Malone College

Elliptic Curves and Factoring Large Integers

In this talk, we will investigate how the group law for points on an elliptic curve can be used to factor large integers.

10:00-10:20 Room 004

Shellie Steffen - University of Indianapolis

Comparison of Crest White Strips Premium and Opalescence as Bleaching Agents on Human and Bovine Teeth

In this study a comparison of two teeth whitening products, Premium Crest White Strips and Opalescence, was conducted by applying the bleaching agents as directed to human teeth and bovine teeth. The change in shade after bleaching was measured using two methods: a colorimeter and a Trubyte Bioform Shade Guide. It was found that Opalescence resulted in a greater change in shade although this difference was not significant. It was also determined that bovine teeth have a greater response to bleaching than human teeth.

10:00-10:20 Room 005

Jessica F. Patton - Bethel University

The Effects of the Hormone Leptin on Obesity, Metabolism, Body Temperature, and Feeding Behaviors, Using Normal, ob/ob, and db/db Mutant Mice

Why is obesity or being overweight such a battle for some people and not others? A way to address this question is to look at how the body utilizes the hormone leptin, which is derived primarily from adipocytes. Leptin, the product of the obese (ob/ob) gene plays a major role in the regulation of food intake, hunger, satiety and metabolism. The purpose of this experiment was to determine if the lack of leptin or the leptin receptor in mutant mice affects basal metabolism, body temperature and feeding behaviors. Eighteen mice were used in this experiment: 6 controls, 6 mutant ob/ob (defective for the expression of leptin), and 6 mutant db/db (defective for the expression of the leptin receptor). The variables tested included basal metabolic rate, food intake, water intake, cage waste, and body temperature. Results demonstrated that normal mice had a statistically higher metabolic rate and body temperature than both the ob/ob and db/db mice. Although the normal mice ate more than the other mice, the increase was not statistically significant. The water intake was statistically higher in the db/db mice compared to the ob/ob and control mice. The cage waste was statistically higher in the db/db mice (from high urine output) and in the control mice (with large amount of food debris) when compared to the ob/ob mice. These results substantiate that mutations in the genetic expression of leptin or the leptin receptor may contribute to interruptions in normal metabolism and may contribute to obesity.

10:20-10:40 Room 005

Saint Wesonga - Malone College

Elliptic Curve Cryptography

We will demonstrate how elliptic curves over finite fields can be used to securely encrypt and decrypt information.