

Poster Abstracts

1. EFFECTS OF RACISM: ARE PEOPLE MORE AGAINST OBAMA BECAUSE HE'S BLACK?

*Robert Murphy, Sara Richardson and Kоди Nordahl, Department of Psychology, University of Northern Iowa*

This study examined whether the degree to which a person agrees or disagrees with a message influences how a message and speaker are rated depending on the race of the speaker. Individuals may feel threatened if a message of the speaker disagrees with their self-interest. This effect may be exacerbated when the speaker is a member of an out-group that is negatively stereotyped. These stereotypes may then be used to discredit the source (Livingston & Sinclair, 2008). College students completed initial questionnaires on demographics and political orientation. They then read an editorial that was either for or against universal health care presented by a Black or White man and evaluated the editorial and source. We expect that liberals will rate the Black speaker equally or more positively than the White speaker when the speech is pro-universal health care. They will rate the Black speaker more negatively (e.g., as less intelligent, confident when they disagree with the message. Conservatives are expected to rate the Black speaker equally or more positively when the speech is against universal health care and more negatively when the speech is pro-universal healthcare. These results would provide further support for the Integrated Model of Racism (Harton & Nail, 2008).

2. ONLINE CONTAGION OF AGGRESSION

*Zachary Lemka, Department of Psychology, University of Northern Iowa*

Students completed an item ordering task, in which they ranked 15 items in order from most to least important for survival on the moon. The students then participated in a 15 minute chat with 6 other students about the proper item order. In the experimental condition, aggression was modeled by a pair of confederates. Participants in the experimental groups were significantly more aggressive than those in the control group, controlling for initial hostility, and indirect aggression toward the confederates was higher than toward other participants.

3. THE EFFECTS OF EPIGALLOCATECHIN GALLATE, A GREEN TEA COMPOUND, ON THE MIGRATION AND INVASION OF HUMAN MACROPHAGES

*Laura C. Whitmore (Biology, M.S.) and Barton L. Bergquist (Biology Department)*

Macrophages are white blood cells which migrate to sites of infection. In order to create pathways for migration, these cells secrete matrix metalloproteinases (MMPs), enzymes which digest the extracellular environment. Previous research indicates that epigallocatechin gallate (EGCG), a compound in green tea, may bind MMPs and inhibit their function. The purpose of this research is to determine how EGCG affects the migration and invasion of human macrophages. Flow cytometry was used to analyze the macrophage surface expression of membrane-type I MMP (MT1-MMP) and migration and invasion assays are currently being performed. Results show that macrophages treated with EGCG express significantly less MT1-MMP than control cells. MT1-MMP activates pro-MMPs secreted by macrophages; thus, decreased MT1-MMP expression could result in fewer active MMPs. Low numbers of active MMPs may inhibit macrophage invasion of the extracellular environment and hinder their migration to sites of infection.

4. CHARACTERIZATION OF THE *TFL1*-LIKE GENE FAMILY IN PAPAYA, *CARICA PAPAYA*

*Jeremy R. Pritchard and Marek K. Sliwinski, UNI Biology Department*

Flowering plants, like all living things, use genes to guide organ development. In the model plant system *Arabidopsis*, the *Terminal Flower 1 (TFL1)* gene plays a key role in flower placement and meristem identity. In *Arabidopsis*, *TFL1* helps to keep the meristem indeterminate, which prevents floral development. In contrast, the *Carica papaya* meristem is determinate resulting in the apical meristem becoming a terminal flower. Our goal is to characterize the papaya *TFL1*-like gene family. To begin, we formed a BLAST database using the current papaya genome and searched for papaya *TFL1* homologs. The BLAST algorithm returned five matches with e values of  $1e^{-30}$  or better. We then constructed a multiple alignment and phylogenetic tree to compare our papaya *TFL1* homologs to *TFL1*-like genes from other species. The

multiple alignment revealed two of the papaya *TFL1* homologs are truncated sequences compared to Arabidopsis *TFL1*. Phylogenetic analysis suggests that the papaya *TFL1* homologs each fit into different clades of the *TFL1*-like gene family tree. We then attempted to PCR amplify each papaya *TFL1* homolog from papaya genomic DNA. Two papaya *TFL1* homologs produced bands of the expected size. In the future, these two papaya *TFL1* homologs will be cloned and transformed into Arabidopsis to study their function.

#### 5. PLAYGROUND SURFACES AND CHILDREN'S HEALTH: THE IOWA 2008 FLOOD EXPERIENCE

*Kelsie Reeve and Catherine Zeman – Health Promotion: Science Intensive Environmental Health*

Serious flooding events raise concerns about increased distribution of toxic substances in flooded areas. This is true for the Iowa flood of 2008. In response to these events a small, cross-sectional pilot study was done to examine the levels of polyaromatic hydrocarbons, PAHs at select school playgrounds in Black Hawk County. Playgrounds were selected based on their status relative to the flood of 2008 and the type of playground surface. Sampling and assessment protocol included exposure assessment modeling of soil ingestion, air intake, and dermal absorption. This data will be presented along with its status relative to flooding and playground surface composition.

#### 6. ARE HERITABLE ATTITUDES PREDICTORS OF VOTING BEHAVIOR?

*Elizabeth Perez, Helen Harton, and Nick Schwab, Psychology Department*

Predictors of voting behavior have managed to continually stymie political strategists, politicians, and researchers over the years. Thus, their focus has turned to attitudes, attitude strength, and more recently attitude heritability. Research has suggested that attitudes classified as being heritable are stronger, more resistant to change, and more predictive of behavior (Tesser, 1993). In this study political views held by college students were assessed over the course of two semesters during the election year. Students residing in four college residence halls completed three internet-based surveys for course credit. We hypothesized that attitudes deemed to be heritable would be more predictive of voting behavior than attitudes that are not. Results demonstrated that only the highly heritable attitude of abortion was predictive of voting. The remaining attitudes, whether of high or low heritability, failed to serve as predictors of voting behavior. The implications of these null results will be discussed.

#### 7. BEYOND OCTANITROCUBANE: ASSESSING THE EFFECTIVENESS OF THEORETICAL OCTANITRO C-8 COMPOUNDS AS HIGH ENERGY DENSITY MATERIALS (HEDMS)

*John A. Bumpus, Tom Hammond, Gabe Martin, Andrew R. Higgins and Michael McGarvey, Department of Chemistry and Biochemistry, University of Northern Iowa*

High energy density materials (HEDMs) are used as high explosives and as propellants and substantial research interest focuses on the identification and synthesis of new HEDMs. Because of the expense and effort that is often required for the synthesis of new HEDMS, it is beneficial to be able to predict the properties of such compounds in order to identify promising candidates for continued investigation and dismiss those that are not likely to be appropriate for this purpose. A great deal of effort has gone into the synthesis and development of cubane and octanitrocubane. As the name implies, cubane ( $C_8H_8$ ) exists in the shape of a cube, having a C-H group at each corner. In octanitrocubane (ONC), the C-H groups are replaced by C-NO<sub>2</sub> groups. At one time, it was thought that even cubane would be impossible to synthesize or, at the least, would be very unstable due to its substantial ring strain. However, both cubane and ONC have been synthesized and well characterized by Eaton and his colleagues. Octanitrocubane is an excellent HEDM and is one of the model or standard compounds against which new HEDMs are compared. Our interests focus on the identification and computational characterization of theoretical octanitro C-8 HEDM compounds that have properties that are predicted to be comparable or even superior to those of octanitrocubane. In the present investigation we have characterized four theoretical octanitro C-8 compounds with respect to their computed heat of formation values, oxygen balance, density, heat of detonation, heat of explosion, volume of gas produced upon explosion, explosive power and power index. The contribution of ring strain and (de)stabilization energy to the heat of formation of these compounds was also investigated. Theoretical compounds studied include 1,3,4,4,5,7,8,8-octanitrotricyclo[5.1.0.0<sup>3,5</sup>]-octane, 1,2,3,4,5,6,7,8-octanitrotricyclo[3.3.0.0<sup>3,7</sup>]-octane, 1,2,3,4,5,6,7,8-octanitrotricyclo[4.2.0.0<sup>2,5</sup>]-octane and 1,4-dinitromethyl-2,3,5,6-

tetranitroprismane. Results suggest that octanitro C-8 compounds represent a family of target compounds that should be further explored with regard to their synthetic accessibility and subsequent usefulness as HEDMs.

#### 8. MORPHOLOGICAL AND ANATOMICAL COMPARISON OF THE TENDRIL PADS OF *CISSUS TUBEROSA* AND *PARTHENOCISSUS QUINQUEFOLIA* (VITACEAE)

*Erin Gitchell and Jean Gerrath, Department of Biology, University of Northern Iowa*

The purpose of this study is to investigate the “pad-like” outgrowth of gelatinous fibers found on the tendrils of *Cissus tuberosa*, which appears similar to the tendril pad of *Parthenocissus quinquefolia* and other climbing vines. This growth has appeared in more than one specimen of *C. tuberosa*, but not consistently. *C. tuberosa* is not known to produce tendril pads; this is the first report of such a structure in this species. Macroscopic investigation showed clear morphological differences between the two taxa in that the pads of *C. tuberosa* lack the adhesive properties present in *P. quinquefolia* and other climbers. Paraffin sections of the tendrils of both *C. tuberosa* and *P. quinquefolia* were made and compared at the cellular level. While there are similarities in general appearance and structure, there are also notable differences in cellular formation: cells that grow in regular formation in *P. quinquefolia* seem to grow erratically in *C. tuberosa* and appear almost cancerous in formation. Since *C. tuberosa* lacks the adhesive abilities of other climbers, the function of this growth remains unknown. Although we have found this growth in more than one plant, we cannot yet rule out the possibility that it is environmentally induced.

#### 9. IDENTITIES FOR M-ARY PARTITION SEQUENCES

*Mackenzie Roepke (UNI\*), Theron Hitchman (UNI\*) and James Sellers (Penn State), \*Department of Mathematics*

The purpose of this research is to study properties of m-ary partitions. An m-ary partition is a way to write a number n as powers of m. For example,  $7 = 2^2 + 2^1 + 2^0$  is a 2-ary partition of 7. We study the function  $b_m(n)$  that counts the number of these partitions for any m and n. We begin to find interesting patterns in these sequences when m is fixed and n continues to grow. We observe surprising symmetry in polynomials formed by these sequences. We attempt to explain and predict these symmetries.

#### 10. ISOMETRIES OF PRODUCTS OF HYPERBOLIC PLANES

*Kyle Pitzen, Joe Winder and Theron Hitchman (UNI), Department of Mathematics*

Isometries of non-positively curved metric spaces can be classified into three types by looking at the points they move the least. The first example of such a space is the hyperbolic plane, and the classification can be characterized by an algebraic invariant of the isometry. We attempt to find a similar classification for the product of more than one copy of the hyperbolic plane.

#### 11. GIS AND MICROPALAEONTOLOGY: A PILOT STUDY TO QUANTIFY THE SHAPE OF MICROFOSSILS USING GEOGRAPHICAL INFORMATION SYSTEMS

*Jake Haden and John Groves, Department of Earth Science*

This project is a pilot study to evaluate the usefulness of Geographical Information Systems (GIS) in quantifying the shape of certain microfossils. I developed a procedure for measuring key features in the shells of microfossils using GIS and highly magnified digital images. Multiple measurements were made on the shells of several specimens in each of two closely related microfossil species. The data then were exported from GIS to the PAST statistical software package for analysis. Results show that measurements acquired using GIS permit the recognition of significant spatial differences in the morphology of the two species. This approach has the potential to improve the speed and ease with which morphometric investigations can be conducted.

## 12. WATER QUALITY INDEX AND HEAVY METAL DISTRIBUTION IN SEDIMENTS OF THE BAGMATI RIVER ALONG THE KATHMANDU VALLEY BASIN IN NEPAL

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The Bagmati River along the Kathmandu Valley Basin in Nepal was studied to assess the water quality condition and heavy metal distribution in the river sediments. It is a major source of surface water in the Kathmandu Valley, which inhabits about 2.18 million people. Water and sediment samples were analyzed from 10 sampling stations along the river from May-July, 2009. Average Water Quality Index (WQI) at each site was calculated using National Sanitation Foundation suggested nine water quality parameters, such as Dissolved Oxygen (DO), Fecal Coliform, Temperature, pH, Biochemical Oxygen Demand (BOD), Turbidity, Total Dissolved Solids (TDS), Nitrate, and Phosphate. The results showed extremely deteriorated water quality condition in the Bagmati River. Out of 100 samples, only 17% of the water samples represented *Good* to *Excellent* category WQI, with all of them from just two sites outside the vicinity of the urbanized area. 77% of the samples showed *Bad* WQI, with remaining 6% as *Medium* level WQI. High number of *E. coli* (well over 100,000 per 100ml) and very low DO (most of them below 5 mg/l) in the river along the urbanized section of the valley showed influence of direct sewerage disposal. Effect of agricultural activities in the river in terms of chemical pollution seems minimal as the nitrate and phosphate in water and total phosphorus in sediment samples were within acceptable limits. The heavy metal distribution along the river segment showed some effects of urbanization, but the values were not far beyond the natural limits. The Bagmati River inside the Kathmandu Valley has been heavily polluted in recent decades due to incessant population pressure and unsystematic waste disposal into the river. Lack of wastewater treatment facilities and direct sewerage disposal into the river have been major constraints in the management of Bagmati River. The direct impact of this degraded water quality condition has been on the aquatic animals and plants, and the impoverished people directly relying on the river for drinking, washing, and agricultural activities.

## 13. IDENTIFICATION OF VIRULENCE GENES IN CORN PATHOGEN *FUSARIUM VERTICILLIOIDES*

Divya Chouhan, Dr. Nalin Goonesekere, Dr. James Jurgenson, Naresh Pandey, *Department of Chemistry and Biochemistry, Department of Biology, University of Northern Iowa*

*Fusarium verticillioides* is a pathogenic fungus that causes infection to crops and vegetables such as corn, wheat, potato, cassava and sorghum. It causes various diseases to corn such as seedling blight, root, stalk, and ear rot. Besides that it also produces mycotoxins such as fumonisin. Consumption of contaminated grain can cause various diseases to animals such as pulmonary oedema in pigs, leucoencephelomalacia in horses and may be associated with esophageal cancer in humans. Identification of virulence genes in *F. verticillioides* will help in understanding its biology and pathogenicity. To create deletion mutants of *F. verticillioides* a double joint PCR method was used, and the putative virulence gene was replaced by a marker gene, the hygromycin phosphotransferase cassette. This cassette was cloned into TOPO cloning vector and transformed into fungal protoplast. Transformants will be identified on the basis of their growth in *Fusarium* complete medium containing hygromycin. PCR amplification and southern hybridization methods will be used to confirm the deletion. The virulence of deletion mutants will be examined by performing virulence assays.

## 14. EXPANDING A MOLECULAR DATABASE FOR CENTRAL NEWTS, *NOTOPHTHALMUS VIRIDESCENS LOUISIANENSIS*, IN IOWA

Selena Losee, S. Scott Whitmore, and Theresa Spradling, *Department of Biology, University of Northern Iowa*.

The central newt, *Notophthalmus viridescens louisianensis*, is a small salamander listed as a "Species of Greatest Conservation Concern" by the Iowa Department of Natural Resources. In order to effectively manage and preserve these animals, this study aims to investigate the genetics of extant newt populations in the state. A 479 base pair region of non-coding mitochondrial DNA was sequenced for 279 newts from 14 sites in Iowa. Sequences for two newts from West Virginia were included for comparison. Results indicate a lack of gene flow between some of the sampled sites. Phylogenetic analysis indicates the presence of distinct northern and southern clades.

## 15. APPLICATION OF CHEMICAL TRACERS TO INVESTIGATE THE CONTRIBUTION OF BASEFLOW TO THE DRY RUN CREEK IN CEDAR FALLS, IOWA

*Sujan Rai & Mohammad Z. Iqbal, Environmental Programs, University of Northern Iowa*

Fluorescein dye, Bromide ion, and  $^{18}\text{O}$  and D isotopes were used as tracers to study the baseflow mechanisms in an intermittent river system named Dry Run Creek in Cedar Falls, Iowa. Field work was carried out in 3 different phases from mid April to the end of August, 2009. Holes of various depths and distances away from the creek were dug in each site using a hand auger or a soil probe in the first two phases. Two on campus monitoring wells were selected for the 3<sup>rd</sup> phase. Fluorescein dye and bromide were poured into the holes during 1<sup>st</sup> and 2<sup>nd</sup> phases and into the wells during 3<sup>rd</sup> phase of the study. Water samples were collected from the creek until one month after the application of tracers and then analyzed in Spectrofluorophotometer (RF 5301PC) for fluorescein and in Ion chromatograph (DX 120) for bromide. Soil samples from around the application holes were also analyzed to understand the movement of chemical tracers. Isotope samples from rain, well, dug holes, and the creek was analyzed at Colorado Plateau Stable Isotope Laboratory. Both fluorescein and bromide were not detected in any of the water samples during the first phase indicating that the tracers did not enter the creek during the first 30 days. However, soil analysis detected some movement of bromide toward the creek in site 3. In the second phase, fluorescein was detected in sites 3 and 4 at 22 and 262 hours after its application while bromide was detected in site 4 after 262 hours. Besides, soil analysis detected a little movement of bromide toward the creek in sites 2, 4, and 5. However, the subsurface movement toward the creek was very limited, implying that any chemicals in the creek are mostly due to the runoff from the surrounding areas that are dominated by agricultural fields. A greater subsurface movement was observed only when the tracer concentrations were increased. Isotopic make up of water samples from rain, well, dug holes, and the creek at dry and wet conditions were different from one another. During dry condition, water sample from one of the site and the nearby hole were different showing no connection between them. In conclusion, it is demonstrated by the data that baseflow is not the primary mechanism of stream discharge in the Dry Run Creek hydrologic system.

## 16. COMPARISON OF BLOOD COAGULATION PROPERTIES IN HIBERNATING AND NON-HIBERNATING WOOD TURTLES (*GLYPTEMYS INSCULPTA*)

*Neha Yadav, Dr. David Saunders, Dr. Jeff Tamplin, Department of Biology*

Hibernation of turtles in cold conditions results in prolonged blood clotting times (Barone and Jacques, 1975). Our study was undertaken to determine if factors other than temperature bring about the prolonged clotting time in hibernating turtles. Blood was removed from wood turtles (*Glyptemys insculpta*) in October (n=10; pre-hibernating), January (n=9, Hibernating), March (n=6; post-hibernating), and June (n=7; non-hibernating). Blood was separated into plasma and blood cells. All plasma samples were tested for Activated partial thrombin time (APTT) in addition to being tested for the functionality of coagulation factors VIII, IX, XI, & XII. APTT was most prolonged in June ( $437.7 \pm 144.8$ ); followed by January ( $237.6 \pm 70.7$ ), October ( $148.24 \pm 95.58$ ) and March ( $137 \pm 31.91$ ), respectively. No significant difference was found in APTT between March and October samples. Factor VIII appears to be missing in all samples and Factor IX and XI were either not present or not functional in blood samples from March, January and October, but were present and functional in blood samples from June. Marked difference occurred in APTT between hibernating and non-hibernating turtles. Despite the apparent lack of Factors VIII, IX, & XI, APTT was not prolonged, but rather shortened, indicating a functional intrinsic coagulation pathway in hibernating wood turtles. Ongoing studies are evaluating the extrinsic coagulation pathway as well as determining the potential role of anticoagulants such as heparin in the reduction of clotting times in hibernating wood turtles.

## 17. DOPING INORGANIC CHALCOGEN FULLERENES

*Tim Kidd and Aaron O'Shea (Physics); Laura Strauss and Kayla Boyle (Chemistry)*

Ta<sub>2</sub> microcrystals were synthesized using the chemical transport reaction method. These microcrystals were then doped with Mn and Cr. EDX and XRD data was taken to determine the amount of doping agent present. Three distinct phases were observed, nucleation clusters, microcrystals, and nanorod bundles. These were analyzed with an EDX-equipped SEM to determine composition and properties of the samples. The majority of doping agent was found in the

nucleation clusters, a negligible amount in the clusters and fullerene-bundles. Fullerene bundles were found to be hexagonally columnar, porous, and highly flexible. While the doping agents apparently didn't take, it is theorized that they may act as a catalyst for the production of inorganic chalcogen nanorods. However, more testing is required to make such an assertion.

#### 18. THE CONSERVATION GENETICS OF THE CENTRAL NEWT, *NOTOPHTHALMUS VIRIDESCENS LOUISIANENSIS*, IN IOWA

*S. Scott Whitmore and Theresa A. Spradling, Department of Biology*

The central newt, *Notophthalmus viridescens louisianensis*, is a small salamander native to the Midwestern United States. Populations in Iowa are restricted to fragmented habitats near the Cedar and Wapsipinicon Rivers. In order to understand the genetic status of these populations in Iowa, DNA was collected from 278 individuals at 14 sites. Preliminary analysis of three microsatellite DNA loci indicate that populations are partitioned into northern and southern regions with more genetic diversity in the south. Two additional microsatellite loci are currently being evaluated. Results will be used to identify imperiled populations and to propose targeted conservation strategies.

#### 19. MOLECULAR EFFECTS OF METOLACHLOR EXPOSURE ON HUMAN CELLS

*Sean P. Hartnett and Kavita R. Dhanwada, Department of Biology*

Metolachlor is one of the most commonly used herbicides in the United States of America. Numerous studies have shown that exposure to this herbicide results in decreased cell proliferation, growth and reproductive ability in different organisms. However, previous studies used high concentrations of metolachlor to see molecular effects. In the study presented here, we investigated the effects of metolachlor on human cells. Prior cell proliferation analysis from our laboratory has shown that metolachlor can significantly inhibit the growth of normal human fibroblasts and HepG2 cells at 1.6 parts per billion (ppb) and 50 ppb, respectively. In this study, we assessed cellular effects after exposure to this herbicide including cell proliferation and the cell division rate, transcript expression of cell cycle proteins, (cyclins) A, B, D1, and E using RT-PCR, and alteration of cell cycle progression using flow cytometry. Our results showed that exposure to 50 ppb metolachlor for 72 h significantly inhibited cell growth while exposure to 500 ppb metolachlor for 48 h caused a significant decrease in the cell division rate. Exposure to 300 and 500 ppb metolachlor for 12 and 24 h produced a significant decrease in the levels of the cyclin A transcript, however, no significant change was observed in transcript expression for cyclins B, D1, and E. Flow cytometry analysis showed that metolachlor exposure for 24 h resulted in an accumulation of cells in S-phase and decreased amounts in G2 at 48 and 72 h. Taken together, our results suggest that metolachlor exposure can affect progression of HepG2 cells through the S phase of the cell cycle and entrance into G2.

#### 20. DIRECT NUMERICAL SIMULATION OF BLOOD FLOW AROUND ARTIFICIAL BARRIERS

*Eddie Maldonado and M.W. Roth, Department of Physics*

In the near future, novel situations will arise where human blood will pass through artificial conduits for filtering, treatment, study, etc. Because of the geometry of the blood corpuscles it is not well known how they will behave in the presence of artificial barriers. We present two - phase Material Point Method numerical simulations of erythrocyte flow around artificial barriers. Results include animations as well as various averages and distributions which characterize the behavior of the cells as they interact with each other as well as with the barrier.