Index to Sessions
# Index to Sessions

**Medical Sciences and Health Poster Session**
09:00 AM - 10:00 AM  
[Page 6]

**Environmental Poster Session**
10:00 AM – 11:00 AM  
[Page 10]

**Social Science, Environmental, Field Biology Poster Session**
02:00 PM - 03:00 PM  
[Page 15]

**Pre-College Poster Session**
03:00 PM  
[Page 21]

**Reptiles and Birds**
09:00 AM Saturday, April 5, 2003  
Brewer/Frost Science 108  
Dr. Danny J. Ingold-Presiding  
[Page 25]

**Insects and Environmental**
02:00 PM Saturday, April 5, 2003  
Brewer/Frost Science 108  
Prof Michael T. Homsher-Presiding  
[Page 26]

**Aquatic Biology**
09:00 AM Saturday, April 5, 2003  
Brewer/Frost Science 109  
Dr. Gwynne Stoner Rife-Presiding  
[Page 28]

**Floristics and Invasive Species**
02:00 PM Saturday, April 5, 2003  
Brewer/Frost Science 109  
Dr. Brian C. McCarthy-Presiding  
[Page 29]

**Plant Biology**
09:00 AM Saturday, April 5, 2003  
Brewer/Frost Science 142  
Dr. Sarah E. Wyatt-Presiding  
[Page 31]

**Plant Ecology**
02:00 PM Saturday, April 5, 2003  
Brewer/Frost Science 142  
Dr. Cadance A. Lowell-Presiding  
[Page 32]

**Medicine**
09:00 AM Saturday, April 5, 2003  
Brewer/Frost Science 141  
Dr. Nancy J. Swails-Presiding  
[Page 33]

**Molecular Biology and Genetics**
02:00 PM Saturday, April 5, 2003  
Brewer/Frost Science 141  
Dr. Beth Berger Pritts-Presiding  
[Page 35]

**Earth Sciences**
09:00 AM Saturday, April 5, 2003  
Brewer/Frost Science 102  
Dr. Daniel J. May-Presiding  
[Page 36]

**Education - Chemistry**
02:00 PM Saturday, April 5, 2003  
Brewer/Frost Science 102  
Dr. Kenneth A. LaSota-Presiding  
[Page 37]

**Soil - Water - Wetlands**
09:00 AM Saturday, April 5, 2003  
Brewer/Frost Science 138  
Mr. James J. Hoorman-Presiding  
[Page 38]

**Water Quality and Treatment**
02:00 PM Saturday, April 5, 2003  
Brewer/Frost Science 138  
Dr. Yung-Tse Hung-Presiding  
[Page 39]

## NOTES
Medical Science and Health Poster Session
09:00 AM - 10:00 AM

Board 01 A HISTOCHEMICAL STUDY ON HUMAN TUMORS OF THE BRAIN AND NERVOUS SYSTEM BY MEANS OF HIGH-RESOLUTION LIGHT MICROSCOPY, IMMUNOMICROSCOPY, AND ELECTRON MICROSCOPY. Meghan L. Bennix 503.BMBennix@wittenberg.edu, David L. Mason 503.DLMason@wittenberg.edu, Department of Biology, Springfield OH 45501.

The goal of this study was to evaluate selected tumors of the brain and nervous system. Customized antibody development for the most common brain tumors will help with their identification. Tissue samples from ten patients presenting at Community Hospital in Springfield, Ohio, were fixed for light and electron microscopy, embedded in Spurr plastic, sectioned, stained, and viewed under both light and electron microscopes. The following tumors were evaluated by these techniques: meningioma, astrocytoma, glioblastoma multiforme, neuroblastoma, ganglioneuroblastoma, neurofibromatosis, parangangioma, schwannoma, and pheochromocytoma. For light microscopy selected cellular markers helpful for identification were immunostained by the application of primary antibodies conjugated to peroxidase. These included: glial fibrillary acidic protein (GFAP) for astrocytomas and glioblastoma multiforme, estrogen and testosterone for meningiomas, and S-100 protein for neurofibromatosis. Electron microscopy was employed for detection of Luse bodies in schwannomas, Golgi apparatus in astrocytomas and glioblastoma multiforme, membrane-bound inclusion granules in ganglioneuroblastomas, and catecholamine granules in pheochromocytomas. High-resolution light and electron microscopic imaging of these tumors will show differences in cellular markers such as Luse bodies, GFAP, and S-100, which distinguish between the tumor types.

Board 02 LIMB BONE STRUCTURE IN BATS VERSUS GLIDERS AND RUNNERS. Jacqueline Runstedt Connour 503.JConnour@onu.edu, Department of Biological Sciences, Ohio Northern University, 525 S Main St, Ada OH 45810.

Bats use their limbs in very different ways than do other mammals. This study examines how bat humeral and femoral structural properties differ from those of small-bodied primates, colugos, and sciurids. Mikulicz indices and compressive indices were used to evaluate the proportions of the proximal and subproximal tubules relative to the femur. The proportion of a tubule (TA) to its respective parent bone (CA) was calculated from radiograph measurements of wildshot museum specimens collected from all over the world. Bone lengths were also measured. Least squares regression and analysis of covariance were used to compare slopes and elevations for bivariate comparisons between different groups. Matching expectations, results indicate that bat humeri are longer and have greater CA relative to body mass than do the humeri of other mammals. Much of the population of CA to TA is comparable to that of other animals. Also, the proportion of humeral length to midshaft CA is only slightly higher than in primates such as cebid monkeys (i.e., squirrel monkeys), and data suggest that strength may be greater in bat wings than in bat limbs. Femora are similar in the proportion of CA to length to the femora of quadrupedal primates and nonflying tree squirrels. However, the proportion of bat femoral CA to its respective TA is different than that of other mammals. This may be because bat hindlimbs are very active in roosting, flying, and climbing.

Board 03 THE EFFECT OF BINGE DRINKING ON THE CORPUS CALLOSUM. Rebecca L. Wilson 503.RLWilson@wittenberg.edu, Andrew M. Petrousis, Cathy L. Pederson 503.CPederson@wittenberg.edu, Wittenberg University, Department of Biology, Springfield OH 45501.

The corpus callosum is white matter that bridges the two brain hemispheres. Chronic male and female alcoholics show a decrease in the volume of the corpus callosum, which can lead to neuropsychological dysfunction. The hypothesis is that binge drinking, without chronic alcoholism, decreases the volume of women's corpus callosum. A Magnetic Resonance Imaging (MRI) study was performed on eight females who binge drank (consumed 3 or more drinks per session) at least once a week and eight control subjects who consumed less than one alcoholic beverage per month. All 16 participants were between the ages of 20 and 29. Those women who had experimented with hard illicit drugs or had smoked more than 50 joints in their lifetime were eliminated. 3D Brain Station was used to trace MRIs and obtain a total volume for each subject. Using an univariate ANOVA, there was a significant difference between the groups for age, IQ, history of abuse, pack years smoking, marijuana, or major depression (p=0.001), the number of times that the subject moved (p<0.001), and the number of times that the subject's mother divorced (p<0.001). Age, packyears of cigarettes smoked (number of years x packs/day), the number of alcoholic drinks consumed and scores obtained on the Childhood Trauma Questionnaire were held constant between groups (p > 0.06 for all). The corpus callosum volumes were not significantly different between the two groups (p=0.60) and thus did not support the idea that childhood stress causes significant changes in the volume of the corpus callosum.

Board 04 THE EFFECTS OF TRAUMA ON THE VOLUME OF THE PITUITARY GLAND. Kathleen E. Gorman 503.KGorman@wittenberg.edu, Lauren Ziegler, Cathy Pederson 503.CPederson@wittenberg.edu, Wittenberg University, Springfield OH 45501.

People who suffered from childhood abuse and family stress have a tendency to release more corticotropin–releasing hormone than individuals who have not experienced such stress. The hypothesis was that women who had suffered from abuse and neglect would have larger pituitary glands to account for the altered hormonal activity. Nineteen women between the ages of twenty and thirty-nine were divided into two groups (n=12) and controls (n=7). Clinical assessment was used to determine the severity of family and childhood trauma. The control group (n=7) had no such history of trauma. MRIs were taken for each subject and traced in 3D Brain Station. Each slice of the pituitary gland was traced three times, the mean was computed and then added to obtain a total volume. An univariate ANOVA confirmed the difference in average age and neglect between groups (F(1,18)=0.01), the number of times that the subject moved (p<0.001), and the number of times that the subject's mother divorced (p<0.001). Age, packyears of cigarettes smoked (number of years x packs/day), the number of alcoholic drinks consumed and scores obtained on the Childhood Trauma Questionnaire were held constant between groups (p > 0.06 for all). The pituitary gland volumes were not significantly different between the two groups (p=0.60) and thus did not support the idea that childhood stress causes significant changes in the volume of the pituitary gland.

Board 05 ALCOHOL AND ITS EFFECTS ON THE CORPUS CALLOSUM. Whitney W. Hendricks 503.WHendricks@wittenberg.edu, Christopher Sanders 503.CSanders@wittenberg.edu, Rich Ziegler, Cathy Pederson 503.CPederson@wittenberg.edu, Wittenberg University, PO Box 720, Springfield OH 45501.

Alcohol use and abuse continues to be a major concern, as its effects are detrimental to millions of Americans. Individuals with high levels of consumption may be classified as alcohol dependent. The hypothesis of this study was that high levels of consumption would cause a decrease in the volume of the corpus callosum. Bats use their limbs in very different ways than do other mammals. This study examines how bat humeral and femoral structural properties differ from those of small-bodied primates, colugos, and sciurids. Mikulicz indices and compressive indices were used to evaluate the proportions of the proximal and subproximal tubules relative to the femur. The proportion of a tubule (TA) to its respective parent bone (CA) was calculated from radiograph measurements of wildshot museum specimens collected from all over the world. Bone lengths were also measured. Least squares regression and analysis of covariance were used to compare slopes and elevations for bivariate comparisons between different groups. Matching expectations, results indicate that bat humeri are longer and have greater CA relative to body mass than do the humeri of other mammals. Much of the population of CA to TA is comparable to that of other animals. Also, the proportion of humeral length to midshaft CA is only slightly higher than in primates such as cebid monkeys (i.e., squirrel monkeys), and data suggest that strength may be greater in bat wings than in bat limbs. Femora are similar in the proportion of CA to length to the femora of quadrupedal primates and nonflying tree squirrels. However, the proportion of bat femoral CA to its respective TA is different than that of other mammals. This may be because bat hindlimbs are very active in roosting, flying, and climbing.

Board 06 ROLE OF NUCLEOTIDE EXCISION REPAIR IN MUTAGENESIS OF ESCHEICHIA COLI FOLLOWING CISPLATIN TREATMENT. Heathen L. Hugh mhugh@bgsu.edu and Doris J. Beck, Department of Biological Sciences, Bowling Green State University, Bowling Green OH 43403.

DNA damage recognition and processing are achieved by the nucleotide excision repair (NER) pathway that occurs in all living organisms. The RecFOR pathway of homologous recombination (HR) repairs daughter strands (SSDs) when DNA adducts are not repaired by NER before replication. Cisplatin is an anticancer agent that forms intrastrand DNA crosslinks in DNA and its efficiency is limited by the development of tumor resistance. Derivatives of E. coli strain CC102 defective in the NER and/or RecFOR pathway were constructed by P1 transduction to compare their resistance and mutability when treated with cisplatin. Survival was determined as percent colony forming units (CFU) of the treated cells relative to that at time zero. The rate of mutation in the lacZ' and rpoB' gene was determined by washing and growing the treated cells in LB to allow mutation expression, then plating for Lac' revertants on minimal media. Mutations were determined by washing and growing the treated cells in LB to allow mutation expression, then plating for Lac' revertants on minimal media. Mutations were determined by washing and growing the treated cells in LB to allow mutation expression, then plating for Lac' revertants on minimal media.ije-034-04249-1552064824918.
In order to elucidate the basis of this phenotype, the neurogenic gene formation were examined by comparing the staining pattern of wild type wing discs to those of US-fred RNA Preliminary data reveals a decrease in expression levels of Delta, the neurogenic gene.

In the developing Drosophila melanogaster Peripheral Nervous System (PNS), Sensory Organ Precursors (SOPs) are specified at stereotyped positions and in precise numbers by a few genes, including Delta and Numb, as a putative cell adhesion molecule. In a study of the mechanism through which fred degradation is resulting in formation of the ectopic SOPs, Fred function was repressed via RNA interference (RNAi) in a posterior temporal fashion by using a Gal 4 driver, pannier Gal 4 prn Gal 4 drives the expression of the UAS-construct on the dorsal most region of the wing disc. Suppression of Fred function results in formation of SOPs. SOPs were visualized by staining for a SOP marker neutralized A101 lac 2.

In order to elucidate the basis of this phenotype, the expression pattern of some of the genes involved in nervous system formation was examined by comparing the staining pattern of wild type wing discs to those of US-fred RNA Preliminary data reveals a decrease in expression levels of Delta, the neurogenic gene.

The Ohio Journal of Science

A-7.
The purpose of this research project is to develop a plate assay that will easily screen for the restored activity of an inactive mutant CK. The plate assay will be conducted on a petri plate in which cells are plated in the presence of the inactive mutant CK and the appropriate adenine nucleotide and energy source. The plate will be incubated at 37°C for 24 hours. After incubation, the plate will be stained with a solution containing a dye that binds specifically to the active CK. The stained plate will be visualized under a microscope, and the number of colonies with restored activity will be counted. The plate assay will be used to screen for new mutants or second site suppressors of already characterized mutants. An enhanced pET17 clone of the CK gene is currently being tested to determine the effect of the second site suppressors on the expression of the CK gene.

**Board 17** DEVELOPMENT AND TESTING OF A SIMPLE AND ROBUST METHOD TO ISOLATE GENOMIC DNA FROM AVIAN BLOOD SAMPLES COLLECTED IN THE FIELD. Dean M. Fraga /Dfraga@acs.wooster.edu /and Donna Y. Ho /donna.y.ho@wooster.edu, Department of Biology, The College of Wooster, Wooster OH 44691

A simple and portable method was developed to collect avian blood samples from adults and nestlings in the field. The isolated genomic DNA was of sufficient quantity and quality for accurate PCR analysis of sex or genotype. The method was used to sex Pied Flycatcher (Ficedula hypoleuca) nestlings and domestic turkey blood samples. The general approach should be applicable to many avian species.

Avian blood samples were collected using capillary pipettes and spot dried onto S&S Isocode cards (Schleicher and Schuell). Genomic DNA was extracted from the samples using a simple extraction procedure in which samples were homogenized in detergent and proteinase K solution. The extracted DNA was purified by ethanol precipitation and resuspended in TE buffer. The extracted DNA was suitable for an accurate analysis of sex using a PCR procedure previously described. In addition, we examined several variables including the minimal amount of DNA sample needed for PCR and the effect of sample contamination on accuracy of sexing (negligible effects with 10% contamination), and the effects of typical field conditions on the quality of the DNA isolated (no effects observed).

**Board 18** CONSTRUCTION OF YELLOW FEVER MOSQUITO EGG SHELL PROMOTER EXPRESSION SYSTEMS. Donna Y. Ho /donna.y.ho@wooster.edu, Adrienne E. Mock /aemock@owu.edu, Marten J. Edwards, Ohio Wesleyan University, HWCC Box 233, Delaware OH 43015

Construct specific gene expression vectors in susceptible aegypti mosquitoes to explore ways to prevent the transmission of the LaCrosse Virus that causes pediatric viral encephalitis. The transmission of virus from the adult female mosquito to her eggs (transovarial transmission, TO) is required for the survival and amplification of the virus in mosquito populations throughout the winter months. An infected female mosquito transfers the LaCrosse Virus into the oocyte through the follicular epithelium. Progress was made toward the construction of four follicle cell-specific gene expression systems. The function of this construct is to express an anti-viral protein in the follicular epithelium of the mosquito in an attempt to block TO of the virus. The promoters used were: 15a-1 and 15a-2, the expression of which was induced in eggshell post blood meal. These promoters were fused with a Red Fluorescent Protein (RFP) marker gene (Clonetech), and the human antiviral protein, MxA. MxA is known to interfere with viral RNA polymerase in the cytoplasm of an infected cell. The purpose of using 15a-1 and 15a-2 was to ensure the expression of both RFP and MxA in the follicular epithelium specifically post blood meal. Molecular techniques employed to make the gene fusion constructs include: restriction enzyme digests, polymerase chain reactions (PCR), cloning and transformation techniques (TA and Blunt End), gel electrophoresis for DNA separation and validation, and DNA ligations. The following constructs were generated: 15a-1-RFP, 15a-1-MxA, and 15a-2-RFP. The clones were verified by automated DNA sequencing to ensure that the constructs contained the desired promoter and gene.
This experiment evaluated the haemostatic effects of varying doses they make will not only affect their lives, but others as well. Students
BOX OH773, 215 SPILLMAN, DIANA M. Neisseria this corresponds to high acetyl dehydrogenase activity detected in found exclusively in individuals who admitted alcohol consumption; was Lactobacillus spp. adults, a statistically significant difference. Alcohol and tobacco use a focus on a healthy and holistic approach to personal wellness. The HELM community (Health Enhancement and Lifestyle Management) is a project on a healthy and holistic approach to personal wellness. The HELM students at Miami University are educated about the seven areas of wellness. Students begin to understand their strengths, weaknesses, limitations, and capabilities. Students become involved in learning to balance their time so that they devote different amounts of time to each of the seven areas of wellness. Students learn that the choices they make will not only affect their lives, but others as well. Students are exposed to discussions, which offer different ways to handle life’s problems. It is our hypothesis that HELM community will improve the quality of life for students during college and after graduation. Thirty-four students surveyed responded to the end of the 2002 school year. Sample questions were: 1. Do you feel you will incorporate HELMS ideas into everyday lives after graduation? Seventy-six percent said “yes”. 2. Do you feel most students living in the HELMS residents halls? Ninety-seven percent said “yes”. 3. Do you have a better understanding of the effects that the misuse of drugs, alcohol, or tobacco can have on your life? Eighty-eight percent said “yes”. Our survey clearly demonstrated that the HELM community provides a really supportive environment and encourages students to improve their quality of life. In comparison to other non-HELM dormitories, the level of satisfaction is much greater in the HELM resident halls. Further, more requests are for the HELM dormitories and over the past few years more HELM communities have developed on Miami University Campus.

**Board 20** HELM COMMUNITY AT MIAMI UNIVERSITY, OHIO. GARY L. HETTERICH GHETTERICH@WOHLER.COM, ALEJSA O. ARMBRUSTER, DIANA M. SPELLMAN, PO Box 773, 215 COUNTRY CLUB, OXFORD OH 45056 HELM Community (Health Enhancement and Lifestyle Management) is a project on a healthy and holistic approach to personal wellness. The HELM students at Miami University are educated about the seven areas of wellness. Students begin to understand their strengths, weaknesses, limitations, and capabilities. Students become involved in learning to balance their time so that they devote different amounts of time to each of the seven areas of wellness. Students learn that the choices they make will not only affect their lives, but others as well. Students are exposed to discussions, which offer different ways to handle life’s problems. It is our hypothesis that HELM community will improve the quality of life for students during college and after graduation. Thirty-four students surveyed responded to the end of the 2002 school year. Sample questions were: 1. Do you feel you will incorporate HELMS ideas into everyday lives after graduation? Seventy-six percent said “yes”. 2. Do you feel most students living in the HELMS residents halls? Ninety-seven percent said “yes”. 3. Do you have a better understanding of the effects that the misuse of drugs, alcohol, or tobacco can have on your life? Eighty-eight percent said “yes”. Our survey clearly demonstrated that the HELM community provides a really supportive environment and encourages students to improve their quality of life. In comparison to other non-HELM dormitories, the level of satisfaction is much greater in the HELM resident halls. Further, more requests are for the HELM dormitories and over the past few years more HELM communities have developed on Miami University Campus.

**Board 21** THE EFFECTS OF GINKGO BILOBA (EGB 761) EXTRACT IN COMBINATION WITH COUMADIN ON HEMOSTASIS IN MUS MUSCULUS (THE LABORATORY MOUSE). Hollie M. Reeves h-reaves@onu.edu, 11644 Parkview Dr, STOUTSVILLE OH 43114 OHIO NORTHERN UNIVERSITY.

This experiment evaluated the haemostatic effects of varying doses of Ginkgo biloba extract alone and in combination with Coumadin, an anticoagulant affecting γ-carboxylation of the plasma coagulation proteins in Mus musculus. Research indicates that Ginkgo biloba is an antagonist of platelet-activating factor. Platelet-activating factor plays a major role in platelet aggregation/blood coagulation. Therefore, it was hypothesized that as the concentration of Ginkgo biloba administered was increased, activation of platelets should decrease. As an anticoagulant, Coumadin also affects hemostasis, and because many older patients often use both substances, the investigation of any synergistic effects on coagulability is important. Five treatment groups were tested with each group consisting of five adult mice. The treatment groups included: Control Group 1 receiving honey and 0.3 mL of sterile saline; Group 2 receiving 0.046 mg/day of Ginkgo biloba extract in honey and 0.3 mL of sterile saline; Group 3 receiving honey and 0.3 mL of Coumadin (2mg/100ml); Group 4 receiving 0.046 mg/day of Ginkgo biloba extract in honey and 0.3 mL of Coumadin. At the conclusion of a four-week experimental period, the prothrombin times and bleeding times for the different treatment groups were determined. The difference in mean bleeding times for the culture of each the five treatment groups was not statistically significant upon analysis. This was expected with Coumadin treatment, as it does not directly affect platelet activation. However, the most noteworthy, but not statistically significant, differences between bleeding times occurred with the Ginkgo biloba treatment as predicted. Insufficient data prevented the statistical evaluation of the prothrombin time values. However, as expected with Coumadin treatment, increased prothrombin time occurred, but surprisingly, decreased when Coumadin and Ginkgo biloba were combined. Perhaps, because Coumadin and Ginkgo biloba affect different points in the coagulation cascade, the suspected synergistic effects did not occur as hypothesized and may actually be the cause of the decrease in prothrombin time when the two were combined.

**Board 22** THE EFFECT OF LORATADINE ON BRONCHOCONSTRICTION ASSOCIATED WITH ALLERGICALBronchoconstriction was assessed in vivo to determine the effects on the respiratory system of pigs treated with a novel drug used to treat common allergic symptoms, and is reported to produce effective control of allergic asthmatic symptoms such as shortness of breath. Pig bronchial rings were used in vitro to determine if loratadine pre-treatment could counteract histamine-induced constriction of smooth muscle. Small bronchi (<3mm internal diameter) from six pigs were obtained from a local abattoir. The bronchi were cut into rings and mounted in a chamber containing Hank's solution Hepes-buffered Carbonate Buffer (37°C) and gassed with 95% O2 and 5% CO2. Force was continually monitored through a force transducer and data acquired using a computer system. A bullseye response to histamine (10^(-3) M to 10^(-1) M) was established. All rings were further contracted with acetylcholine (10^(-3) M), then relaxed with isoproterenol 10^(-4) M to ensure the viability of the preparation. After wash out, half the rings were incubated with loratadine 10^(-3) M whereas the remaining received vehicle only (controls) and the dose response to histamine was repeated. Histamine contracted all segments in a dose-dependent manner during the first exposure; however, after washout control rings contracted in response to histamine, whereas loratadine-incubated rings did not. Both control and loratadine rings contracted to acetylcholine indicating that loratadine effectively inhibited histamine-induced contraction by a non-competitive mechanism. Therefore, loratadine pretreatment may improve symptoms associated with asthma by inhibiting allergy-induced bronchoconstriction.

**Board 23** THE EFFECTS OF STRYCHNINE ON THE ANTRUM AND DUODENUM IN THE GASTROINTESTINAL TRACT OF SWINE. Amber Ferrell JH449707977@AOL.COM, OHIO NORTHERN UNIVERSITY, 402 W COLLEGE AVE, ADA OH 45810 Strychnine, an alkaloid poison, interacts with many receptors in the human body and paralyzes the muscles. In the view of the fact that the gut has its own intrinsic nervous system, this project examined the effects of strychnine on the motility of the swine gastrointestinal tract. Segments of antrum and duodenum (n=8) were mounted in organ baths containing Krebs-Henseleit bicarbonate solution and force was continually monitored through a data acquisition system. Following equilibration, acetylcholine (10^(-4) M) was added to all segments. Half the segments then received 100-fold cumulative doses of strychnine ranging from subconvulsive to lethal (10^(-1) M to 10^(-3) M respectively; estimated from clinical reports) whereas the other half received deionized water (vehicle controls) and SEGMENTS responded with an increase in frequency and amplitude to acetylcholine (10^(-4) M). Paired comparisons (Students t-test, a=0.05) indicated that after strychnine addition, the antrum showed no significant change from control. The dose of strychnine in strychnine segments decreased at lower doses and increased at higher doses as compared to controls, whereas the amplitude effects showed an opposite pattern. In the duodenum, a contractile amplitude increase to all strychnine doses compared to controls, which only reached significance at the highest concentration tested (10(-3) M). Duodenal frequency was not altered from controls. Results imply that strychnine promotes increased contraction of the antrum and decreased motility of the duodenum; which in turn, would promote gastric emptying and increase absorption in the duodenum of the swine gastrointestinal tract.

**Board 24** THE MAJOR HISTOCOMPATIBILITY COMPLEX OF THE OWL MONKEY, AOTUS AZARAI: A MODEL SYSTEM FOR STUDYING MATE CHOICE. Nehima Sharma nlsmhmar@otterbein.edu, (SIMON K. LAWRENCE SLawrance@otterbein.edu), DEPT OF LIFE SCIENCE, OTTERBEIN COLLEGE, WESTERVILLE OH 43081 The purpose of this project is to examine the DRB region of the major histocompatibility complex (MHC) in the owl monkey (Aotus azarai). The monogamous social organization of Aotus azarai offers a unique opportunity to study the role of MHC genes in mate choice. The 16 A. azarai samples used in this study were collected from zoos in the United States and from wild animals living in the Chaco forest of eastern Argentina. The DRB region of the MHC was amplified from A. azarai DNA samples using the polymerase chain reaction (PCR). Denaturing gradient gel electrophoresis (DGGE) was used to characterize the alleles present in the amplified samples. We have successfully obtained "MHC fluorescent fingerprints" from several A. azarai samples. Analysis completed on the A. azarai samples reveals the presence of five distinct alleles based on gel migration. Surprisingly, identical banding patterns were observed in DGGE gels containing the wild Aotus family members. To determine how these alleles vary within the genus Aotus and how they are now collecting additional samples from different areas of the Chaco. An additional objective of this study is to characterize the nucleotide sequence of the major histocompatibility genes of A. azarai. To
accomplish this we have cloned the DGGE bands into pTOPO vector and are now in the process of sequencing.

**Board 25**

**CONSERVATION GENETICS: USING GENETIC TECHNOLOGY TO STUDY ENDANGERED MOUNTAIN GORILLA POPULATIONS. Andrea N. Dennis andonndson@otterbein.edu, Yunwu Zhang, (Dr. Simon Lawrence slawrence@otterbein.edu), Otterbein College, Westerville OH 43081**

Poaching, human-transmitted diseases, habitat destruction, and decreasing biodiversity threaten the future of the mountain gorillas of the Virunga Mountains in Africa. Researchers have located two territories of biodiversity on the genetic level, the major histocompatibility complex (MHC). MHC diversity has been found to correlate with health, behavior, and reproductive habits (i.e. mate choice). Preliminary studies have shown that the mountain gorilla population is relatively homozygous at the MHC loci when compared to humans, and this lack of diversity at the gorilla MHC genes is cause for concern and grounds for research in the area of conservation genetics. The specific objectives of my project are to isolate DNA from the non-invasive samples such as feces, amplify MHC sequences and compare them to other human and gorilla DNA samples. DNA has been successfully isolated from fifteen mountain gorilla fecal samples. PCR (polymerase chain reaction) was used to amplify mitochondrial DNA from these samples. We are currently using nested PCR to amplify MHC loci, and plan to genotype these using denaturing gradient gel electrophoresis. Further, the gorilla DNA can be cloned in order to isolate the particular MHC gene from other unwanted gene sequences. Purifying the clone samples and purifying them through the DNA Sequencer allows us to read the specific barcode for any research that could contribute to the big picture of genetic biodiversity in the mountain gorilla population and to the development of programs to prevent the loss of this diversity.

**Board 26**

**IMMUNOCYTOCHEMICAL OBSERVATIONS OF INCREASED EXPRESSION WITHIN THE NUCLEUS LAMINARIS OF CHICK EMBRYOS BETWEEN E10 AND E15 OF THEIR DEVELOPMENT. Leslie A. Tuttle lslatli@otterbein.edu, Linda Ross, Otterbein University, College of Science and Medicine, Am Jeness-Marshall, Otterbein College, 204 W Main St., Westerville OH 43081**

Many inherited deafness disorders are believed to be associated with abnormalities in early auditory development. Nervous system development requires more axons to be sent out to the target sensory nuclei than necessary to ensure the proper connections are made. Once innervation from the periphery is complete, the extra axons are removed via programmed cell death, or apoptosis. Cell communication must occur to achieve the correct orientation and to signal cells to die. Gene knockouts in chick embryos have showed that collection of cells that allow messages to pass between the cytoplasm of adjacent cells. The connexins are the integral membrane proteins that make up gap junctions, and they can be categorized according to size. Connexin 43, the form studied, has a size that enables research on the host cells in the brain are often found in clusters, die synchronously, and neighboring cells are coupled by gap junctions. We hypothesized that brain cells signal apoptosis. Using mouse embryos from day 13 was labeled and examined in the nucleus laminaris and nucleus magnocellularis in chicks at embryonic development days of 10, 12, 14, 16, and 18. Connexin 43 was expressed in nucleus laminaris during the period E10-E15 when 75% of the neurons are dying and the protein is not expressed after the mass cell death. Nucleus magnocellularis acted as a positive control because it showed temporal selectivity but did not undergo apoptosis during a defined period. Results indicate that the communication by connexin 43 gap junctions may play a key role in nucleus laminaris cell death determination.

**Board 27**

**THE EFFECT OF CHARGED AMINO ACID MUTATIONS IN HYDROPHIC TRANSMEMBRANE DOMAIN III IN THE LACTOSE PERMEASE OF Escherichia coli. Christopher J. Wallace (Amy E. Jessen-Marshall, ajessen@otterbein.edu), Dept of Life and Earth Sciences, Otterbein College, Westerville OH 43081-1466**

All cells require a mechanism to transport bulk or polar nutrients and wastes across hydrophobic, nonpolar membranes. Based on genetic and biochemical study, the lactose permease of Escherichia coli is a model system for this transport paroch. The secondary protein structural model, based on hydrophobicity plots, proposes twelve α helices that cross the bilayer. Eight are predicted to be amphipathic, and form the pore itself. The remaining four are believed to be completely hydrophobic, and are presumed to be embedded in the nonpolar environment of the anchor. Site directed mutagenesis in Helix III, an anchoring helix, was used to substitute charged amino acids for hydrophobic ones in positions 85, 86 and 87. This was screened for functionality on 1% and 0.2% melibiose MacConkey media based on qualitative color change, A 100% function yields a red phenotype; white colonies indicate no function at all. Pink colonies indicate functional activity between 10%-30%. The functional mutants were then verified by using an automated gene sequencer. Additional characterization of these mutants was done in three replication with ONPG (o- nitro-phenyl-galactoside) spectrophotometric assays providing quantitative measurements that disrupt the hydrophobic helix disrupts function of the protein. The four anchoring helices have not been shown to play an active role in the binding of either protons or lactose during transport. Thus, the characterization of this helix and the effect on function provides further evidence for a role in global conformational stability.

**Board 28**

**ANALYSIS OF THE MHC CLASS II I-Ag7 BINDING PEPTIDES IN NOD AND NOD.Ea+ MICE. Marissa R. Matarrese s03.matarrese@wittenberg.edu, (Matthew S. Hanson mhanson@wittenberg.edu), Wittenberg University, 508 1/2 N. Wittenberg Ave, Springfield OH 45501**

Insulin Dependent Diabetes Mellitus (IDDM) is an autoimmune disorder that destroys the body's ability to produce insulin, a molecule that regulates blood glucose levels. Destruction occurs when the T cell receptor and co-receptor molecules interact with an autoantigen present in the binding cleft of an MHC class II molecule on the surface of host cell tissue. The T cell erroneously marks the autoantigen as being pathogenic, initiating a cascade that induces destruction of the non-regenerative insulin-producing beta cells of the pancreas. In non-obese diabetic (NOD) mice, the expression of only 1-Ag7 MHC class II molecules is attributed to the spontaneous development of IDDM. The NOD Eaa mouse is genetically identical to the NOD mouse, except for the expression of I-E, an additional type of MHC class II molecule. This mouse strain is diabetes resistant. We hypothesize that the peptides presented by the I-Ag7 molecule differ when the I-E molecule is also present. To assess the I-E protective mechanism, peptide-bound class II molecules were purified from a 35 animals from both the NOD and NOD Eaa mouse strains using affinity column chromatography. The eluent was treated with trifluoroacetic acid, and the haptidins from the binding cleft of the MHC class II 1-Ag7 molecules. The peptides were isolated using Amicon Centriplus YM-10 centrifugation devices. The presence of peptides has been confirmed via Matrix-Assisted Laser Desorption/Ionization Mass Spectrometry (MALDI-MS) analysis of the MHC. The peptides from the two mouse strains will reveal if the expression of I-E quantitatively or qualitatively affects antigen presentation.

**Environmental Poster Session 10:00 AM - 11:00 AM**

**Board 01**

**STUDIES ON THE LEAF SPOT OF WALNUT INCITED BY Gnomonia leptostyla (Fr.) Ces. & De Not. David L. Mason, dmason@wittenberg.edu, Dept of Biology, Wittenberg University, Springfield OH 45501**

The objective of this study was to investigate the host parasite relations of Gnomonia leptostyla, a saprophytic fungus infecting Juglans nigra, American Walnut. The fungus causes black spot on the leaves, and expands around the margins of a necrotic lesion. Although the infection is not systemic, many of the leaflets can become heavily infected during the mid to latter days of July into October, and they appear to undergo abscission earlier than healthy leaflets. Host parasite relations were evaluated by means of light microscopy, transmission electron microscopy (TEM) and scanning electron microscopy (SEM). The results from inoculation trials revealed that the parasite can enter the host by direct penetration of epithelial cells from a conidium that forms an appressorium-like structure or from a spore germ-tube that grows directly through a stoma. Results from histological studies on infected tissues revealed a number of findings. In direct directly penetrating, TEM, showed that multinucleated hyphae readily grow from cell to cell. Hyphae were also seen penetrating the host cell wall and extending into the intercellular spaces. The host cells appeared to be rapidly destroyed by intracellular invasion of hyphae. In contrast, with intercellular growth of hyphae, mesothelial cells were not as readily damaged, for TEM shows intact chloroplasts and microchondria in the cytoplasm. Haustoria were frequently seen penetrating cells from the intercellular hyphae. Histological studies also revealed hyphae growing between epithelial cells to establish spore-bearing, subcuticular, acervuli.

**Board 02**

**DISCOVERY OF A NEW SEX PHEROMONE IN TICKS. Chris I. Saunders, csaunders@wittenberg.edu, Jeff A. Domingus, Jay A. Yoder and Peter E. Hanson, 203 W College Ave, Wittenberg University, Springfield OH 45501**

2,6-Dichlorobenzophenone has so far been the only verified attractant sex pheromone of the American dog tick, Dermacentor variabilis (Say).
and acts to bring members of the mating pair together. Females release this pheromone during feeding, which prompts nearby feeding males to become excited, detach and search for the female emitter. Extracts of blood-engorged female adults (100 per replicate; N=3) obtained by feeding on newt tissues were analyzed by single-ion monitoring detection (SIM, m/z = 162 e.g. the parent ion of a dichlorophenol). Observed retention times matched those of authentic standards (9.44 min for 2,4-6-DCP, 9.74 min for 2,6-DCP) and co-injection of tick extracts with known standards to standards provided by TMS. Extracts contained 2,4-dichlorophenol (2,4-DCP) in addition to the expected 2,6-DCP, in a 1:9 ratio. No monochlorophenols (i.e., 2-, 4-, chlorophenol and 4-chlorophenol; m/z = 128) were detected. The single-ion detection of 2,4,6-TCP (replicates of 2,000; N=3), used as a negative control, contained no chlorophenols. When tested in 9cm i.d. Petri dish bioassays 2,4-DCP was highly attractive to partially fed, sexually excited males (60%), and the number of males captured favorably to number of males added (2-6-DCP 65%) (replicates of 10 each; N=10). Monochlorophenols were not attractive. Our conclusion is that 2,4-DCP is also a component of attractant sex pheromone in D. variabilis.

**Boards 03 First Report of a Tick Phenol in Ticks and Its Probable Function.**

Jeff L. Dommage, SD4 04dommages@wittenberg.edu, Chris I. Sanders, Peter E. Hansson and Jay A. Yoder, Wittenberg University, Dept. of Biology, Springfield, OH 45505

Chlorophenols are found in all developmental stages and are sequestered in glands as the tick completes its metamorphosis. Only females can secrete these chlorophenols (namely 2,6-DCP). This sex dependent secretion is consistent with expected sex expression of chlorophenols to males indicates that chlorophenols act as sex pheromones. 2,4,6-trichlorophenol (2,4,6-TCP) was detected in adults and nymphs, but not in any of the American cases of the American Tick Variabilities (Say). This report of 2,4,6-DCP supplements our previous observations of chlorophenols in ticks, namely 2,4-dichlorophenol (2,4-DCP) and 2,6-dichlorophenol (2,6-DCP). Identification of 2,4-DCP was achieved by obtaining extracts from live, pathogen-free ticks. Analysis of extracts produced using refluxing diethylether in a Soxhlet apparatus (100 per replicate; N=3) was conducted by single ion monitoring GC/MS (SIM GCMS, m/z = 198 e.g. m/z of a dichlorophenol). Only a single peak was observed. Identification of the compound as 2,4-DCP was made by comparison of retention time to that of authentic standard (9.74 min). 2,4-6-DCP is behaviorally attractive and induces a 65% attraction by fed sexually excited males compared to 49% for acetonitrile controls in 9cm i.d. Petri dish bioassays (replicates of 10; N=10; *p<0.05). Sythesis studies with NaCl suggest that chlorides on 2,4,6-TCP are derived from host blood. Thus, 2,4,6-DCP production plays an important role in chloride elimination to produce fresh water. Loss chemically efficient, albeit more prevalent, is production of 2,4-DCP and 2,6-DCP. We conclude that production of chlorophenols in ticks serves two purposes; to desalinate a salt-rich bloodstream, and to produce compounds that serve as sex pheromones.

**Board 04 The Effect of Regulatory Peptides on Regeneration and Epithelial Cell Proliferation in Hydra.**

Andrea M. Albright, (L. EPP) Mount Union College, 1972 Clark Ave, Alliance OH 44601

Peptide signaling molecules have regulatory roles in various developmental processes. The tissue of hydra contains such peptides that are active as developmentally regulated signaling molecules, regulating specific developmental events in the animal. These events include regeneration, cell differentiation and gene expression, among others. The peptide HYM 194, isolated from the tissue of three of these peptides (HYM 194, HYM 330 and HYM 346) on signaling molecules, regulating specific developmental events in the animal. These events include regeneration, cell differentiation and gene expression, among others. The peptide HYM 194 (SIM GCMS, m/z = 162 e.g. the parent ion of a dichlorophenol). Observed retention times matched those of authentic standards (9.44 min for 2,4-6-DCP, 9.74 min for 2,6-DCP) and co-injection of tick extracts with known standards to standards provided by TMS. Extracts contained 2,4-dichlorophenol (2,4-DCP) in addition to the expected 2,6-DCP, in a 1:9 ratio. No monochlorophenols (i.e., 2-, 4-, 6-chlorophenol and 4-chlorophenol; m/z = 128) were detected. The single-ion detection of 2,4,6-TCP (replicates of 2,000; N=3), used as a negative control, contained no chlorophenols. When tested in 9cm i.d. Petri dish bioassays 2,4-DCP was highly attractive to partially fed, sexually excited males (60%), and the number of males captured favorably to number of males added (2-6-DCP 65%) (replicates of 10 each; N=10). Monochlorophenols were not attractive. Our conclusion is that 2,4-DCP is also a component of attractant sex pheromone in D. variabilis.

**Boards 05 The Effect of Regulatory Peptides on Neurogenic and Nematocytic Differentiation in Hydra.**

Dustin M. Wallace, (L. EPP) Mount Union College, 1972 Clark Ave, Alliance OH 44601

Peptides isolated from hydra tissue have been found to be active as agents that can induce tentacle buds, and differentiate nematocytes and nerve cells, which are the developmental progeny of the pluripotent interstitial cells, are identified and counted after BrdU antibody staining. Altered numbers of these progeny cells in peptide-treated animals as compared to controls would indicate a regulatory effect by these peptides on the rate of differentiation of the stem cell populations. Preliminary results indicate that HYM 194 has no effect on nematocyte differentiation, while HYM 330 may suppress nematocyte differentiation.
OH. The mesocosms equilibrated for six weeks, after which four treatments of carbaryl were added to the mesocosms: 0.0 µg/ml, 0.1 µg/ml, 1.0 µg/ml, and 20 µg/ml. Glass microscope slides, on which biofilms could attach, were placed into each mesocosm immediately before each carbaryl addition. One biofilm was removed from each mesocosm daily for the first five days after the carbaryl disturbance and again on days 8, 9, 11, 22, and 36. To reconstruct the three-dimensional architecture of the biofilms, each biofilm was stained with fluorescein isothiocyanate (FITC) for the summer and/or fall and then excised for imaging (each 1 µm thick) using confocal laser scanning microscopy. Four quadrants, each with an area of 0.48 mm², were analyzed on each biofilm. Subsection IV and V heterocystous cyanobacteria were the most dominant genera across all sections. Another scheme classifies them into two Subsections, with I, II and III comprising 56 genera across all sections. Phylogenetic trees were constructed using parsimony, maximum likelihood, and an automated sequencer. Final consensus sequences were made for phylogenetic analysis. DNA was isolated from each strain, comprising members of the heterocystous cyanobacteria (Subsection IV and V). The hypothesis tested was that different surfaces would attract different correlation between species of larvae and pattern darkness/lightness. The hypothesis tested was that different surfaces would attract different correlation between species of larvae and pattern darkness/lightness. The hypothesis tested was that different surfaces would attract different correlation between species of larvae and pattern darkness/lightness. 

**Board 09** Settlement of Marine Larvae on Micropatterned Surfaces. Alex A. Johnson Johnson sonaa@hiram.edu, (Greg K. Szulgit, szulgitgk@hiram.edu), Hiram College, Department of Biology, PO Box 67, Hiram OH 44234 Many marine invertebrate species disperse themselves by taking on larval forms (usually microscopic) that drift or swim through the water column until they encounter a surface that is suitable for their settlement. It is well known that certain surfaces are more attractive to certain larval, but what factors do elicit a shell-switching response? Of the thousands of species of larvae are still being discovered. These factors are of great interest to scientists and marine engineers, who often would like to prevent the settling of invertebrates on boat hulls and other structures. To test the preferences of larval settling, optically patterned surfaces were suspended in sea grass beds in the Indian River Lagoon, approximately 20 m from the shore. These patterns were created on the boat and their effects confirmed. To test the original location and clams that were eaten replaced. Although usually found buried, most snails moved daily and movement was more habitat dependent. Relatively few movements were related to predation. B. contrarium moves more and occupies a larger active space. We reject the hypothesis that B. contrarium and B. carica use habitat similarly.

**Board 10** Phylogenetic Analysis of the Heterocystous Cyanobacteria Based on the 23S rRNA Gene. Kyle C. Kenyon, kenyonkc@muohio.edu, Linda E. Watson watsonle@muohio.edu, Susan R. Barnum barnumsr@muohio.edu, Department of Botany, 316 Pearson Hall, Miami University, Oxford, OH 45056

Cyanobacterial nomenclature has been traditionally based on morphological and reproductive characteristics. It was proposed that they be separated into five Subsections, with I, II and III comprising the nonheterocystous strains and Subsection IV (12 genera) and V (6 genera). Subsections I and II were split into two subgroups each based on morphological, with a total of 56 genera across all sections. Another scheme classifies them into 6, with 7 distinct families and 66 genera. The heterocystous cyanobacteria are capable of fixing atmospheric nitrogen in specialized cells called heterocysts. A group of 21 strains comprising members of the heterocystous cyanobacteria (Subsection IV and V) and 3 outgroup strains from Subsection I, II and III were used for phylogenetic analysis. DNA was isolated from each strain, the 23S large subunit ribosomal RNA gene was amplified using PCR, cloned into E. coli and sequenced using Sanger dideoxy chemistry and an automated sequencer. Final consensus sequences were made from 3 sequenced clones. Stems and loops were weighted for the RNA secondary structure and analyses were made using Pauplor 4.0. Phylogenetic reconstructions were performed using parsimony and maximum likelihood and distance methods. Bootstrap analysis, a standard resampling method that evaluates clade support, was done. Based on these analyses, the Subsection IV and V heterocystous cyanobacteria form a well supported, monophyletic lineage. The heterocystous strains should be treated as a single group and the classification into two Subsections based on reproductive characteristics is not well supported.

**Board 11** Quantifying Population Loss of Goldenseal, Hydrastis Canadensis L., In Ohio. Margaret R. Mulligan marrimulligan@hotmail.com, and David L. Sorensen sorensen@wittenberg.edu, Department of Botany, Pearson Hall, Oxford, OH 45056 Goldenseal, Hydrastis canadensis L. (Ranunculaceae), is a slow-growing perennial herb that is harvested for its rhizome. Goldenseal has become increasingly rare throughout its range, and was listed on the Convention for International Trade on Endangered Species (CITES) in 1997, but it is not clear to what extent this is due to overharvesting versus habitat loss or degradation. In Ohio, the goldenseal populations are believed to be declining. Voucher specimens from eight herbaria (MI, OS, CLM, BHO, KE, BGSU, JHWW, CINC) in Ohio were examined to determine what proportion of sites that historically supported goldenseal populations still supports them today. Of the 269 voucher slides examined, 129 (49%) were from dead snails and/or hermit crabs elicit a shell-switching response of tropical regions and inhabits snail shells. Finding an appropriate shell for protection is important to the hermit crab's survival. Odors from dead snails and/or hermit crabs elicit a shell-switching response in the hermit crab. We hypothesized that the compounds identified by gas chromatography would stimulate shell-switching behavior in Clibanarius tricolor. Groups of 10 crabs were placed in a bucket with 1.89L of seawater and acclimated for 3 weeks before the experiment. When a food solution was added; after 10 seconds, their behavior was observed for one minute. Responses consisted of moving away from the other
Axonemes are microtubule-based organelles that mediate motility in cells originating from flagellated organisms (n=214), crabs (n=219), and invertebrates (n=218) with cilia. Axonemes are also essential structures for the movement of sperm in many species. Crabs, for example, have two sets of sperm, termed spermtails, which are formed from the axoneme. Each spermtail requires a male-specific form of α-tubulin, to support their exceptionally long spermtails. The sensitivity of the spermtail axoneme to pH and temperature, and the presence of defects in axoneme formation, the question raises, how did the α tubulin evolve while maintaining a functional axoneme? Do this answer, question, J2 was checked (n=217) and sometimes J2 (n=218) in the presence of defects in axoneme formation. The sensitivity of the axoneme to J2 identity raises the question, how did the α protein evolve while maintaining a functional axoneme? Do this answer, question, J2 was checked (n=217) and sometimes J2 (n=218) in the presence of defects in axoneme formation.
This research will determine the influence of non-genetic, non-
emergence and have a higher survival rate than the offspring from
survival rate and size of offspring of different sized mothers are being
understood to be genetically uniform. Despite this genetic homogeneity, there is
L. GRANVILLE, OH has shown them

GRANVILLE, OH. ZIDRON A@DENISON.EDU

MULROY ANDREADIS ANDREADISP@DENISON.EDU, DENISON UNIVERSITY,
in three trees for the whole summer of 2002, while we
was measured in three trees for the whole summer of 2002, while we

Temperature differentials were measured every 10 seconds and means
were recorded every 10 days. The variation in sap flow was analyzed within and among trees on 10-day
intervals to optimize the use of TDP probes in the stand. The sap flow
variability measured at different azimuth locations was not consistent between
trees. The variability within a tree ranged from 1-100%.

Despite such variability, there was good correlation (R² values range
from 75 to 95%) between daily sap flow of the three constant trees to
those of the others. Therefore, we think we can estimate sap flow in
any tree using these correlations and thus scale to the level of the
stand.

The objective of this research is to scale sap flow measurements from
individual red pine trees (Pinus resinosa Alz.) to an entire red pine
stand. Sap flow in tree trunks can be estimated using temperature
dissipation probes (TDP). Thirty-minute-long probes were inserted at the
four cardinal directions, S, E, W, and N at 50-mm-long probes were inserted at the SW, SE, NW, and NE azimuths.
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The two goals of this study were 1) to initiate a long-term database of GPS mutants of Arabidopsis. The GPS mutant has nine mutations, all equally scored within the 14 loci. Each loci are packaged onto chromosomes of Arabidopsis thaliana. The GPS mutant will serve as the female and the GPS mutant will serve as the male for cross-fertilization. The F1 generation seeds are collected and sown. The F2 generation seeds (the mapping population) will be collected and sown. Each plant will be scored for the gps response and for each of the nine traits. Each mapping trait will be analyzed separately for its segregation with the gps response. The F2 generation seeds will be performed to determine if the observed number of plants with a particular phenotype equals the expected independent assortment indicating whether or not the gsp loci is linked to that particular trait. This should allow us to determine on which chromosome the GPS loci reside. Partially supported by the Program to Aid in Career Exploration at Ohio University and United States Dept of Agriculture.

Board 02 CORRELATION BETWEEN CHLOROPHYLL AND MINERAL CONTENTS OF SENESCENT AND GREEN LEAVES OF MAPLE TREES (ACER RIGIUM). SHEHEDAN DARESH AND BRIAN D MITCH, (MORRIZAV & MITCH FACTORY INC.), COLUMBUS OH 43202. Leaf chlorophyll and elemental element concentrations diminish in autumn. It is hypothesized that senescent leaves contain reduced levels of essential elements, including iron, magnesium and copper, thus the chlorophyll content diminishes accordingly, compared with that of green leaves. Stopstone at Columbus State Community College conducted an experiment in order to establish a correlation between chlorophyll concentration and essential mineral contents of senescent and green leaves. The experiment contained three replication, and two treatments per replication, green leaves versus senescent leaves (N=6). Chlorophyll was extracted by Hiscox and Israelstam (1979) method, and chlorophyll concentrations were determined based on the work of Amon (1949). No significant difference was observed between chlorophyll concentration of the green and the senescent leaves. Leaf elemental analysis is in progress.

Board 03 SOCIAL SCIENCE, ENVIRONMENTAL, FIELD BIOLOGY POSTER SESSION 02:00 PM - 03:00 PM

ORDERED DEATHS OF GREAT BLUE HERONS ALONG SHORELINES OF UPPER POOL 20,
Seasonal studies of two plant species, Podophyllum peltatum and Arisaema triphyllum were carried out. Observations of the shoot apices are described based on an analysis of the theories on shoot apical organization. Mean measurements and descriptions of apical dome height for each species have been used for classroom discussions concerning the changes in apical organization over a one year period. The mean height of the apical dome of Podophyllum peltatum is 40.5 μm and for the mean height of the apical dome is 189.16 μm. The mean height of the apical dome of Arisaema triphyllum is 28.45 μm and the mean width of the apical dome is 125.05 μm. Results of these studies were used to prepare a multi-media orientation slide to allow students to make observations and generate hypotheses about shoot development. During classroom discussion, fundamental anatomical and morphological questions were generated to be used as the basis for student laboratory projects. Select teaching, in particular, devoted more attention to need for teaching methods and strategies which can develop students’ ability to think logically, analyze, and utilize basic concepts to draw conclusions and make predictions. A model using angiosperm seasonal studies was developed. This model maintains a balance between teaching content and enhancing higher order thinking skills.
Previously, several biological diversity investigations have been completed across an urban gradient in Oxford, Ohio that includes sites at a business district, an apartment complex, a residential area, a golf course, and a forest preserve. During the summer of 2002, arthropod communities were sampled weekly at each site from June 8 - August 2 using rat carrion, which was tied to the underside of a screened trap, to attract a specific suite of arthropod consumers. Samples were collected, sorted, and identified to the species level. The effects of insecticides on soil microbes, a sample of soil will be collected and treated with organo-phosphate pesticides on earthworms and common soil microbes. Earthworms, species Lumbricus terrestris, will be used because earthworms are the most representative soil animals used for assessing chemical pollution in soils. Microbes are an important part of nutrient recycling in the soil. A preliminary test with a wide range of pesticide concentrations will be conducted on both bacteria and earthworms to determine the lethal concentrations of the insecticides that will be used in the final toxicity tests. Ten worms will be sustained per worm bedding of varying concentrations of the pesticides Diazinon and Malathion and their weight will be measured every 2 or 3 days to see if the addition of these chemicals to their environment causes changes in this parameter. In addition, their rate of mortality will be recorded in order to calculate LD₅₀. In order to test the effects of insecticides on soil microbes, a sample of soil will be taken from a land preserve with very low or no pesticide and chemical use. This microbe-containing soil will be grown on autoclaved T-Soy nutrient agar containing different concentrations of the Malathion and Diazinon pesticides. Different colonies will be isolated and identified and observations will be made to determine how the colonies were affected by the pesticides.

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Board 15: The role of interspecific competition at woodpecker nest sites: comparing burn versus unbeburned treatments in the Black Hills, S.D. Ian M. Brown, curr. W. Kerr, A-18. Conservation science has emerged as one of the most important fields of contemporary biology. Loss of genetic diversity, both in wild and captive populations, raises concerns about the potential impact of inbreeding, genetic bottlenecks, and founder effects. Wildlife preserves and associated areas are often designed to address these problems by creating natural ecosystems, biological databases, which can be used to determine family lineages and relatedness among individuals of the same species. Data
from these sources can be used to plan optimal mate pairings in species with low populations numbers thus minimizing the deleterious effects of inbreeding. Inbreeding causes low fertility, low juvenile survivorship, birth defects, and increased vulnerability to disease. The objective of this study was to determine if there was a difference in vegetation structure surrounding nesting trees and random trees, (2) to correlate the location of woodpecker nesting trees to the vegetation surrounding those trees, and (3) to compare the microhabitat preferences of Lewis' Woodpecker. (Melanerpes lewis) and Red-headed Woodpecker (Melanerpes erythrocephalus) woodpeckers. Habitat characteristics including overstory cover, tree condition, and ground cover were recorded at 25 random tree plots and 26 woodpecker tree plots (7 Red-headed, 19 Lewis'). Preliminary analysis suggests that vegetation structure differs between random and nesting tree plots. However, there is little evidence of structure differences in vegetation between Lewis' and Red-headed woodpecker nesting plots.

**Board 21** 
**MICROHABITAT PREFERENCES OF LEWIS' AND RED-HEADED WOODPECKERS IN THE SOUTHWESTERN BLACK HILLS AND WIND CAVE NATIONAL PARK, SOUTH DAKOTA. ERICKA J. PELCHER, ERICKAPELCHER@YAHOO.COM (SHIRLEY ATKINSON ATKINSON@MUSKINGUM.EDU), MUSKINGUM COLLEGE, 163 STORMONT St., NEW CONCORD OH 43762**

In order to better understand habitat preferences among woodpeckers, a study was conducted in the summer of 2001 in a forested area that has been recently burned at the McCallister Field Station (a field research station owned by MUSKINGUM COLLEGE, 163 STORMONT St., NEW CONCORD OH 43762) and the Wilds. Cavity nesters prefer older burnt trees because they can be more easily excavated for nesting, roosting, and feeding than live trees. Objectives of the study were: (1) to determine if there was a difference in vegetation structure surrounding nesting trees and random trees, (2) to correlate the location of woodpecker nesting trees to the vegetation surrounding those trees, and (3) to compare the microhabitat preferences of Lewis' Woodpecker (Melanerpes lewis) and Red-headed Woodpecker (Melanerpes erythrocephalus) woodpeckers. Habitat characteristics including overstory cover, tree condition, and ground cover were recorded at 25 random tree plots and 26 woodpecker tree plots (7 Red-headed, 19 Lewis'). Preliminary analysis suggests that vegetation structure differs between random and nesting tree plots. However, there is little evidence of structure differences in vegetation between Lewis' and Red-headed woodpecker nesting plots.

**Board 22** 
**A COMPARISON OF BUTTERFLY POPULATIONS TO DETERMINE SPECIES RICHNESS AND ABUNDANCE IN RECLAIMED AND UNDISTURBED HABITATS IN OHIO. CASSANDRA C. MATTERN, CMATTERN@MUSKINGUM.EDU, (JIM DOOLEY JDDOOLEY@MUSKINGUM.EDU), MUSKINGUM COLLEGE, 163 STORMONT St., NEW CONCORD OH 43762**

Butterfly communities can be affected by many factors such as predators, climate, human disturbance, host plant availability, and habitat. Butterflies are closely linked to the health of their habitats and can be used as key biodiversity indicators. Species richness and abundance relationships of two butterfly populations were examined at two study sites that were superficially similar but differed in land use and management. The first site was at the Western Reserve National Conservation Research and education institution located in Guernsey County, Ohio) in a wetland located on reclaimed strip mined land. The second site was at the McCallister Field Station (a field research station owned by MUSKINGUM COLLEGE, 163 STORMONT St., NEW CONCORD OH 43762) in a zone of abandoned farmland. Walk and count transects were used to estimate butterfly biodiversity as well individual species population sizes. Plants that were being utilized by each butterfly species were documented. Sixteen species of butterflies were found across the two sites. Butterfly diversity was relatively similar across the two sites with the same six species identified at the McCallister Field Station. Of those, 11 were also found at the Wilds. The total species found include Black Swallowtail, Cabbage White, Clouded Sulphur, Common Buckeye, Common Roadside Skipper, Common Wood Nymph, Easter Tailed Blue, Eastern Tiger Swallowtail, Great Spangled Fritillary, Monarch, Orange, Pearl Crescent, Pink-Edged Sulphur, Red Spotted Purple, Silver Spotted Skipper, and Viceroy. Sizes were also resistant to clindamycin and may produce this class of antibiotics against gram positive and gram negative bacteria. When testing Streptomyces for their antibiotic susceptibility these same two strains were also resistant to clindamycin in this class of antibiotics. Although all 42 strains were capable of degrading feather keratin by day 21, twelve degraded feathers in less than seven days. Streptomyces colonized and degraded black feathers equally well. Beta-scales bound sections of snake skin were colonized by the bacteria. This specificity of keratinolytic bacteria may be useful in the study of evolution of feathers from modified beta keratin scales.

**Board 23** 
**A COMPARISON OF BEHAVIOR OF CHINESE GORAL (NEMORHAEDUS GORAL) AND ARNOUXIANUS) AT THE WILDS AND IN NATIVE HABITATS. JENNIFER LOCKARD JLOCKARD@MUSKINGUM.EDU, (JIM DOOLEY JDDOOLEY@MUSKINGUM.EDU) AND SHIRLEY ATKINSON ATKINSON@MUSKINGUM.EDU, MUSKINGUM COLLEGE, 163 STORMONT St., NEW CONCORD OH 43762**

The purpose of this research is to conduct a behavioral analysis of captive Chinese goral (Nemorhaedus goral) and Arnoxi Katar (Nemorhaedus arnouxianus). Chinese goral are a relatively understudied species, in both the wild and captivity, native to the mountains of central Asia. The objectives are: (i) to determine how goral use the space available to them in their enclosure,
The Niagara Escarpment is an erosional feature formed in Paleozoic strata that extends from western New York State, north into Ontario, Canada, and through eastern Wisconsin. It is a separate landscape feature. Results indicate that surface water drainage, soil types, and forest vegetation distribution, allow for the identification of the Niagara Escarpment in southwestern Ohio. An unsupervised land cover classification of Landsat satellite imagery revealed the presence of a variety of associated land uses along the Escarpment including agricultural practices. The study will contribute to ongoing efforts in the Great Lakes region to further bioprospecting and conservation efforts in regards to the Niagara Escarpment.

The OB pond is 2.48 acres, and was created in the late 1960s. It has species density was recorded prior to and after habitat enrichment by adding new physical habitat. Our hopes are that this method will outlay a long-term methodology to monitor the aquatic community. Following this initial treatment of the pond, I formally observed this lack of diversity.
The name Bass Islands Series was originally proposed for rocks typically represented in upper Silurian strata, including the Tymochtee, Ozarkodina, and transgressive segregation; and 2) to determine whether CI 13227 and backcross populations were crossed to produce Fl, F2, and backcross populations. Plants were used as perch sites by singing males were used to determine the location of perimeter trees, and GIS methodology was used to estimate territory size. Although GIS provides an indirect way of estimating the area size of a bird's territory, it has the benefit of yielding information at a larger spatial scale than the more traditional method. For instance, GIS may be used to examine relationships between nest success, territory size and territory location relative to selected landscape-level features.

The Ohio Journal of Science

A-21

PRE-COLLEGE POSTER SESSION 03:00 PM

Boards 01-03

Boards 01

TRICLOSAN INDUCED RESISTANCE OF PSEUDOMONAS AERUGINOSA

KELLY D. KLEFFNER

1.18 (n = 26), 10.80 ± 1.18 (n = 26), 10.80 ± 1.81 days (n = 69), and 10.05 ± 1.53 days (n = 69), respectively. No maternal inheritance was observed (P>0.05) for the remaining characters. The large effect on generation time. These results indicate that the resistance in CI 13227 and L-574-1 could be combined to create wheat cultivars with slightly greater resistance than either parent.

Boards 02

CREATING A DECISION-MAKING ROBOT USING A NEURAL NET

ZACHARY J. TONG

KLEFFNER.1@OSU.EDU, GLENN E. LARSEN2

The hypothesis was to determine if a robot could learn to turn left, right, move forward, and stop based on sensory input and previous decisions. In this experiment, P. aeruginosa was exposed to the triclosan but also against other antibiotics. It was found that the change was not chromosomal mediated, which means that the assumption can be made that the change was plasmid mediated. In order to confirm this, a number of other organisms might be analyzed. Because of the use of triclosan in so many products, the use of triclosan should not be abused because even though it appears to be helping people stay infection free, it may be creating a dangerous, resistant bacteria.

Boards 03

DO PEOPLE DETECT A FLASHING RED LIGHT BETTER THAN A STILL RED LIGHT?

LALLI J. REDDY

LOLLIPPO504@AOL.COM, 7478 KELLY D. KLEFFNER

Planting cultivars with slightly greater resistance than either parent. This was done to see if the triclosan created a resistance in the P. aeruginosa not only against the triclosan but also against other antibiotics. Resistance to other antibiotics would make it very hard for doctors to treat patients infected with the triclosan-resistant P. aeruginosa. After PFGE was run, it turns out that the change was not chromosomal mediated, which means that the assumption can be made that the change was plasmid mediated. In order to confirm this, a number of other organisms might be analyzed. Because of the use of triclosan in so many products, the use of triclosan should not be abused because even though it appears to be helping people stay infection free, it may be creating a dangerous, resistant bacteria.

Boards 04

NUMBER OF GENES SEGREGATING FOR GENERATION TIME IN A CROSS BETWEEN TWO PARTIALLY RESISTANT LINES OF WHEAT

KARIN A. HANSON

This study describes the segregation of genes for resistance to the fungus Puccinia graminis in a cross between partially resistant wheat CI 13227 and L-574-1. Previous work had determined to have two and four genes for partial resistance, respectively. In this study, parental, F1, F2, and backcross populations were used: 1) to quantify maternal inheritance, degree of dominance, and transgressive segregation; and 2) to determine whether CI 13227 and L-574-1 share any resistance genes. CI 13227 and L-574-1 were crossed to produce F1, F2, and backcross populations. Plants were inoculated with P. triticina prior to flowering. On days 6-22 after inoculation, disease lesions were measured using a disease intensity rating scale for 57-77% of the progeny in the F2 and backcross populations were less than or greater than the mean value of the parents. Resistance
Another expectation was that healthier plants would increase assimilation of the nutrients (N-P-K) in the test containers with the habitat (water surface, suspended in water, and upon the gravel). The highest nutrient concentration. The procedure for this project had the algae of nutrients than the aquatic plant species, or the additional nutrients, (2) water from Lake Erie with plant species and a 20 ppm dose of N-P-K added. It was hypothesized that the algae species and a 20 ppm dose of N-P-K added, (3) water from Lake Erie with plant species and a 20 ppm dose of N-P-K added, and (4) water from Lake Erie with plant species added. Cladophora sp., Vallisneria sp. Cladophora sp. assimilated 66%-100% of all nutrients (N-P-K) in all tests, especially phosphorus, which was assimilated at 99%-100% in all tests. In conclusion, Cladophora sp. was the aquatic plant that was most effective in plant nutrient (N-P-K) assimilation, especially phosphorus. Quantitative analysis of the algae/plants growth and color tend to support the hypothesis and quantitative data derived from the nutrient analysis.

Boards 04 FACTORS AFFECTING ROAD MORTALITY OF SNakes, KLIDDEIER PLAINS WILDLIFE AREA, NATHAN J. YAUSUS YAUSUS@YAHOO.COM, 5051 N GALENA RD, SUNBURG, OHIO 44144 (BUCKEYE VALLEY HIGH SCHOOL)

Surveying and road kills of snakes in the Killdeer Plains Wildlife area has not been conducted before 2000. Actual impact that vehicular traffic may have upon snakes was unknown. Previous fieldwork indicated that visible hourly species of snakes has decreased with vehicular traffic. Eastern plains garter snakes (Thamnophis radix radix) and eastern massasaugas (Sistrurus catenatus catenatus) are listed as endangered on Ohio’s threatened and endangered species list and found in Lake Errie and Wyoming County, Ohio USA. Serious concerns exist regarding a decline in numbers threatened and endangered snakes at Killdeer Plains. All roads in the Killdeer Plains were driven into June before July. August to November. Snakes were identified, and location recorded by Global Positioning System (GPS). Live snakes were assisted off the road. Fall 2001 and Fall 2002 road surveys were compared using a chi-squared test and found to have the same distribution (p > 0.99).

The lack of snakes found during the months of March to June in the spring of 2002 may be an indicator of a decrease in snake populations. This study was conducted in cooperation with the Ohio Dept of Natural Resources.

Boards 05 HOW DO DIFFERENT NUTRIENTS (PHOSPHORUS/NITROGEN/POTASSIUM) AT VARIABLE CONCENTRATIONS AFFECT ALGAE (CLADOPHORA SP.), AND THE AQUATIC PLANTS (MYRIOPHYLLUM SP.) FROM THE WATERS OF LAKE ERIE? VALERIE M. ANDRUS 05VANDRU@BEAUMONT.SCHOOL.ORG, 4880 FOXXAIL TRAIL, RICHMOND HEIGHTS OH 44143 (BEAUMONT SCHOOL)

The purpose of this project was to evaluate plant nutrient uptake of the macronutrients, phosphorus, nitrogen, and potassium on the algae (Cladophora sp.) and the aquatic plants (Vallisneria sp. and Myriophyllum sp.), all collected from the southern shore of Lake Erie, by the inter-tidal zone, in Cuyahoga County, Ohio. Aquatic plant species were collected from the surface waters of the shore of Lake Erie, by the Euclid Creek inlet. The algae Cladophora sp. was collected from scraping blooms in the submerged areas of the lake. The algae species (Myriophyllum sp.) were collected from the submerged areas along the lake. The purpose of this project was to collect water from Lake Erie. All samples were collected and the test evaluations performed in the spring and fall of 2001. The variables for this project are: (1) water collected from Lake Erie and water with additional nutrients, (2) water from Lake Erie with plant species and a 10 ppm dose of N-P-K added, (3) water from Lake Erie with plant species and a 20 ppm dose of N-P-K added, and (4) water from Lake Erie with plant species added. Myriophyllum sp. is susceptible to growing in all phases of the habitat (water surface, suspended in water, and upon the gravel). Another hypothesis is that plants can be grown in a test container with the highest nutrient concentration. The procedure for this project had four test trials: (1) all plant species added, (2) Cladophora sp., (3) Vallisneria sp., and (4) Myriophyllum sp. Each of the four test containers, as follows: (a) Lake Erie control water only, (b) Lake Erie water with plant species added, (c) Lake Erie water and plant species with 10 ppm dose of N-P-K added, and (d) Lake Erie water and plant species with 20 ppm of N-P-K added. Gravel from Lake Erie where the samples were collected was added to each container at a bed level of 2 cm. in depth. The gravel was of grain size (0.101-0.202 cm.) to granule size (0.202-0.406 cm.). The gravel can be characterized as common rock and mineral compositions from the southern shore of Lake Erie, including limestone, dolomite, quartzite, shale, sandstone, siltstone, chert, quartz, coal, and (in a few cases) igneous metamorphic rock and metal types. A light source provided illumination throughout the test period. The light source was a plant grow light, of metal halide form, at 150 watts, and producing 16,000 lumens. The following were the different nitrogen, phosphorus, and potassium concentrations (all in ppm), on all containers after 0 hours, 72 hours (3 days), and 144 hours (6 days). The data for this project indicates that the hypothesis was supported. The Cladophora sp. assimilated a greater amount of nutrients than the aquatic species Myriophyllum sp., and Vallisneria sp. Cladophora sp. assimilated 66%-100% of all nutrients (N-P-K) in all tests, especially phosphorus, which was assimilated at 99%-100% in all tests. In conclusion, Cladophora sp. was the aquatic plant that was most effective in plant nutrient (N-P-K) assimilation, especially phosphorus. Quantitative analysis of the algae/plants growth and color tend to support the hypothesis and quantitative data derived from the nutrient analysis.

Board 07 SPACE FLIGHT EXPERIMENT TO DETERMINE POLYMER EROSION AND SIlICONE CONTAMINATION ON SPACECRAFT. MAURA C. LILLIS MUIR MCK1405@AOL.COM, 8402 EDGE LAKE OVAL, SAGAMORE HILLS OH 44067 (BEAUMONT SCHOOL)

This project focused on the fascinating and controversial topic of short-term memory. The study asked, "Is there a point when age and short-term memory of humans become negatively correlated?" The following hypothesis was developed: "There is a point when age and short-term memory become negatively correlated."

The MUIR SHORT-TERM MEMORY TEST was formulated. The test requires the subject to study nouns, numbers, and shapes, and to read one minute of text aloud. Over 100 copies of the MUIR SHORT-TERM MEMORY TEST were administered and evaluated. People in the age range of 11 to 70+ participated in this study. Subjects were divided according to their age into 11-20 years, 21-30 years, 31-40 years, 41-50 years, 51-60 years, 61-70 years, and 70+ years. Results of the tests were calculated, charts quantifying the percentage of nouns, numbers, and shapes retained in the subjects were measured. It was evident from the retention percentages of the seven age groups that the point at which age and short-term memory became negatively correlated was in the age range of 70+. Although the hypothesis was supported, many questions remain concerning the results of the experiment. The most prominent issue was the almost indistinguishable results of the first seven age groups. No explanation has been offered for such low retention of information as compared with the six other age groups. Perhaps of even greater concern, however, is the reason why there is no gradual degradation in performance of short-term memory over the preceding six age groups.

Board 08 STUDY OF THE POINT WHEN AGE AND SHORT-TERM MEMORY BECOME NEGATIVELY CORRELATED. MCKINSEY R. MUIR MCK1405@AOL.COM, 8402 EDGE LAKE OVAL, SAGAMORE HILLS OH 44067 (BEAUMONT SCHOOL)

This concept confirms the advantages (benefits) of flashing lights in traffic accident prevention.
application techniques, and the effects of condensation on salt-sprayed samples have been researched for every polymer through experimentation. These studies are relevant to determining erosion yields of various materials and their dependence on temperature, as both salinity and temperature affect the properties of the materials. The study also investigates the feasibility of using platelet aggregation as a measure of thrombogenicity.

**Board 08**

**IDENTIFICATION OF FLUOROQUINOLONE RESISTANCE PROTEINS IN STAPHYLOCCUS AUREUS.** Zachary T. Tackett, ZachTackett85@AOL.COM, 9604 St Rt 7, Proctorville OH 45669

As a result of the liberal use of fluoroquinolones in the treatment of bacterial infections, many strains of Staphylococcus aureus have acquired resistance to fluoroquinolones. In order to determine the mechanism of fluoroquinolone resistance, cultures of Staphylococcus aureus were grown on tryptic soy agar (TSA) and exposed to 5 μg of ciprofloxacin by the disc diffusion method. This was repeated until the culture was more difficult to grow. The resistant strain was then treated with sodium bisulfite (NaBHS) and a hypothetical protein was cut out of the gel and prepared for matrix-assisted laser desorption-ionization time of flight mass spectrometry (MALDI-TOF MS). The MALDI-TOF MS results were successful at identifying two proteins: an endo-1,4-β-glucanase homolog (BABA52553) and a hypothetical protein (BABA69202). As far as the function of this hypothetical protein has not been experimentally determined, however, because of sequence homology with many known resistance genes, this protein could be the drug resistance gene. The results of this experiment indicate that fluoroquinolone resistance is a complex challenge and that a multidisciplinary approach is needed to understand the mechanisms of resistance.

**Board 09**

**USING PLATELET AGGREGATION AS A MEASURE OF THROMBOGENICITY AND ITS RELATION TO AGE AND GENDER.** Vivek S. Yadavalli, phenom2020@gmail.com, 6143 Wegen Ct., Dublin OH 43017 (Village Academy)

Recently, the use of Nitrolin stents in cardiovascular surgical procedures has gained wide popularity. In a study performed at the University of California, Los Angeles, placed in a narrowed artery where it expands and dilates the artery. Obviously along with this use, questions have been raised as to the biocompatibility of Nitrolin in these clinical applications. In particular, the effect of thrombogenicity on Nitrolin has been addressed in this context. Towards this objective, it was proposed to use platelet aggregation as a measure of thrombogenicity. For this it is important to understand the platelet aggregation characteristics without any foreign substance (such as a Nitrolin stent) and after these characteristics are analyzed thoroughly, the effect of Nitrolin stent's presence on these characteristics can be analyzed at a later stage. Thus the emphasis in this research project is to analyze the platelet aggregation characteristics as a function of patients' gender and age. The platelet aggregation is calculated as a percentage value normalized to a given amount of platelet aggregation at a given volume of blood. It was hypothesized that the platelet aggregation is more for older patients (above 50 years of age) and that this phenomenon is more pronounced in females than in males. With a list of 60 patients' platelet counts supplied by the Laboratory of Dr. Glen Cook of the Ohio State University Heart and Lung Research Institute, where the platelet count was determined by an experimental procedure followed in the laboratory with the assistance of laboratory personnel, the data was analyzed to test these hypotheses. From this analysis, it is concluded that the first hypothesis is correct in the sense that patients above 50 years of age have more platelet aggregation percentages than younger males whereas the females did not show that much variation as a function of age. This research thus demonstrates that platelet aggregation is indeed an important measure to be used in understanding the thrombogenicity in cardiovascular surgeries and that patients' gender and age play an important role in these surgical procedures involving blood/material interaction.

**Board 10**

**WILL THE SURFACTANT, POLYOXAMER 407 ADD TO UTILIZATION OF ALLIUM SATIVUM L. AS AN ANTI-INFECTION IN GROUND BOMBING?** Any C. Schlegel, deschlegel@coshocton.com, 1900 Atwood Terrace, Coshocton OH 43812

It is known that Allium sativum L. does decrease the bacterial growth represented by the total plate counts of heterotrophic mesophilic bacteria in colony forming units on a tryptcase soy agar plate in all tested hawkerdrum. Allium sativum L. with Polyoxymer 407 would have the greatest effect on the decrease of bacterial growth. Hamburger samples from Burger King and Wendy's fast food restaurants, and Big Bear Raw Ground Beef Chuck in Coshocton, Ohio, were tested using Allium sativum L. and the surfactant Polyoxymer 407 (found in most commercially available mouth rinses). Twenty percent solutions were made using the surfactant Polyoxymer 407 and in the five trials, both alcohol (trials 1-4) or water (trial 5) was used. Then Kyolic Liquid Aged Garlic Extract was added to the Polyoxymer 407 solution in a separate container. Hamburger were diluted and tested plain, with Bicarbonate, with garlic, with a Polyoxymer 407 solution, and with a combination Polyoxymer 407 and Garlic solution. All solutions were mixed in a 1:1 ratio, then left to sit for 45 minutes (time protocol for Bicarbonate). All samples were plated on tryptase soy agar plates, maintained at a 27 °C environment, and read at 24, 48, 72, and 96 hours. The results were that garlic did not decrease bacterial growth, but rather increased growth; and that the garlic and Polyoxymer 407 solution did decrease growth.

**Board 11**

**DOES PRICE DETERMINE THE PURITY OF WATER?** Michael A. Sears, peaers@ashland.edu, PO Box 998, Ashland OH 44805 (St. Edward School)

While some bottled water is pure, and why do people pay more for some bottled waters than for others? Are they paying for purity? The hypothesis suggested by these questions is that bottled water with a high price is more pure than water that is sold for free. To test this hypothesis, 27 trials were performed to test for bacterial growth. The first experiment yielded one positive result for bacterial growth (Absopure Natural Fluoride Artesian Drinking Water contains bacteria and results were not significant using the sterilization test). The second experiment indicated that it may play a role in fluoroquinolone resistance. As a result of the liberal use of fluoroquinolones in the treatment of bacterial infections, many strains of Staphylococcus aureus have acquired resistance to fluoroquinolones. In order to determine the mechanism of fluoroquinolone resistance, cultures were proven resistant as determined by one-way ANOVA with ± = 0.05; proteins were then extracted from the initial and resistant cultures for SDS-PAGE. The molecular weights of the dynamic proteins were used to standardize the test. The results of this experiment indicate that it may play a role in fluoroquinolone resistance. Endo-1,4-β-glucanase provides ATP, which enables the cell to survive in a stressful environment. This study indicates that fluoroquinolone resistance may be caused by a pump, which would require the cell to use additional energy. These conclusions will be useful in producing an antibiotic to suppress fluoroquinolone resistance proteins.

**Board 12**

**THE MYSTERY OF MISSING MATTER IN THE UNIVERSE: THE SEARCH FOR WIMPS (WEAKLY INTERACTING MASSIVE PARTICLES).** Katharine G. Trosset, ktrosset05@hb.edu, Caitlin A. Fogarty, 1900 N Park Blvd, Shaker Heights OH 44122 (Hathaway Brown School)

The composition of the universe remains a mystery due to the problem of missing mass. It is known that clusters of stars constitute 30 percent of the total mass of the universe. However, baryonic matter only makes up 5 percent of the total mass of the universe. Thus, it is apparent that 75 percent of the matter in clusters has not been identified. Exotic dark matter may account for this discrepancy. Our study focused on a specific type of cold dark matter called WIMPs, or weakly interacting massive particles, because they can account for some structure formation. Currently, two studies are being performed to find evidence of the existence of WIMPs. DAMA, or Dark Matter Search, claims to have detected WIMPs, while CDMS, (The Cryogenic Dark Matter Search), does not support this claim. This study aimed to examine this discrepancy by fitting DAMA's data to three halo models, varying in their velocity dispersions, to either confirm or rule out one of these models as accurately as possible. This was accomplished by using a significance test, and then examining the data's limit plots behaved for each model in comparison to the standard model. As a result, we found that these halo models were not indeed sufficient since the results agree, and were able to rule them out as possible solutions to the problem.
Board 13  A THEORETICAL APPROACH TO THE OPTIMAL LENGTH OF A MUSICAL SCALE. ELENA UDOVINA LEINA_u_1999@yahoo.com, VITALY BERGELSON VIT@OHIO-STATE.EDU, WILLIAM A. BRANNICK Dr, SOLON OH 44139 (Hathaway Brown School)

It is a well-known problem in music theory that the 12-tone scale used in Western music today is not acoustically ideal; that is, the intervals between adjacent notes are not equally spaced in the acoustic context. Two natural questions, therefore, arise: why was 12 chosen for the length of the scale, and is it the ideal length? An order of consonance was assigned to the musical intervals, which was shown mathematically sound and consistent with previous studies. Octave equivalence was assumed for the purposes of a purely mathematical investigation. Only well-tempered scales with equal intervals between subsequent notes and a third between notes inside of the accepted approximation in mathematical studies in the field. Several definitions of a best scale were introduced that involved different techniques, each scale was evaluated, and the cumulative result of each was analyzed. The length of a string, and scales of length up to 150 tones were compared using C++ and Microsoft Excel under the definitions established. The first 100 consonant intervals (as defined by the order of consonance established) were used in the computer approximation; while the number is less than infinite, other studies usually consider no more than 10 intervals. The results suggest that in the era of computer-generated sound when large lengths of scales are becoming more viable, the scale of length 53 is the best for accommodation of voice.

Board 14  RECYCLED RESIN PLASTICS CAN IMPROVE PLANT GROWTH WHILE REDUCING ENVIRONMENTAL WASTE. ALICIA D. BOYD ABSOTC16@AOL.COM, 3383 FAULKNER DR, BRUNSWICK OH 44212 (High School)

Plastics are important to society. Many household products, packaging and consumer products are made of plastics. Society uses resin plastics faster than they can decompose. This project investigates a way to recycle resin plastics by pulverizing the plastics and using them as a soil supplement. Six different types of resin plastics were pulverized and used in this experiment: Polyethylene Terephthalate, (PETE), High Density Polyethylene, (HDPE), Low Density Polyethylene, (LDPE), Polypropylene, (PP), and Polystyrene, (PS). The resin plastics were obtained from everyday items, such as a soda bottle or a grocery bag. Soybeans, corn and string beans were the plants tested in this experiment, and some of the soil treatments were on experimental. The plants were grown from November 2001 – March 2002. It is hypothesized that pulverized resin plastics will reduce environmental waste and improve plant growth. Each plant was grown separately with each type of resin plastic. A layer of the pulverized plastics covered the seeds, and more soil was placed over the plastic layer. Each test was run twice and compared to the control. The pH level of the soil was tested to ensure that the plastic did not affect the pH level of the soil. The amount of water in the soil was also tested to determine if the pulverized resin plastics helped trap water in the soil. The height of each plant was taken after each comparison was made. The results showed that the resin plastics would reduce its volume and primarily reduce the amount of space it would occupy, thus reducing environmental waste. The pulverized plastics also aided in the growth of the plants. All string beans and soybean plants with the plastic PETE were taller than their controls. Plastic PETE aided best in the growth of the string bean and soybean plants. This pulverized plastic kept the most amount of water stored in the soil by the plastics, grew the tallest in the time provided. Pulverized plastics in the soil increase the process of string bean and soybean growth, which may ultimately benefit farmers and the consumer of the products.

Board 15  A COMPARATIVE STUDY OF DIVERSITY IN THREE FOREST ECOSYSTEMS IN NORTH EAST OHIO. ROWAN R. WEBSTER2, FLAMESTORM2000@yahoo.com, MARY J. McGRARIGLE1, MAKELA SLAVICK1, ANNA A. KELTH1, ABE J. HAA1, TRISTAN T. OGDEN1, FRANCIS S. LIHARD2, MARSHALL S. LIHARD2, D. MARSHALL2, MARSHALLS@HIRAM.EDU, AND RACHEL McKENNY1,

1Hershey Montessori Farm School, 11330 Prouty Rd, Huntsburg OH 44044, J.H. Barrow Field Station, Hiram College
2Hiram Township, Portage Co. and a 60 year maple forest at Hershey Montessori Farm School, Huntsburg, Geauga Co. We created nine randomized plots in each forest to study the diversity of the forest. The studies were conducted between 23 September 2002 and 4 November 2002. At each visit, we would visually examine the plots for any vertebrates, invertebrates, or fruiting fungi. We randomly sampled three plots using environmental noise exposure in each quadrats in each plots. To sample forest-floor invertebrates we set up three replicate pitfall traps in each plot. To sample the leaf-litter community we took three 57.3 cm2 replicate leaf litter samples per plot, and used a Berlese funnel to extract all invertebrates. We conducted point count surveys for birds in the Hiram plots. This consisted of four individuals scanning the forest in and around each plot for 10 minutes on the 30th of September. We identified and measured the DBH of all the trees in our plots. We also identified and counted all standing woody vegetation taller than breast height and < 3 cm dbh. Preliminary analyses indicate that the old-growth forest at J. H. Barrow Field Station has the highest species richness over all.

Board 16  EFFECTS OF NUTRIENT LOADING ON SEEDLING GROWTH. ALEX DLUOGOSS ADLUOGOSS@HOTMAIL.COM AND ZACK SLOCUM, 9415 LANGDON LANE, NORTH ROYALTON OH 44133 (Cuyahoga Valley Career Center)

Growth was studied by comparing nitrogen, phosphorus, and potassium treated plants. Each nutrient affects different aspects of plant physiology. Nitrogen encourages green and vegetative growth. Potassium promotes healthy root growth and increases chlorophyll production. Phosphorus encourages production of seeds, production of fruit, and root formation. It was hypothesized that nitrogen treated plants would have the best overall growth because nitrogen encourages vegetative growth. The sweet corn seedlings were transplanted into sixty pots (each containing 98.0 grams of soil) and were randomly arranged. Four sets of fifteen pots were treated with a 300ml nitrogen solution (0.075 grams of Urea). This procedure was repeated for phosphorus (0.150 grams of Phosphate), potassium (0.425 grams of Potassium Chloride) and a control (300ml of tap water). The data showed that sweet corn treated with nitrogen (mean height =23.3cm, standard deviation = 3.86cm) grew faster than the control treatment (mean height =22.3cm, standard deviation = 2.3 cm). A t-test comparing growth between the control group and the nitrogen treated group was statistically significant (p < .05). The next step was to test the hypothesis that nitrogen encourages more rapid vegetative growth than a non-treated solution.

Board 17  THE EFFECTS OF EARLY TRANSPLANTATION ON PLANT GROWTH. THOMAS FITZGERALD E2EMINTENANCE@aol.com, JASON MARTIN, 161 FITZGERALD AVE, NORTHFIELD OH 44067 (Cuyahoga Valley Career Center)

Most literature concerning transplanting states that seedlings should not be transplanted before true leaf establishment. Plant growth was observed for effects of early transplantation (before true leaf establishment). Beans were transplanted either before or after the establishment of true leaves. A control group was not transplanted. Plants transplanted before true leaf establishment were hypothesized to have stunted or lower growth rates compared to those that were transplanted after the establishment of true leaves. Three groups of twelve bean plants were placed into flat trays for the procedure. The experiment was conducted in a greenhouse. The bean seeds were planted at a depth of two centimeters in sixteen grams of soil. The plants were placed under a mist system and rotated each day to ensure equal light. The greenhouse temperature control procedure was twenty-one degrees Celsius. The plants were observed for three weeks. Bean plants transplanted before true leaf establishment grew less (mean = 12.7 cm, standard deviation = 4.5 cm) compared to those that had the first seed leaves opened (mean = 15.1 cm, standard deviation = 1.6 cm). A t-test was conducted comparing the results from the two experimental groups. The difference in height between the two groups was statistically significant (p < .05). These results support the hypothesis that transplantation before establishment of true leaves is detrimental to plant growth.

Board 18  AH...THAT IS BETTER. CHAD W. KOENING GKW@TDS.NET, 5692 RD.16-C, CONTINENTAL OH 45831 (Miller City HS)

Many have various sound absorbing qualities. A metal test chamber measuring 8 x 12 x 27.5 was constructed to evaluate the four different materials to determine their individual acoustic ability. The four materials tested were carpet, ceiling tile, blue board, and particleboard. The sound levels of the presses and welding stations in a steel factory where the occupational environmental noise exposure was above eight-five decibels were recorded by using a dosimeter and a tape recorder. A tape recorder generated the known sound level in one end of the test chamber and the dosimeter determined the reduction in noise level at the opposite end of the chamber. Each material was tested for its absorption properties. The project is to compare the sound absorption qualities of various insulating materials using the same thickness of each material (one half inch and one inch). It is hypothesized that more dense the material the higher the sound absorption quality. The results showed that different materials absorb different amounts of noise at different thickness. Graphs were designed to show the comparison of materials. Hearing conservation must be a priority. It assesses the quality of hearing for those individuals exposed to loud noises.
9:00 POPULATION AND DIVERSITY OF TERRESTRIAL CAUDATA ALONG AN ELEVATIONAL GRADIENT. Jacqueline M. Doyle, doyle@wooster.edu, VIKRAM IYENGAR VYENGAR@WOOSTER.EDU, 1189 BEALL AVE, WOOSTER OH 44691

Recent evidence of amphibian decline in the Southern Appalachians suggests a need for better understanding of the relationships among amphibian species and their habitats. During the winter of 2002, species of Caudata were surveyed within the five forest communities located within Coweeta Hydrologic Laboratory in Otto, NC. It was hypothesized that salamander species diversity will differ from one forest community to another, suggesting the ecological niche that each species prefers. It was further hypothesized that salamander activity will differ with changing temperature and precipitation, suggesting microclimatic conditions that are important for individual species habitat specialization. One sampling site was established in each of five forest communities situated across an elevational gradient. Forest communities surveyed and included valley, ridge, cove, hardwood, low elevation mixed oak, high elevation mixed oak and northern hardwoods. Each site was divided into a 5 x 5 x 5 grid, with each plot containing two cover boards. Salamanders found under cover boards were identified and measured every two weeks from mid-June to October. Precipitation, air temperature and soil temperature data for each site were measured by microclimate stations. Initial observations include the following species of salamanders: 18 Plethodon glutinosus within all forest communities and at elevations, 4 Eurycea wilderae at the lowest elevations, 71 Plethodon jordoni at the two highest elevations, and 8 Desmognathus ochrophaeus only at the highest elevation.

9:15 EFFECTS OF SOIL TYPE AND MOISTURE ON THE BODY MASS AND TIMING OF THE EASTERN BOX TURTLE’S (TERRAPENE CAROLINA) EMERGENCE FROM HIBERNATION. Guenvere L. Reilly, (Teresa A. Johnson terrapene26@wooster.edu, COLLEGE OF WOOSTER, 1189 BEALL AVE, WOOSTER OH 44691

Understanding the seasonal activity patterns of an animal is essential to aiding in its preservation. For reptiles, particularly those that dwell in temperate zones and are thus exposed to harsh winter conditions, this involves functional knowledge concerning all aspects of their winter dormancy or hibernation. Influences of substrate type and moisture have been described with regard to the survival during hibernation. However, the impact of these environmental factors on hibernation emergence has not been studied. The timing of renewed activity affects the turtle’s ability to remain a normal body weight due to food availability and weather conditions. Two different types of soil will be utilized in this experiment, one treatment consisting of solely the Ohio Killbuck series Ap and Bg, while the second treatment will consist of a half-and-half mixture of the Killbuck series and sand. Each site type will be maintained at two different moisture contents of 30% and 80%, thus creating a total of four separate testing environments. Thirty-two adult male Eastern Box Turtles will be randomly, but evenly, distributed amongst these four environments and, after a period of cold acclimation, they will be placed within a human created hibernaculum (i.e., den) of predetermined substrate type. These dens will be held at 4°C for three weeks, after which a heat source will be applied to the surface of the soil. Records will be kept as to the soil temperature, turtle internal temperature and turtle weight throughout the duration of the hibernation period. Records concerning the time intervals between the application of a heat source and increased turtle activity will also be kept. It is hoped that our findings will indicate that soil type and moisture content have a significant bearing on the time at which the box turtles emerge from hibernation.

9:30 PHYLOGEOGRAPHY OF THE FRECKLED PYTHON (LASSIS MACKLOTI) OF INDONESIA’S LESSER SUNDAS ARCHIPELAGO BASED ON MULTIPLE CHARACTER ANALYSES. Christopher K. Carmichael ccarnicae@malone.edu, MALONE COLLEGE, DEPT OF NATURAL SCIENCES, 537 SY NW, CAMBRIDGE, OH 43725, Brian K. Kreiser Brian Kreiser@usm.edu, UNIVERSITY OF SOUTHERN MISSISSIPPI and David G. Barker vpt@beecreek.net, VIDA PREPARED TREATMENT MATERIAL

Since Darwin’s time, insular populations have played an important role in our understanding of the nature of variation. Empirical studies of natural populations are benefited by a simplified population structure generally observed on islands with reduced or no migration between adjacent islands. These natural coincidences have allowed us into our understanding of the biological processes that influence patterns of geographic variation. Our main goal was to elucidate the genetic patterns of population structure and historical demography in a large predator, the freckled python (L. mackloti) of Indonesia, in order to gain a thorough understanding of the historic vicariant events that shaped the phylogeographic complexity of this species. Two phylogenetic approaches were taken: a morphological characters (using scale counts collected from three individuals originating from each of the five populations; N = 15) was also determined so that derived or ancestral characters could be mapped onto the phylogenetic character tree. Genetic variation patterns (e.g., presence or absence of male-male combat, courtship, ability to discriminate between intra and interpopulational pheromone trails) were observed (N = 30), statistically analyzed, and parsimoniously mapped onto the genetically- and morphologically-determined phylogenetic hypotheses. These characters were compared to see if there were significant between-data-set incongruencies prior to presenting a final and resolved phylogenetic hypothesis. Results indicate that morphological, behavioral, and genetic characters are congruent and yield three well-supported clades that provide substantial evidence for recognizing each clade as a new species.

9:45 THE EVOLUTIONARY RELATIONSHIPS OF CHARADRIIFORMES (SHOREBIRDS) BASED ON MULTIPLE OSTEOLOGICAL CHARACTERS. Eric J. Pilko ephilko@wooster.edu, 1189 BEALL AVE, COLLEGE OF WOOSTER, Box C-2500, WOOSTER OH 44691 and Gareth J. Dyke garth@wooster.edu, WOOSTER OH 44691

The placement of species into genera and families based on anatomical (including bone, muscle, and feather features) and molecular characters are well documented in the avian order Charadriiformes (shorebirds). However, the phylogenetic relationship among these families has not been clearly established. Traditionally, Charadriiformes have been divided into three suborders: Charadrii, Lari, and Alcae. In a 1997 phylogenetic analysis, Charadrii and Alcae were merged into a single clade. However, recent morphological characters were coded for 56 species (34 species) of birds spanning 15 families. The data were collected in June of 2002 using the ornithology collection at the American Museum of Natural History in New York. These data have been analyzed using the method of parsimony on the software program PAUP. Our results disagree with Strauch and support the more traditional breakdown of the Charadriiformes. However, instead of dividing Charadrii into three suborders, we subdivided it down into two: Lari (which includes Alcae) and Charadrii (which includes Scapulaci). In both cases, the included groups form a monophyletic subgroup of the larger suborder.

10:00 EFFECTS OF EASTERN WILD TURKEY (MELEAGRIS GALLOPAVO SILVESTRIS) SCRATCHES ON HARDWOOD REGENERATION IN TWO SOUTHEASTERN OHIO FORESTS. Zachary L. Rinker ZacharyRinker@hotmail.com and Brian C. McCarthy mccarthy@ohio.edu, DEPT OF ENVIRONMENTAL AND PLANT BIOLOGY, OHIO UNIVERSITY, ATHENS OH 45701

Scratches by the wild turkey have the ability to impact seed germination in the forest understory by removing the leaf litter layer. Litter may play a time important role in impedance, light availability, and water availability- all important factors for successful forest regeneration. The primary objective of this study was to aid foresters and wildlife managers by examining the impacts of turkey scratches may have on seed germination at two forests in southeastern Ohio (Raccoon Ecological Management Area (REMA) and Zaleski State Forest). These forests have heterogeneous forest floor conditions due to various management regimes (Burned, Thinned, Burned, Thinned, Unburned, and Undisturbed). Enclosures (N=8) were erected in each unit and contained a litter removal treatment (scratched) and control (non-scratched) plot. Seeds of Quercus alba, Q. velutina, and F. grandifolia, and Acer rubrum were planted in each plot. A 4-way ANOVA detected no significant (P > 0.30) difference in germination between sites or among silvicultural units, but a significant difference was found among treatments (P < 0.01) and a treatment x site interaction (P < 0.05). Q. alba, Q. velutina, and F. grandifolia had better germination success (P < 0.05) in the unscratched plots, while A. rubrum did not respond to the scratching treatment. The nut species may require a microenvironment with adequate litter to promote optimal germination.
10:15 NEST-SITE FIDELITY IN GRASSLAND NESTING SPARROWS ON A RECLAIMED MINE IN EAST-CENTRAL OHIO. DANNY J. INGOLD
INGOLD@MUSKINGUM.EDU, BIOLOGY DEPT., MUSKINGUM COLLEGE, NEW CONCORD, OH 43762, CHARLOTTE WORTHALL
CWORTHALL@MUSKINGUM.EDU, RICK YOST YOST@MUSKINGUM.EDU

One measure of the long-term usefulness of reclaimed stripmines for breeding grassland birds is the extent to which individuals return to previous nest sites during consecutive years. During May through July of 2000-2002, we set out to determine the extent to which three grassland sparrow species and bobolinks (Dolichonyx oryzivorus) return to nest on previous nest sites on a reclaimed stripmine (The Wilds). During each season, nests were captured in mist nets, fitted with a unique combination of plastic color bands and released. In 2001 and 2002 we searched our study plots for birds banded during previous years. Sixteen of 47 grasshopper sparrow populations (Ammodramus savannarum) (24%) were recaptured (or resighted) in subsequent years in the same 100 m x 200 m plot in which they were banded, while 9 of 41 savannah sparrows (Passerculus sandwichensis) (22%) were recaptured. Only 1 of 26 (3.9%) wasps's sparrow's (A. henslowii) and 2 of 7 (29%) bobolinks were recaptured in subsequent years. Significantly more male grasshopper sparrows returned versus females of this species (g = 5.36, df = 1, P < 0.05). The frequency with which birds returned to plots that had been mowed in April of each year did not differ from the return rate of birds to unmowed plots. Three of 48 birds banded in 2000 (6%) (2 grasshopper and 1 savannah sparrow) returned to the same plot in which they were banded for two consecutive years. These data suggest that grasshopper sparrow and savannah sparrows are strongly nest-site tenacious on this reclaimed mine. The data further suggest that these species are having some reproductive success on this artificially created grassland.

10:30 FACTORS INFLUENCING BIRD MORTALITY FROM AUTOMOBILES NEAR WOOSTER, OHIO. CRISKA K. COOBY, CCOOBY@WOOSTER.EDU, (MARILYN D. LOVELESS MLOVELESS@WOOSTER.EDU), COLLEGE OF WOOSTER, C-1311, 1189 BEALL AVE, WOOSTER OH 44691

Cars are lethal towards animals. Researchers found that raccoon population number estimates could be determined by the number of raccoon road casualties detected in a designated area (Rolley and Lehman, 1992). Jones (2000) determined whether introduced deer populations were in trouble due to road casualties. Bird road casualties were examined on roads surrounding Wooster, Ohio. Types of roads, road characteristics and bird migration trends were compared to see if they influenced bird road death. Road types and characteristics were predicted to influence bird death. Each week of the migration season was predicted to yield different numbers of bird deaths. The study took place between September and December of 2002. Four road types (interstates, main, less traveled and back roads) were examined. Three roads of each category were observed for a total of 12 roads. Once a week, each road was surveyed for ten miles. When a dead bird was found on the road, the species, age, (juvenile/adult), and gender (from plumage) were determined. Road characteristics such as speed limit, road width, shoulder width on both sides, lane (north, south, east, west) and road type were recorded. A significant difference was found between road type versus the total number of birds detected (ANOVA r2 = 0.038; P value = 0.954). Significant differences were found between the week of the migration season versus the number of birds detected (ANOVA r2 = 0.626; P value = 0.0029) and main roads (ANOVA r2 = 0.625; P value = 0.0029).

Insects and Environmental
02:00 PM, Saturday, April 5, 2003
Brewer/Frost Science 108
Prof Michael T. Hornshser-面白い

2:00 RESPONSE OF MALE HELICOVERPA ARMIGERA (LEPIDOPTERA: NOCTUIDAE) TO A FEMALE SEX PHEROMONE TRAP: POPULATION DENSITY ACTIVITY AND EFFECT OF WEATHER PARAMETERS ON THE TRAP CATCHES. LAKSHMAPATHI SRIKERIRAU, SRIKERIRAU@FINDLAY.EDU, UNIVERSITY OF FINDLAY, 1000 N MAIN ST, DEPT OF ENVIRONMENTAL MANAGEMENT, FINDLAY OH 45840-3695

Insect sex pheromones are routinely used to attract pests to a source and trap them for monitoring or pest control. This project was funded by the International Crops Research Institute for the Semi-Arid Tropics, Asia Region, (ICRISAT) during 1999-2000, on the male nocturnal moth, Helicoverpa armigera, to examine the trapping effectiveness of the "ICRISAT" female sex pheromone trap. Previous studies had only compared the yields from different trap designs, not the flight behavior of a male moth to a female pheromone source and how it impacts the efficiency of the trap. The objective of this study was to determine if the number of males that entered the trap per hour assumed a skewed distribution, with a steady increase through the night, recording a slight peak at around midnight (8.7% of the total moth catch; 5.7 x 1.3 moths) and a more prominent peak (56.2% of the total catch; 56.2 ± 3.9 moths). Numbers of 450 approached the traps about 1.5 times per minute and were trapped at a rate of 0.32 per minute. This trapping rate is considered low for reliable pest monitoring. Moth flight behavior near the pheromone source is known to be influenced by improvements to trap design. Near the pheromone source, flight oscillations increased, with short downwind exploratory movements, and well-defined zigzagging in a vertical plane took place before leaving the source and escaping in a gentle downwind climb. Meteorological factors such as fluctuations in temperature, relative humidity and wind velocity also appeared to impact trapping effectiveness, but were not varied enough to produce any marked activity thresholds.

2:15 THE DIVERSITY OF NATIVE BEE (APIOIDEA) COMMUNITIES IN THE ADIRONDACK MOUNTAINS IN BOGS AND IN RELATION TO ELEVATION AND SUCCESSION. DAVID A. POWELL, (LYN LOVELESS MLOVELESS@WOOSTER.EDU, COLLEGE OF WOOSTER, AND WILLIAM L. ROMLEY ROMLEY@MAIL.POTS DAM.EDU, SUNY-POTS DAM), COLLEGE OF WOOSTER, BOX C-2522 1189 BEALL AVE., WOOSTER OH 44691

Despite their significance as pollinators, native bee (non-honey bees) communities are known to be declining in abundance and diversity. A deeper knowledge of the baseline diversity and ecology of native bees would provide greater understanding of the role of bees in the development conservation methods. This project attempted to address this goal with three ecological studies on the diversity of bees in the Adirondack Mountains of New York State over the summer of 2002. Each site was monitored with three studies and each study was conducted in at least 2005. Sites were sampled at each site with a total of 3 nights and physical surveys of the sampling sites were conducted using meter quadrants at every sample site. Close to 1,000 individual bees were collected in all of these sites. The first study examined the relationship between elevation and bee communities. We hypothesized that elevation would have an inverse relationship with the diversity of bee communities. However, our results showed a peak in bee diversity at the mid-elevation (3500 ft.) of five elevations, each sampled seven times. A second study examined the diversity of bees in three bog stations in the Adirondack Mountains over five sampling days. A unique habitat, bog stations are home to a variety of flowering plants, such as blueberries, that may have specialized pollinators not found elsewhere in this area. We predicted the diversity of bee genera in bogs would vary from other study sites. The last study compares bee diversity between four logging sites, each representative of a separate stage of succession, sampled five times over the summer. We predicted that more open sites would support a higher diversity of native bees due to more abundant floral resources. All three of these studies should enhance the understanding of how habitats affect the diversity of bee communities.

2:30 ATTRACTION OF MULTICOLORED ASIAN LADY BEETLES, HARMONIA AXYRIDIS, TO EXTRAFLORAL NECTAR CYTOLIS OF MUNG BEANS. MARK E. HEADINGS, HEADINGS.1@OSU.EDU, ROGER N. WILLIAMS, WILLIAMS.44414@OSU.EDU, DEPARTMENT OF OHIO AGRICULTURAL RESEARCH AND DEVELOPMENT CENTER, 1328 DOVER RD, WOOSTER OH 44691 AND OSU OHIO AGRICULTURAL RESEARCH AND DEVELOPMENT CENTER, WOOSTER OH 44691

The multicolored Asian lady beetle, Harmonia axyridis, is a non-native beneficial insect in agriculture, which has become an increasingly widespread nuisance in the continental United States. It feeds extensively on aphids; however, the growing concern is the prevalence of this insect, sometimes in very large numbers during colder months of the year, in the homes of people. The objective of this study was to investigate the culture of mung beans under Ohio growing conditions and insecticides associated with the plant. Field research was conducted on six rows, 16.15 m in length, near Wooster, Ohio. The multicolored Asian lady beetle was one of the insect species commonly observed on mung beans, during late summer, 2002. Upon closer examination, these beetles were observed feeding on nectar from extrafloral nectaries located near the distal end of stems between pairs of flowers. A scanning electron microscope was used in preparing 33 photographs of the nectaries. Each nectary consisted of at least six openings in the nectar exudes. A flowering stem commonly has one to three nectaries on each of two sides of the stem; however, up to seven have been observed. Wasps, ants, and flies also frequently visited the nectaries. In summary, mung beans were found to have extrafloral nectaries which are attractive food sources for multicolored Asian lady beetles plus several other insects and arthropods. The importance of these nectaries for plant pollination and crop yields are warranted.
AUSTRIAN PINES, LEADING TO A TREND OF ALTERATIONS IN THE EXPRESSION OF DEFENSE RESPONSES IN THE AUSTRIAN PINE (PINUS NIGRA) - CONIFERS PLAY KEY ROLES IN ECOSYSTEM STRUCTURE AND FUNCTION IN THE TROPICS. HERITAGE INTACT, HERITAGE ALLOTTED - EXPERIMENTAL DESIGN, IN SITU EXPERIMENTATION, AND NATURE AS A LABORATORY. 3:30 A NEWLY DISCOVERED MUTUALISTIC ASSOCIATION BETWEEN A SPECIES OF TIMBROPODIID FLIES AND ITS BISPIDOMYCETE HOST. BRITT A. BUNYARD BRUNYARD@URSULINE.EDU, BIOLOGY DEPT, DAUBY SCIENCE CENTER, URSULINE COLLEGE, PEPPER PIPES OHIO 43222. THE family Platyepetidae (Insecta: Diptera) is a small family (23 genera and 215 species; 71 species from 18 genera are found in North America) of Neotropical flies. Although members of this family are poorly known, it is believed that all species are mycophagous. A recent investigation by the author has found a strong association between individuals of the species Platyscelis consobrina and members of the common macrofungus Basidiomycete genus Agaricus. Most species of Basidiomycetidae fungi that produce large basidiospores (mushrooms) serve as hosts for many families of Diptera with mycophagous species (Mycophilidae, Sclerididae, Drosophilidae, Chloropidae, Phoridae, Cecidomyiidae, Tipulidae, etc.). This does not seem to be the case for species in the genus Agaricus (e.g. A. campestris and A. arvensis). These species produce mushrooms in the spring and fall and are utilized almost exclusively by members of the Platyepetidae. When examined microscopically it was determined that the larvae of Platyepetidae feed on the lamellae (gills), including basidiospores, as well as other basidioles. Basidiospores are retained within the gut of developing larvae, through pupation, and into the adult flies. Rearing adult flies (n = 40) and wild flies (n = 22, caught during oviposition on Agaricus sp. basidiospores) passed basidiospores through their feces. P nămese basidiospores of Agaricus campestris and A. arvensis were viable and germinated on Sabaroud-dextrose agar. These findings support the hypothesis that P. consobrina serves as a mutualistic vector of Agaricus spores and would facilitate sexual reproduction in natural populations of this mushroom.

Aquatic Biology
09:00 AM, Saturday, April 5, 2003
Brewer/Frost Science 109
Dr. Gwynne Stoner Rife-Presing

9:00 MODELING THE "STATE OF THE LAKE" AS AN EDUCATIONAL TOOL. ROBERT A. KREBS R.KREBS@CSUOHIO.EDU, AND CAROL A. STEPIEN C.STEPHEN@CSUOHIO.EDU, DEPT OF BIOLOGICAL, GEOLOGICAL, AND ENVIRONMENTAL SCIENCES AND THE CENTER FOR ENVIRONMENTAL SCIENCE AND POLICY, CLEVELAND STATE UNIVERSITY, 2121 EUCLID AVE SI 219, CLEVELAND OH 44115. Thirty years ago Lake Erie was a symbol of disaster. Today the Lake remains an icon of how the environment and humanity can be reconciled. As government partners join across state and national borders. To understand how these changes have taken place, the Ohio Lake Erie Commission produced a State of the Lake Report in 1998 that assessed changes in the use of the lake, the perception of the lake, the value of the lake, the use of the lake, and the use of the lake. This index addressed broad areas of the state of Lake Erie, its Water Quality, Pollution Sources, and Ecological and Environmental Sciences, J. N. HUICKS AND J. D. PETTY, UNITED STATES GEOLOGICAL SERVICE, COLUMBIA ENVIRONMENTAL RESEARCH CENTER. Traditional monitoring techniques use grab samples to characterize chemical contamination in biota, sediment, and water. However, grab samples may inadequately detect contaminant pulses that may occur in ecosystem compartments and among samples, nor do they provide valuable data on the impact of chemical mixtures on biota (e.g. survival, growth, reproduction). In this study reported in 2000, simultaneous exposure of Semipermeable Membrane Devices (SPMDS) and the mussel D. polymorpha were used to examine time-integrated concentrations of chlorinated pesticides in a diked marsh and a bay area at Waukegan Point, Ohio. Mussel growth, lipid content, and survival were determined, along with sorption constants for simultaneously detected contaminants. Results in mussel growth and survival were associated with high total suspended solids loads and chlorinated contaminants in water at either site. Chlorinated pesticides were analyzed in the water, sediment, and in mussel tissue. SPMD-derived water concentrations and mussel tissue concentrations were used to calculate mussel sorption constants (K). Experimental K values ranged from 3.79 to 5.07. Average relative percent differences varied 14.5% from reference values. Survival and growth rates were lowest at the two sites closest to agricultural drainage, lipid levels suggest that mussel reproduction was impaired at sites with multiple levels of contaminants. These data represent an in-situ multiple chemical exposure assay. Results suggest that time-integrated monitoring with SPMDS and a bioassay provides more information about ecosystem status than chemical analysis from grab samples also evaluates the synergistic impact of chemical mixtures to mussels.
Habitat and Biology; the index also considered Coastal Recreation, Fishing, and Boating; beach quality; and the economic importance of the Lake to transportation and tourism. We produced an educational resource for high school and college students to teach real conflicts between humans and nature, and to help the public understand the full extent of our water quality). While still focusing on the sustainable preservation of Lake Erie. Furthermore, we provide a spreadsheet model that assesses how the 10 regional sites the State of the Lake report to the Ohio (e.g., ditches with bench; n=8), and (3) ditches without riparian ecosystems and without floodplain bench (e.g., ditches with bench; n=8), and (3) ditches without riparian ecosystems and without floodplain bench (e.g., control ditches; n=7). Macroinvertebrate communities in a transect of the Portage River watershed were assessed May 2000. We emphasized on identification and community structure of the macroinvertebrate biota resident in its smallest order streams and ditches. We used a 6-meter-wide multi-plate sampler were used at each site (e.g., in the Streamflow drainages, Hardie Creek and the South Branch of the Portage were the most diverse, while Bull Creek was the least diverse. The most common macroinvertebrates collected at 70% of the sites were: Caenidae, Stenonema femoratum, Lirceus lineatus, Physella integra. As predicted from the physical appearance of the majority of the sites, the Portage River watershed macroinvertebrate communities were both depauperate and trophically simplistic. Depressed and uncharacteristic communities were not evident in the headwaters. The improved state of the communities present in what is the most active time of the year for these species suggests that steps to increase the health and complexity of the habitat would offer greater natural services to the watershed and drainage.

9:15 NATURALLY OCCURRING LARGE WOOD REPLACEMENT IN KILLBUCK CREEK, OHIO, ONE YEAR AFTER LARGE WOOD REMOVAL. ARTHUR E. L. MORRIS
RIFE RIFE@FINDLAY.EDU, DWIGHT S. COUNTY, OH). The landscape
practices, nutrient
the headwaters
by forest and
pasture. Concentrations of
ammonium and total
were positively
correlated with residential
by croplands, and
negatively correlated with
the stream are positively
on water quality. Our
quality within the headwaters
order to determine
sites
impaired due to
Ohio, which are severely
as watershed-scale water
quality improvement
of a stream's
waterways of the
region, and shows how different perspectives can
decisions of
how Lake Erie and its surrounding
watersheds can best be improved.

9:30 LANDSCAPE CHARACTERISTICS AND THEIR INFLUENCE ON WATER QUALITY IN THE HEADWATERS OF A NORTHEAST OHIO WATERSHED. KATHRYN L. HOLMES2,3, HOLMES.203@OSU.EDU, P. CHARLES GOEBEL GOEBEL.11@OSU.EDU, DEAN HUMPHREY, DAVE MCCARTNEY5, OARDC, OHIO STATE UNIVERSITY, SCHOOL OF NATURAL RESOURCES AND AGROECOSYSTEMS MANAGEMENT GROUP, 1680 MADISON AVE, WOOSTER OH 44691. Water quality to be a leading environmental concern for waterways of the United States, especially those flowing through agricultural landscapes. As watershed-scale water quality improvement plans emerge, healthy headwater systems are critical because they represent a high proportion of a stream's drainage network and have the ability to retain the majority of pollutants received. One such area is the headwaters of the Sugar Creek watershed in Wayne County, Ohio, which are severely impaired due to nutrient loading, sedimentation, and riparian habitat loss. Nutrient and sediment levels were sampled bimonthly at 21 sites throughout the headwaters watershed for one year. In order to determine and remediate possible sources of impairment, landscape characteristics including hydrologic, geomorphic, soils, and land use were analyzed to determine their influence on water quality within the headwaters of the Sugar Creek. Specifically, we used multivariate analyses (e.g., redundancy analyses) to assess the importance of each of these biophysical and social factors on water quality. Our preliminary results suggest that nitrate levels in the stream are closely correlated with the proportion of the watershed dominated by croplands, and negatively correlated with the proportion dominated by forest and pasture. Concentrations of ammonium and total solids were positively correlated with residential areas. The effects of riparian buffers would be the most important to the headwaters where best management practices, nutrient management plans, and habitat restoration will be most beneficial within the watershed.

9:45 AQUATIC MACROINVERTEBRATE COMMUNITIES OF THE PORTAGE RIVER WATERSHED (WOOS). JEFF D. VIYENGAR@WOOSTER.EDU, CHARLES L. HOLMES, KRISHNA VADREVU, COLLEGE OF WOOSTER, DEPT OF BIOLOGY, 1189 BEALL AVE, WOOSTER OH 44691. Invertebrate sampling has proved to be an effective, reliable, and practical form of monitoring and assessment of health of various aquatic environments—the invertebrates of an aquatic environment have been described as the "ecological memory" of the habitat. The objective of this study was to determine the relationship between in-stream and riparian habitat structure and biological diversity (i.e., aquatic macroinvertebrates, amphibians and plants) in headwater agricultural ditches in Northwest Ohio. Our hypothesis was that the reestablishment of floodplain connectivity and riparian habitat would increase biodiversity in ditches. To test our hypothesis, we sampled macroinvertebrates, amphibian and plant communities in three types of ditch reaches: (1) ditches with riparian ecosystem (e.g., ditches with tree; n=8), (2) ditches without riparian ecosystems but with a low narrow floodplain bench (e.g., ditches with bench; n=8), and (3) ditches without riparian ecosystems and without floodplain bench (e.g., control ditches; n=7). Macroinvertebrate richness and diversity did not differ significantly among the three types of ditches. However, the ditches with bench had the highest average richness (23.3 species) and a Shannon diversity index of 1.47 while the ditches with tree had the lowest richness (6.8 species) and a Shannon diversity index of 1.40. We suspect that ecosystem productivity is lower in ditches with riparian zone, as in-stream autotrophs are much less abundant due to shading by the tree canopy. We have found substrate quality to be positively correlated with macroinvertebrate richness.

10:00 LINK BETWEEN GEOMORPHOLOGY AND AQUATIC BIODIVERSITY IN HEADWATER AGRICULTURAL DITCHES IN OHIO. VIRGINIE BOUCHARD BBOUCHARD@OSU.EDU, OARDC, OHIO STATE UNIVERSITY, SCHOOL OF NATURAL RESOURCES, 2011 COFFEE RD, COLUMBUS OH 43210. Agricultural ditches are designed to maximize drainage through straightening, dredging and clearing of riparian vegetation. As a consequence aquatic habitat is destroyed, streams are disconnected from their floodplains, and flow patterns are altered. However, in absence of maintenance of geomorphology the geomorphology of ditches changes over time with the establishment of a low bench structure and the development of riparian ecosystems. The objective of our research was to determine the relationship between in-stream and riparian habitat structure and biological diversity (i.e., aquatic macroinvertebrates, amphibians and plants) in headwater agricultural ditches in Northwest Ohio. Our hypothesis was that the reestablishment of floodplain connectivity and riparian habitat would increase biodiversity in ditches. To test our hypothesis, we sampled macroinvertebrates, amphibian and plant communities in three types of ditch reaches: (1) ditches with riparian ecosystem (e.g., ditches with tree; n=8), (2) ditches without riparian ecosystems but with a low narrow floodplain bench (e.g., ditches with bench; n=8), and (3) ditches without riparian ecosystems and without floodplain bench (e.g., control ditches; n=7). Macroinvertebrate richness and diversity did not differ significantly among the three types of ditches. However, the ditches with bench had the highest average richness (23.3 species) and a Shannon diversity index of 1.47 while the ditches with tree had the lowest richness (6.8 species) and a Shannon diversity index of 1.40. We suspect that ecosystem productivity is lower in ditches with riparian zone, as in-stream autotrophs are much less abundant due to shading by the tree canopy. We have found substrate quality to be positively correlated with macroinvertebrate richness.

10:15 INFLUENCE OF LAND USE ON STREAM HEALTH USING INVERTEBRATES AS BIOINDICATORS: A FOCUS ON BASS LAKE BASIN, GEAUGA CO., OHIO. LEIGH HUTCHISON LHUTCHISON@WOOSTER.EDU, (VIKRAM IVENGAR IVIYENGAR@WOOSTER.EDU), COLLEGE OF WOOSTER, DEPT OF BIOLOGY, 1189 BEALL AVE, WOOSTER OH 44691. Invertebrate sampling has proved to be an effective, reliable, and practical form of monitoring and assessment of health of various aquatic environments—the invertebrates of an aquatic environment have been described as the "ecological memory" of the habitat. The objective of this study was to determine the health of seven streams managed by the Geauga Park District with a specific focus on the Chagrin River watershed and the Bass Lake Basin in Ashtabula County, Ohio, using aquatic macroinvertebrate as indicators of stream health. The hypothesis that streams located near disturbed land, though industry, residential development, and other anthropogenic factors, existed, no stream health that was located in a relatively low (e.g., in an area with little urban or agricultural development) was assessed using Geographic Information System. Stream health and the extent of organic pollution were quantified through water quality testing or a variety of parameters and through the benchmark biotic oïdix. Sampling was conducted on at least four streams associated with the Bass Lake Basin (Chagrin River watershed), an additional stream in the Chagrin River watershed, and three streams in the Bass Lake River watershed. Stream sampling was not associated with Bass Lake. Each stream was sampled at three selected riffle sites using a D-shaped aquatic net to collect debris and
invertebrates disturbed by prescribed kicking and scrubbing. Chemical parameters including dissolved oxygen, pH, hardness, nitrates, phosphates, and total dissolved solids were taken for each stream. Variations in land use and the implications of these on productivity, species assemblages, and water quality will be determined.

10:30 EFFECT OF RIPARIAN FOREST FRAGMENTATION ALONG DITCHES ON RICHNESS AND BIODIVERSITY OF TERRESTRIAL INSECTS. AARON R. FRIEND

Species richness and diversity are two key concepts often used in assessing ecological integrity. Intensive agricultural practices generally create homogeneous landscapes and severely reduce biodiversity. The goal of this study was to examine the effect of fragments of the forested riparian ecosystems on terrestrial invertebrate diversity and richness located within and along Wood County Ohio. We hypothesized that invertebrate diversity will be significantly correlated to the quantity and quality of the riparian systems. We also hypothesized that the diversity and richness of terrestrial invertebrates will be higher along segments of ditches that did not have riparian zones. Forested and non-forested habitats located within the riparian zones of agricultural ditches were sampled using pitfall traps, made of two liter soda bottles. Five forested and five non-forested sites were sampled with three pitfall traps placed evenly within each riparian zone site. The traps were open for one week from early July to early October 2002. The traps were collected once a week for analysis and identification of the insects with field guides and identification books. Diversity was calculated using the Shannon diversity index. Data from the forested sites were compared to those from the non-forested sites. Invertebrate diversity in the forested riparian sites was plotted against riparian zone area. Examining the species richness and biodiversity of riparian zones located along ditches in agricultural landscapes allowed us to determine the potential for diversity in such stressed ecological environments.

10:45 ANALYSIS OF DIATOM COMMUNITIES IN AN ACID MINE DRAINAGE IMPACTED SUBWATERSHED. ROBERT G. VERB1 VERB@ONI.EDU, MORGAN L. VIE2, AND BEN J. STUART3.

Acid mine drainage (AMD) impacts numerous streams worldwide. During June of 2000, 18 stream segments located within the Black Fork subwatershed in southeastern Ohio, USA were sampled for diatom flora and critical environmental parameters. This area has a prolific history of coal mining and many of the region’s lotic systems are inundated with acid mine drainage. In this region, many of the abandoned mines have been reclaimed using various techniques. The goal of this study was to determine if AMD could provide evidence of the progress and effectiveness of reclamation activities with respect to biotic integrity of aquatic systems. Through the cross-referencing of various exploratory techniques (i.e., canonical correspondence analysis) three distinct groupings of sites were depicted, each containing similar relative abundances of important diatom taxa. Group I sites were heavily impacted by AMD (low in pH and calcium) and were dominated by Eunotia exigua. Group II sites were impacted by AMD (intermediate reclamation success) and had diatom assemblages of Achnanthidium minutissimum, and Brachysira vitrea. The third group of sites contained relatively unimpacted headwater regions in the subwatershed with diatom assemblages dominated by A. minutissimum. The diatom assemblages were useful in identifying certain sites that, prior to this study, were thought to be major contributors of AMD, but yielded taxa characteristic of intermediate conditions, suggesting that these sites fluctuate in water chemistry throughout the year. The unique diatom assemblages in these intermediate, oscillating streams (Group II) pinpointed cryptic pollution sources with a greater degree of accuracy than environmental parameters alone.

Floristics and Invasive Species

02:00 PM, Saturday, April 5, 2003
Brewer/Frost Science 109
Dr. Brian C. McCarthy-Presiding

2:00 VASCULAR FLORISTIC ANALYSIS, DOCUMENTATION AND SURVEY OF SALT FORK STATE PARK AT DEEP WOODS, HOCKING COUNTY, OHIO. S. L. LARSON, DANNY J. INGOLD.

The Division of Parks and Recreation of the Ohio Dept of Natural Resources currently manages 74 state parks consisting of over 82,554 hectares. Salt Fork State Park, located in Guernsey County, is the largest of these parks and the closest to the Appalachian Continental divide in Ohio. In December 2002, the Ohio Biological Survey, in cooperation with the Division of Parks and Recreation, began a study of the vascular plant diversity located within this park. The purpose of this continuing study is to thoroughly document the vascular plant diversity located within the park. In addition, complete habitat classification throughout the park will ultimately lead to a better understanding of species occurrence within these areas. From, August 1998 to January 2003, this author identified 82 families, 103 genera, and 258 species of vascular plants within the park. In total, of the 92 species documented thus far, eight comprise new records for Guernsey County. The park has also yielded a healthy population of the state listed, potentially threatened Green-flowered Milkweed, Asclepias viridiflora. As a result, this study, for species characterization, has identified that it may have also crossed the divide via the Ohio canals. Published reports and museum specimens (including Cleveland Museum specimens collected from the Walhonding Canal in the 1950s) indicate thriving and/or diverse mussel communities in parts of the canal complex. The mussel Pyganodon grandis was reported from the Ohio & Erie Canal by early and recent workers despite its highest glochidia release in winter, when canals were plagued with ice. This mussel is spread partly by yellow perch (Perca flavescens), which Jared Kirtland thought was spread via the canals by the English. Kirtland suggests that it may have also crossed the divide via the Ohio canals. The canal system provided habitat and dispersal routes for these and other aquatic and semiaquatic organisms preadapted for conditions in and along the canals.
The relationship between its distribution and woodlot characteristics of L. maackii in invasion in southwest Ohio. During the first year, 12 woodlots were sampled using the point quarter method to estimate overall density, importance values of shrubs, and seedling survival. The study was performed in 2002 at the University of Cincinnati. American chestnut (Castanea dentata) was virtually extirpated as a dominant tree species throughout the Appalachian region due to chestnut blight (Cryphonectria parasitica). Unfortunately, a small number of disjunct chestnut populations escaped infection throughout the Midwest and were described as the “River Edge Chestnut” (C. p. acuminata). This occurrence provides considerable hope for restoration ecologists considering the reintroduction of chestnut into oak-hickory forest ecosystems. This study examines the regeneration ecology of chestnut, specifically the responses of seedling survival and edaphic conditions. The study was performed in 2002 at the Wayne National Forest (WNF). In total, 10 forest stands were randomly sampled in each plot. In addition, hemispherical canopy photos were taken to describe the microenvironment and regeneration conditions. A total of 27 species were found in the overstory. The total basal area of the stand was 35 m², with chestnut contributing 9%. Chestnut was colonized by the invasive species Lonicera maackii in this oak-hickory forest. This occurrence provides considerable hope for restoration ecologists considering the reintroduction of chestnut into oak forest ecosystems, as disease resistant varieties become available.

### 3:00 DISTRIBUTION PATTERNS IN THE ABUNDANCE OF WILD HERBS IN A CHESTNUT-DOMINATED HARDWOOD FOREST IN SOUTHWESTERN OHIO, USA

Mathew A. Albrect, Department of Biological Sciences, University of Cincinnati, Cincinnati, OH 45221. Numerous forest herbs are indiscriminately harvested from National Forests and sold in the profitable herb market. As demand and economic value of wild harvested herbs increases, land managers urgently need baseline ecological data to formulate management policies. We used a strip transect sampling scheme to estimate the abundance and distribution of the seven most popular wild harvested herbs in the Wayne National Forest (WNF). In total, ten forest stands were randomly surveyed with four 1000 m² transects that traversed a variety of slope positions as described in the forest type. The most abundant and frequently encountered herb was (G = 30.7: G(1) < 0.001), with 58% of the transects containing at least one ramet. The distribution of black cohosh varied in a complex manner, with north and west facing mid-slopes having the greatest abundance. We encountered only 33 Virginia snakeroot (Panax quinquefolius) ramets and 45 ginseng (Panax quinquefolius L.) ramets in the entire study. (G = 4.4: G(1) < 0.001) in abundance of herbs. However, forest stand variety, classified as “special areas” by the WNF, did not harbor more medicinal herbs than forest stands with this distinct distinction (nested ANOVA, G > 0.05). No difference in herb density was found between different forest types (F = 1.61; P = 0.16). The overall patchy distribution and infrequent encounter rate impedes the effective management of these valuable non-timber forest resources.

### 3:15 COMPOSITION, STRUCTURE, AND DIVERSITY OF A CHESTNUT-DOMINATED HARDWOOD FOREST IN SOUTHWESTERN OHIO, USA

Brian C. McCarthy, Department of Environmental and Plant Biology, University of Cincinnati, Cincinnati, OH 45221. American chestnut (Castanea dentata) was virtually extirpated as a dominant tree species throughout the Appalachian region due to chestnut blight (Cryphonectria parasitica). Unfortunately, a small number of disjunct chestnut populations escaped infection throughout the Midwest and were described as the “River Edge Chestnut” (C. p. acuminata). This occurrence provides considerable hope for restoration ecologists considering the reintroduction of chestnut into oak-hickory forest ecosystems. This study examines the regeneration ecology of chestnut, specifically the responses of seedling survival and edaphic conditions. The study was performed in 2002 at the Wayne National Forest (WNF). In total, 10 forest stands were randomly sampled in each plot. In addition, hemispherical canopy photos were taken to describe the microenvironment and regeneration conditions. A total of 27 species were found in the overstory. The total basal area of the stand was 35 m², with chestnut contributing 9%. Chestnut was colonized by the invasive species Lonicera maackii in this oak-hickory forest. This occurrence provides considerable hope for restoration ecologists considering the reintroduction of chestnut into oak forest ecosystems, as disease resistant varieties become available.

### 3:30 GROWTH OF A NONINDIGENOUS SHRUB, AMUR HONEYSUCKLE (LONICERA MAACKII), UNDER VARYING LIGHT, WATER, AND SOIL CONDITIONS

Kurt C. Hartman, University of Cincinnati, Cincinnati, OH 45221. Lonicera maackii is an exotic invasive shrub that has colonized many regions of the eastern U.S. This shrub is able to invade a habitat by suppressing recruitment of native species, yet L. maackii does not equally invade all habitat types. The goal of this experiment was to evaluate its performance under a number of conditions to better understand its potential growth. We used a fully-crossed factorial design with light (10%, 50%, 100% full light), water availability (soil brought to 50% and 100% full water capacity biweekly), and soil type (from glaciated and unglaciated Ohio) as main effects. MANOVA results found soil type to be nonsignificant in predicting growth responses, which indicates equal invasive ability in both glaciated and unglaciated soils. Light, water, and light x water treatments were significant. ANOVAs indicated that seedling growth parameters were greatest for all measured variables (except root-shoot ratio and leaf dry matter content) in the high light treatments (either 50 or 100% full light), followed by the 100% water capacity soil treatment. A negative correlation was found between overall growth and root-shoot ratio suggesting that allocation to aboveground biomass, rather than below, occurs when growth conditions are favorable. The least amount of growth occurred in low light-low water conditions; however, no seedling mortality occurred allowingescape of L. maackii to persist until conditions improve. Because L. maackii had the best seedling performance in bright, moist conditions, habitat types with these characteristics should be monitored most closely for future invasion.

### 3:45 THE EFFECTS OF MULCH TYPE AND DEPTH ON EDAPICH CONDITIIONS AND TREE SEEDLING SURVIVAL ON A CLOSED OHIO LANDFILL

Eric R. Athyer, University of Cincinnati, Cincinnati, OH 45221. Restoration of degraded lands, including brownfields and closed landfills, is increasing in demand. However, many restoration attempts fail due to poor soil conditions (e.g., compacted, low in nutrients and organic matter). Dry, infertile soils that characterize many restoration sites frequently plague agricultural fields as well. Current agricultural strategies and management focus on multifaceted treatments that control weeds, restore soil properties, restore moisture potential, and increase plant growth. Employing similar practices on landfills with similar soil limitations may help to develop new planting strategies for future restoration projects. This study evaluated the effects of mulch type and depth on seedling survival and edaphic conditions. The study was performed in 2002 at Center Hill Landfill, Cincinnati, OH where five species of tree seedlings (Fraxinus pennsylvanica, Picea rubens, Acer saccharum, Quercus macrocarpa, Populus spp.) were planted in a clustered arrangement on each of 35 replicate plots, including non-mulched controls. Three types of mulch (hardwood, leaf, and mixed) were distributed in three depths (0, 5, 15 cm). Gravimetric soil moisture and temperature were taken each month during the growing season. Seedling survival varied by species from Fraxinus (97%) to Prunus (13%). Seeding survival was lowest (50%) in control treatments and highest (64%) in 15 cm hardwood mulch plots. Preliminary analysis suggests that mulch type and depth had the greatest impact on seedling survival. Due to the variability in the species, the effects of mulch type and depth on seedling survival were examined using a two-way ANOVA. Future studies may help to guide future terrestrial restoration projects.

**Plant Biology**

09:00 AM, Saturday, April 5, 2003

Brewer/Frost Science 142

Dr. Sarah E. Wyatt-Presiding

9:00 GENETIC DIVERSITY OF ATRIPLEX PROSTRA In AN INLAND SALT MARSH OVER TIME. Christy T. Carter cr346390@ohio.edu and Irwin A. Ungar uanger@muohio.edu, Department of Biological Sciences, University of Cincinnati, Cincinnati, OH 45221. Atriplex prostrata, a halophytic plant that is widespread in salt marshes in the midwestern United States and Europe, has a central role in understanding the restoration of salt marshes. This information, coupled with additional studies, may help to guide future terrestrial restoration projects.
Many studies have compared genetic variation among populations and between seed banks and aboveground vegetation for a given species. None have assessed changes in genetic diversity for a population over time. Our goal in this investigation was to examine temporal changes in genetic diversity in a natural population of Atriplex prostrata, a species found in an inland salt marsh in Rittman, Ohio, by comparing current aboveground diversity with the seed bank and a cohort propagated from wild seeds collected from the marsh. A total of 90 samples (30 samples for 3 sets of tissue) were extracted for genomic DNA. Inter-simple sequence repeat (ISSR) markers were amplified using PCR and then scored as present or absent using Quantity One v. 4.3 software. The Jaccard coefficient was calculated in Numerical Taxonomy and Multivariate Analysis System (NTSYS) to produce a similarity matrix from the raw data which was subjected to a Principle Coordinate Analysis (PCO). An Analysis of Molecular Variance (AMOVA) was performed to determine variance within and among the three sampling levels indicating that diversity of Atriplex prostrata, even though it can reproduce autogamously, has been maintained over a 20 y period.

9:15 LIGHT AND INDUCTION OF SECONDARY GROWTH IN ARABIDOPSIS. JESSICA STERLING, JESSICA STERLING, 38242399@OHIO.EDU, SARAH BASHORE, SARAH E. WYATT, DEPT OF ENVIRONMENTAL AND PLANT BIOLOGY, OHIO UNIVERSITY, ATHENS OH 45701
Light is a fundamental stimulus governing plant growth and development. It can control everything from seed germination to flower induction. One function of light that has been less explored is its role in affecting the growth of shoots or roots in darkness. Genetic studies on secondary growth have been very difficult and limited by the long generation time and large genome size of forest trees. Through the modification of growth conditions of Arabidopsis, we have shown that inflorescence stems can attain secondary growth. When these inflorescences were allowed to develop in white light for eight days, a greater amount of secondary growth was seen as compared to those placed in total darkness. To determine which wavelengths of light affected the inflorescences, a complete range of light might be responsible for this effect, sixteen Arabidopsis plants were grown under short day conditions to enhance rosette size. After the rosettes were large enough to support considerable secondary growth, inflorescences were grown to the first node and then allowed to continue development for eight days under either blue light or red light. Stems were then fixed, embedded in paraffin and sectioned for microscopic observation. Secondary growth was significantly increased in the inflorescences of stems grown under red light. Secondary growth was assessed measuring the width of the middle of the secondary xylem and the total area of the crossection indicating that red light, and therefore phytochrome, may be a major factor in the initiation of secondary growth.

9:30 ASSESSMENT OF VIBRATIONAL STIMULUS ON THE SENSITIVITY OF THE GRAVITY RECEIVER IN ROOTS OF ARABIDOPSIS THALIANA (COLUMBIA) AND STARCH-DEFICIENT MUTANTS. MIRANDA N. SHAW M- SHAW@ONU.EDU, JASON LESKOFF J-LESKOFF@ONU.EDU, SARAH E. WYATT WYATTS@OHIO.EDU, DEPT OF ENVIRONMENTAL AND PLANT BIOLOGY, OHIO UNIVERSITY, ATHENS OH 45701
The gravity persistent signal (GPS) is a three-stage process: gravity perception in the cap via a starch-starch-like graviprimer; signal transduction resulting in the modification of basipetal auxin flux patterns; and downward curvature due to differential growth rates. Gravitropic curvature of Arabidopsis roots is affected in gravistimulation or loss of apical dominance. However, tension wood causes sawn timber to split, shrink or collapse. The study of the genetic mechanisms underlying tension wood formation has been greatly limited by the long generation time of forest trees. Our goal is to establish Arabidopsis thaliana as a model for the study of tension wood formation. Although not normally thought of as a woody plant, we propose the Arabidopsis does form secondary xylem. By reducing plant density and clamping inflorescence stems, we were able to delay senescence of the rosette, increase rosette size, and increase the production of secondary xylem. Initially, 50 plants were grown under these conditions. 25 plants were then gravitropically tilted by 15° to induce tension wood formation and 25 were left vertical to serve as a control. Microscopic examination of the tissue from the gravitropically induced plants showed an unusual xylem zone, with highly dilated of the cortex, and the typical blue-green (as stained by Alcian blue) gelatinous fibers characteristic of tension wood. Establishment of methodologies to use Arabidopsis as a model for tension wood formation will enable the use of the vast, detailed knowledge of Arabidopsis genetics and genomics to the advanced study of tension wood.

10:00 Break

10:15 ESTABLISHING ARABIDOPSIS AS A MODEL FOR TENSION WOOD FORMATION. SARAH E. WYATT WYATTS@OHIO.EDU, DEPT OF ENVIRONMENTAL AND PLANT BIOLOGY, OHIO UNIVERSITY, ATHENS OH 45701
Trees and herbaceous plants continuously respond to their environment to maintain appropriate stem growth and regulate optimal branch orientation. Tension wood is formed by woody dicotyledons to generate the force necessary for reorientation of branches and stems following gravitational or loss of apical dominance. However, darkness causes sawn timber to split, shrink or collapse. The study of the genetic mechanisms underlying tension wood formation has been greatly limited by the long generation time of forest trees. Our goal is to establish Arabidopsis thaliana as a model for the study of tension wood formation. Although not normally thought of as a woody plant, we propose Arabidopsis does form secondary xylem. By reducing plant density and clamping inflorescence stems, we were able to delay senescence of the rosette, increase rosette size, and increase the production of secondary xylem. Initially, 50 plants were grown under these conditions. 25 plants were then gravitropically tilted by 15° to induce tension wood formation and 25 were left vertical to serve as a control. Microscopic examination of the tissue from the gravitropically induced plants showed an unusual xylem zone, with highly dilated of the cortex, and the typical blue-green (as stained by Alcian blue) gelatinous fibers characteristic of tension wood. Establishment of methodologies to use Arabidopsis as a model for tension wood formation will enable the use of the vast, detailed knowledge of Arabidopsis genetics and genomics to the advanced study of tension wood.

10:30 THE GRAVITY PERSISTENT SIGNAL (GPS) MUTANTS OF ARABIDOPSIS: THE SEARCH FOR A GENE. MATTHEW J. SHIPP M_SHIPP22@yahoo.com and SARAH E. WYATT, DEPT OF ENVIRONMENTAL AND PLANT BIOLOGY, OHIO UNIVERSITY, ATHENS OH 45701
Gravity is a fundamental factor governing plant growth and development. Although much is known about how plants are affected by gravity. Little is known about the components of signal transduction pathway that link these events. In hope of identifying genes involved in the signal transduction events, we used a cold treatment to isolate three recessive mutants and have identified three recessive mutants from a T-DNA tagged population of Arabidopsis. gps1-1 did not bend in response to the 4°C gravity stimulus upon return to room temperature. gps2-1 responded to the 4°C stimulus but bent in the opposite direction. gps3-1 over-responded to geotropism at room temperature, continuing to bend to an angle greater than wild-type plants. Characterization of several growth parameters indicates that the gps mutants are normal in all respects except for their response to gravistimulation at 4°C. In addition, at 4°C amyloplasts sedimented normally in the gps mutants, indicating that the GPS loci affect an aspect of the gravity signal perception/transduction pathway that occurs after amyloplast sedimentation (perception). With the initial characterization complete, work has shifted to identification of the GPS genes. This is being accomplished through polymerase chain reaction (PCR) techniques and the T-DNA region on the genome where the GPS genes are located. Partially supported by the Program to Aid Career Enhancement, Ohio University, and the United States Dept of Agriculture.
MYCORRHIZAL COLONIZATION OF AMERICAN CHESTNUT TREES FROM EXPOSED TO PRESCRIBED FIRE AND/or OVERSTORY THINNING.

CAROLYN J. MCMULLEN1, ccmcmullene@fs.fed.us, CORINNE McCARTHY2, mccarthycc@osu.edu, AND BRIAN C. MCCARTHY2, mccarthycc@osu.edu

1OHIO STATE UNIVERSITY, DEPT OF PLANT AND ENVIRONMENTAL PATRIOT, CONTOURS, 359 MAIN RD, DELAWARE OH 43015, AND 2OHIO UNIVERSITY

The potential for establishment of blight-resistant American chestnut (Castanea dentata) in Ohio forests has led to renewed interest in chestnut seedling growth and survival. Mycorrhizal fungal colonization of roots, which usually results in increased nutrient uptake, may improve seedling survival on disturbed forest sites. In May 2002, 400 chestnut seedlings were planted in Vinton County, Ohio sites: undisturbed site, control (C); overstory thinned by 29% (T); forest floor exposed to a prescribed burn in spring 2001 (B); combination of burn plus thinned (B+T). The study objectives were to describe mycorrhizal root morphotype and determine percent colonization of seedling roots after one growing season. In October 2002, three representative lateral roots from each of three seedlings per treatment were chemically preserved. All short roots on each lateral root were examined for mycorrhizal colonization. Root tips were subsequently embedded in epoxy resin and sectioned to verify mycorrhizal root structure. Chestnut roots from each treatment were ectomycorrhizal, with defined hyphal mantle and Hartig net development. Percent colonization of short roots varied by treatment: C, 36%; T, 53%; B, 71%; B+T, 78% (p = 0.10). Greater mycorrhizal colonization was associated with differences in microbial communities related to micro-site changes such as increased light levels (T), altered soil temperatures, moisture or nutrient levels (B), or some combination (T+B). Additional root collections are planned over the next several years to determine longer term effects of treatments on mycorrhizal associations.

Plant Ecology
02:00 PM, Saturday, April 5, 2003
Brewer/Frost Science 142
Dr. Candace A. Lowell-Presiding

2:00 VARIATION IN FLOWERING PHENOLOGY CHARACTERISTICS IN THE NORTH AMERICAN DANDELION (TARAXACUM OFFICINALE) (ASTERACEAE). Matthew H. Collier1, mcollier@wittenberg.edu, and STEVEN H. ROGDESTAD2, rogestad@email.jcu.edu, Wittenberg University, DEPT OF BIOLOGY, PO BOX 720, SPRINGFIELD OH 45501-0720 AND 1UNIVERSITY OF CINCINNATI

The variation in flowering phenology is an important characteristic of many plant species. The North American dandelion (Taraxacum officinale) (Asteraceae) is a well-studied species due to its unique characteristics under a constant set of environmental conditions. To test this hypothesis, plants representing nine different dandelion clones (identified by DNA fingerprinting) were grown under identical conditions in a growth chamber for a period of eight months, with chamber settings similar to environmental conditions at peak dandelion flowering time for their population sites. Five flowering phenology parameters were monitored daily for a total of 301 buds developing during this time: 1) time to bud; 2) time to inflorescence (i.e., anthesis); 3) time to re-closure of inflorescence; 4) time to fruit (full opening of the inflorescence); and 5) total flowering time. Significant differences in mean time to inflorescence, mean time to re-closure, mean time to fruit, and mean total flowering time were revealed among some genotypes that have different responses to uniform environmental conditions. Significant differences may have potential fitness effects. Further research is needed to determine if such floral differences are observed under a broader range of environmental conditions.

2:15 RESPONSE OF ACORUS CALAMUS L. LAYER GROWTH TO SHADE AND NUTRIENT TREATMENTS. ASWINI PAI, ap345389@ohio.edu AND BRIAN C. MCCARTHY, DEPT OF PLANT AND ENVIRONMENTAL BIOLOGY, OHIO UNIVERSITY, ATHENS OH 45701

Acorus calamus L. (Acoraceae) is an emergent macrophyte found along vernal water bodies in unglaciated Ohio. It has economic potential as a source of medicine for stomach ailments and is also considered useful for wetland restoration. Shoots of the plant consist of long shoots with equitant leaf bases arising from a geophytic rhizome. We investigated optimal growth parameters of A. calamus rhizome with respect to nutrient and shade. We planted rhizomes of A. calamus that were 5 cm in length in 15 cm aquatic pot containers and subjected them to three shade (50% shade and full sun) and nutrient levels (0.225 g m⁻² N and 0.75 mg ml⁻¹ N) applied semi weekly. Non-rooted leaves, total buds were preserved at the end of ninety days. Analysis of variance indicated that there was no significant difference (F = 0.21, p < 0.05) in number of buds among those shade treatments. There was no difference (F = 22.01, p < 0.001) to nutrient treatments. Total number of leaves varied significantly among light (F = 14.47, p < 0.0001) and nutrient (F = 23.07, p < 0.0001) treatments. Total leaf area varied significantly both among light (F = 17.57, p < 0.0001) and nutrient (F = 28.78, p < 0.0001) treatments. There were no significant interactions among treatments for any of the measured growth responses. Results suggest that both shade and nutrient availability may be limiting factors for optimal growth of the plant.

2:30 EFFECTS OF A COAL-BURNING POWER PLANT ON A POPULATION OF ACER SACCHARINUM TREES IN CENTRAL OHIO. J. S. BYRON RHOJACK1, (ALAN STAM astam1@capital.edu), CAPITAL UNIVERSITY, 2199 E MAIN ST, COLUMBUS OH 43219

Coal-fired power plants are the major source of electrical power generation in the United States. Coal combustion produces air pollutants, including sulfur dioxide, which in heavy concentrations are known to inhibit the growth of trees. In 1980 the AEP Picaway power plant in Central Ohio shut down its short, roof-mounted smokestacks and began directing all emissions through an 88-meter stack. The assumption was made that the amount of pollutants reaching Acer saccharinum (silver maple) trees within 3.5 km of the plant was then reduced. This study was an attempt to discover if these theoretically reduced pollutant levels had a positive effect on the growth of silver maple trees 1.5 to 3.5 km from the plant. Percent increment growth for the years 1966-2001 was calculated. A. saccharinum is an important species in Ohio with its vivid red fall coloration and the ring boundaries of the trees are easily hard to determine. A combination of laser light diffusion and chemical treatment (5% phloroglucinol and 6 M HCl treatment) was used to highlight ring boundaries for easier measurement. The mean annual growth for the population before 1980 (95% CI, 5.69 ± 0.55 mm) was compared to the mean annual growth of the population after 1980 (95% CI, 5.82 ± 0.32 mm), and no statistical difference was found between the two means (p = 0.207 > 0.05). No mean growth difference in mean tree ring growth due to the change in pollutant emission patterns can be proven from the analysis of this data.

2:45 AN ECOLOGICAL STUDY OF QUEEN OF THE PRAIRIE (FILIPENDULA RUBRA). AMY L. GARCHAR AMYGARCHAR@YAHOO.COM, (COURTNEY N. WILLIS CWWILLI@CC.YSU.EDU), YOUNGSTOWN STATE UNIVERSITY, DEPT OF BIOLOGICAL SCIENCES, YOUNGSTOWN OH 44555

Filipendula rubra (Roseaceae) is a perennial herb native to calcareous fens in the northcentral United States. Although F. rubra has high seed production, most seeds are consumed by birds, because it is self incompatible. Knowledge of the life history of F. rubra will provide insights into the conservation of this species and its unique habitat. The goal of this study was to investigate factors that influence the reproductive success and distribution of F. rubra in 2002. Seed production, plant density, and pollinator abundance were measured at four fens: Jackson Bog in northeast Ohio and Gallagher/Springfield Fen and Lake Wetlands Fen and Prairie Road Fen in Mansfield. Plants (N = 20) at each site were randomly selected and tagged in order to determine seed production and pollinator abundance. Plots (N = 16) were selected that included the 20 tagged plants in order to determine plant density. In addition, associated plant species and soil samples were collected in order to compare habitat characteristics between the sites. An increase in seed production (P = 0.10) and total seed production (P = 0.02). In addition, pollinator abundance tended to be correlated with the number of viable achenes (P = 0.10). These results suggest that plant density and pollinator abundance may influence the reproduction and establishment of this fen species.

3:00 Break

3:15 SLOW PLANTS IN A FOREST FOREST: CONSEQUENCES OF FOREST LAND USE HISTORY FOR THE DISTRIBUTION OF WILDFLOWERS. GLENN R. MATLOCK, GLMATLOCK@OHIO.EDU, ENVIRONMENTAL AND PLANT BIOLOGY, PORTER HALL, OHIO UNIVERSITY, OHIO 45701

Although we now have more forest in the eastern United States that at any time in the last 250 years, the forest flora appears to be species poor at most sites. Observations of gradual species accumulation in deciduous forest stands in North America and Europe suggest that many species are long-lived. Extension of population-level dispersal limitation to a regional scale is tested with a spatially explicit cellular automaton model. In the model habitat islands arise and disappear, and a hypothetical herb species disperses among them. Results: The model shows that regional distributions are limited.
Vol. 103 (1) The Ohio Journal of Science

A-33.

by habitat connectivity at low forest frequency (i.e. forest occupies a low proportion of the landscape) and by dispersal rate at high forest frequency. Allowing random destruction/regeneration of forest stands in the model seriously reduces the frequency of species of low dispersal ability but not those of high dispersal ability. A computer program was developed to predict regional frequencies with regional frequencies of 36 wildflower species observed in forests of the Delaware River Valley indicating a wide number of species in a given area with regional abundance of species dispersed by ants, spores, and wind, and those without vectors. Herbicide dispersed species are poorly predicted. The work suggests that biological diversity may be best protected by identifying forest types at risk and protecting against changes to these characteristics of little conservation value because it has not yet been colonized.

3:30 RESTORATION ECOLOGY: REINTRODUCTION TRIALS OF AMERICAN CHESTNUT, CASTANEA DENDATA, IN A MIXED OAK FOREST Ecosystem in SOUTHEAST OHIO. Corinne McCauley mccarthy@bigfoot.net and Brian C. McCarthy mccarthy@ohio.edu, Dept of Environmental and Plant Biology, Ohio University, Athens OH 45701

Castanea dentata was once a major component of northeast forests before the arrival of the chestnut blight Cryphonectria parasitica in the early 1900’s. A blight resistant variety of American chestnut is scheduled to be available for large scale restoration efforts within the next decade. The purpose of this study was to evaluate the effect of seed source on growth and survival of chestnut trees.

3:45 DENDROClimATICAL ANALYSIS OF EASTERN HEMLOCK (TSUGA CANADENSIS L.) IN SOUTHEASTERN OHIO, USA. Scott A. Weaver sw22649@ohio.edu, Brian C. McCarthy mccarthy@ohio.edu, Dept of Environmental and Plant Biology, Athens OH 45701.

Dendroclimatological techniques were applied to eastern hemlock growing in Hocking County, OH to determine the relationship between radial growth and climate. Increment cores were obtained from trees sampled on sandstone ledges (N = 10) and forest interiors (N = 14) and sampled on sandstone ledges (N = 10) and forest interiors (N = 14) and observed throughout the months of June, July, August, and September. Results indicate that there was no significant difference in growth between forest type. The mean (± SE) annual growth of forest type was (H = 1.92, p > 0.05) or between treatments. There was no significant difference in survival between forest type (H = 2.62, p > 0.2) or between treatments (H = 0.55, p > 0.9). There were no significant interactions between forest type and treatment for any test. Results suggest that the hemlock forest is well under a broad array of forest management conditions.

4:00 A PRELIMINARY STUDY FOR THE POTENTIAL USE OF PSEUDOMonas SYRINGAE PV. TAGETIS AS A BIOLOGICAL CONTROL OF CHESTNUT RUST (CIRCUS ARVENSE) IN OHIO AGRICULTURE. Fukumi Aikawa faik@ohio.edu, 910 Northernview Apt. 3H, Ada OH 45810.

Pseudomonas syringae pv. tagetis is a common weed found in the USA and Canada where it causes many agriculture problems. Pseudomonas syringae pv. tagetis, the pathogen that causes severe chlorosis of the stem apex of these plants, has possibility for controlling the Canada Thistle. We examined various vegetative structures of both control and affected plants to determine the extent of Pseudomonas infection in the terms of microbiome population size and distribution within the plant. A total of seventeen plants were harvested from four different sites in Ohio. Tissues from stem apex, leaves, rhizome were homogenized with M9 broth and spread onto both Pseudomonas selection agar and Bacto Pseudomonas isolation agar. The plates were incubated for 48 hours at 37°C. The identification of Pseudomonas was confirmed via Gram staining and the oxidase test. Preliminary results using the isolation agar indicate that Pseudomonas was present in all tissues tested. Pseudomonas had an affected plant type, stem apex: 50, rhizome: 76, green leaves: 10. This represents substantially greater infection of the plant apices and rhizomes relative to leaves and stems as the difference between these means is statistically significant (Dunnett’s multiple range test: stem apex: 66.8, rhizomes: 62.9, green leaves: 1.2, and stem = 20.3). Since plants were tested in the late summer/early fall, it is hypothesized that the Pseudomonas may be undergoing relocation from infected apices to rhizomes to over the winter.

9:00 AM, Saturday, April 5, 2003

Brewer/Frost Science 141

Dr. Nancy J. Swails-Prading

9:00 HISTOPATHOLOGY OF SPONTANEOUS DENTAL IMPLANT EXPOSURE. Terry Tagetz, PV. Tagetzs@pvtagetzs.com, Capital University, Biological Sciences Dept., 2199 E Main St., Columbus OH 43209-2394.

Endosseous dental implants are becoming a common treatment option in the practice of dentistry and have shown great promise for being able to restore dental function and esthetics. Spontaneous exposure of endosseous dental implants is a complication that can be indicative of later implant failure, but few definitive studies have been conducted concerning this histological phenomenon. In this study, literature review of relevant clinical and laboratory studies, along with clinical observations, were conducted to determine the histopathological factors associated with the spontaneous exposure, and subsequent failure, of endosseous dental implant systems during phase I (implant phase) of treatment. Eleven peer-reviewed studies (1997-2001) of endosseous dental implant complications and failure, published over a five-year period, were reviewed. Clinical observations (N=95) of maxillary and mandibular (dentulous and partial dentition) surgical placement of single-unit, endosseous dental implants were conducted over a three-month period, to gain further knowledge of treatment procedures. All patients were in good health, and no control group was used. The study design included histopathological examination of dental implants, and study patients were selected to determine the histological factor of endosseous dental implant exposure. It was also noted that no definitive, uniform protocol exists for diagnosing this complication.

9:15 THE EFFECTS OF A KETOGENIC DIET ON BRAIN METABOLISM IN A HYPOXIC ENVIRONMENT. Douglas S. Emancipator, Emanci_p@hotmail.com, Michelle A. Puchowicz, Kui Xu, Joseph C. Lamanza, Biology Dept., Ursuline College, 2550 Lander Rd, Pepper Pike OH 44124 and Case Western Reserve University.

Chronic hypoxia promotes many metabolic changes in brain tissue, especially increased lactate concentration. Under certain conditions of low glucose, such as starvation, ketones (+-hydroxybutyrate; BHβ + -acetoacetate) serve as an alternative energy substrate. These ketones are derived from: 1) ketosis and lactic acid accumulation, might be additive in brains of rats exposed to hypoxic conditions. Nonetheless, we hypothesized that ketosis would reduce lactate levels in hypoxic brain tissue, maintaining health comparable to normoxia. We investigated the effects of ketosis induced by feeding a ketogenic (high fat) diet on the brain's responses to hypoxia. 24 Male Wistar rats (60g) were equilibrated on either standard, ketogenic (low fat) diet for three weeks. Subgroups (n=4 each) were maintained in a hypobaric (380 torr) or normobaric atmosphere for another three weeks. At sacrifice, lactate, ketones and glucose concentrations in brain homogenates and plasma were measured. The ketogenic diet group increased BHβ tissue levels 3-10 fold in either normoxic or hypoxic states. In chronic hypoxia, rats on standard diet showed a 36% increase in brain lactate levels compared to normoxia (t=2.8, p<0.05). However, in the hypoxic-
ketogenic diet group, the brain lactate levels were normalized (t=2.2, p<0.05) compared to hypoxic rats fed a standard diet. We conclude that availability of ketones ameliorates the effects of hypoxia on lactate levels in the brain and may mitigate the effects of hypoxia on cerebral function.

9:30 PREDICTION OF THE FIRST CASE OF WEST NILE IN 2003 IN GREENE COUNTY, OHIO. DONALD E. BRAUNER, DONALD E. BRAUNER dbrauner@gcchd.org, GREENE COUNTY COMBINED HEALTH DISTRICT, 360 WILSON DR, XENIA OH 45385, 937-372-6700

The Greene County Combined Health District (GCCHD) provides public health services to a population of 147,886 over 414.9 square miles. A surveillance plan was implemented by GCCHD to detect infection with West Nile Virus (WNV). It is hypothesized that 2002 data and the surveillance data can be used to predict the first human case of WNV encephalitis in Greene County in 2003. The combined jurisdiction of the City and Township of Beavercreek was chosen based upon the jurisdiction’s 2002 DB density and location near wooded and wetland reserves. The critical indicator was set at 1.5 DB per square mile per week (for a total of 73 DB in a one-week period) that might give a 2-week early warning of the first WNV case. DB reports were taken from week 16 to 39 of Greene County 2002 data and the total per week was forecasted for the next mosquito season by calculating an equation of best fit: y = 5E-05x + 0.0072x + 0.4434x^2 - 0.0079x + 0.9151x^2 + 1.6392x - 1.1589. This equation was not used previously but the 2002 data appears similar to other reports. If 2003 weather conditions are similar to 2002, then the fourth week of next year’s mosquito season when DB density exceeds 73 DB per week, should predict the first human case of WNV in Greene County. Of the sixteen years of recorded data, epidemic curve in 2003 follows a polynomial distribution, additional measures may need to be taken to limit human WNV exposure in Greene County.

9:45 THE EFFECTS OF LAVENDER OIL ON THE VISUAL PROCESSING ABILITIES OF ADOLESCENTS AND ADULTS VERSUS ELEMENTARY-AGED CHILDREN. JULIE A. MAUND, MAUND@OUNU.EDU, NANCY WOODLEY WOODLEY@OUNU.EDU, OHIO NORTHERN UNIVERSITY, UNIT # 2555 402 W COLLEGE AVE, W. WOOSTER, OH 44691

English lavender, Lavandula angustifolia is one of the most widely used aroma-therapeutic agents and has been claimed to have a variety of effects including relaxation and stress relief. Some evidence indicates relaxing effects of lavender oil on the autonomic nervous system that may translate into certain cognitive functions. Two groups of subjects were recruited for this study. An adult group (n=13) was comprised of 6 males and 7 females aged 19 to 22; and the child’s group (n=15) was comprised of 4 males and 11 females aged 6 to 10. The effects of lavender oil administered under three conditions on the visual processing abilities of adolescents and children were tested. Subjects were exposed to lavender (essential oil diffuser that diffused the lavender oil throughout the room), and high exposure to lavender oil (pinning a lavender flower to the subject’s shirt) for 10 minutes. The latter, given two simple visual processing tests per trial: a twenty-four-piece puzzle, and a simple word search to perform in the presence and absence of lavender oil. Tests differed from each other in that E. coli samples were collected from three veterinary clinics and cultured on Eosin Methylene Blue agar to isolate colonies. A total of 24 positive colonies of E. coli from each PCB type were tested against five antibiotics by disk-diffusion on Mueller-Hinton agar. Zones of inhibition were measured and compared with standards to determine resistance. Preliminary results indicate: 3.8% show resistance to gentamicin, 100% to thiacetazone, 7.7% to Nitrofurantoin, 6.5% to ampicillin, and 92% to clindamycin. Resistance to two or more of the antibiotics was found in 62% of the isolates. Conclusions from this study are that exposure to lavender oil (such as lavender or urinary tract infections) should not be treated with clindamycin and ampicillin. These tests also point out the need to curb over-prescription of antibiotics to prevent selection of drug resistance.

10:00 DO AMERICANS CONSIDER THE FOOD SUPPLY TO BE AT RISK FROM A TERRORIST ATTACK? DIANA M. SCHUMAN, SCHUMAN@OHIO.EDU, OHIO UNIVERSITY, 100E PHILLIPS HALL, MANN HALL, UNIVERSITY, OXFORD OH 45056

Since the attacks of 9/11, 2001, Americans have been told to be alert and on guard because there have been heightened risks and the establishment of a homeland security system. With all of the risks that Americans feel the food supply is a risk from a terrorist attack. Have people changed their food habits since 9/11? The results indicate that only 10% of the students felt that the food supply was at risk for biological, nuclear or other contamination risk. The greatest concern mentioned by both non-students [78% (390)] and students [81% (162)] was water. The students [45% (90)] mentioned contamination of fast foods such as colas or beef patties, while this concern was mentioned by only 13% (65) of the non-students. There were no differences in the food habits due to income or gender. These children were not restricted to age, education, income or gender.

10:15 TRICLOSAN RESISTANT BACTERIA FOUND IN NORTHEASTERN OHIO. MICHAEL D’ONOFRII, D’ONOFRII@URSULINE.EDU, BRIAN A. BUNYARD, BUNYARD@URSULINE.EDU, OHIO NORTHERN UNIVERSITY, 525 S MAIN ST, ADA OH 45810

Pathogenic bacteria demonstrating antibiotic resistance are becoming a major problem in all medical fields. This study used to determine the comparative levels of antibiotic resistance to commonly prescribed antibiotics used in veterinary medicine. Salmonella and Escherichia coli were collected from local populations of dogs with diarrhea. Diarrhea samples were collected from three veterinary clinics and cultured on Eosin Methyline Blue agar to isolate colonies. A total of 24 positive colonies of E. coli from each PCB type were tested against five antibiotics by disk-diffusion on Mueller-Hinton agar. Zones of inhibition were measured and compared with standards to determine resistance. Preliminary results indicate: 3.8% show resistance to gentamicin, 100% to thiacetazone, 7.7% to Nitrofurantoin, 6.5% to ampicillin, and 92% to clindamycin. Resistance to two or more of the antibiotics was found in 62% of the isolates. Conclusions from this study are that exposure to lavender oil (such as lavender or urinary tract infections) should not be treated with clindamycin and ampicillin. These tests also point out the need to curb over-prescription of antibiotics to prevent selection of drug resistance.

10:45 MULTIGENERATIONAL EFFECTS OF POLYCHLORINATED BIENYLS (PCB) ON THE REPRODUCTION, ESTRUS CYCLES AND ORGAN WEIGHTS OF SPRAGUE-DAWLEY RATS. CHRISTINA M. CARRUTHERS, CARRUTHERS@BGSU.EDU, LEE A. WISE, WISE@BGSU.EDU, BOWLING GREEN STATE UNIVERSITY, BOWLING GREEN OH 43403-0212

Polychlorinated biphenyls (PCB) are synthetic chemicals with hundreds of industrial applications because of their stability. Because of bioaccumulation, they have been found to cause many health problems in animals. In this study, we evaluated multigenerational effects of PCB on Sprague-Dawley rats fed a diet containing one of three types of PCB (PCB 77, PCB 47, or AROCLOR 1254) in one of two concentrations (1.25ppm or 12.5ppm), mated to the F2 generation. The FDA allows foodstuffs to contain no more than 3.5ppm. Therefore, these concentrations used reflect an accepted amount and elevated amount. Estrous cycles were monitored in female rats. Animals were euthanized and liver, thyroid gland, testes, uterus and ovaries were dissected. Each dissection was collected and weighed. Data were analyzed using a one way ANOVA. PCB significantly extended the length of estrous cycles (P<0.0001) and delayed mating in cohabitating pairs of rats. Exposure to PCB variably influenced organ weights. Although not significant, treatment groups experienced an increase in ovarian weights. High and low doses of each PCB type caused a general increase in liver weights.
increase in the uterine weight in F2 females. A general, but not significant decrease in testis weight was observed in most treatment groups. A significant increase in thyroid weight was seen in female rats for high and low doses of all congeners studied, with a similar trend of a general increase in thyroid weight, PCB exposed males. Overall, a trend toward depression in liver weight occurred in F2 females, while the liver weights of males were variable. Thyroid weights were altered in treatment animals. These results suggest that PCB effects over two generations differ from those in the first generation.

Molecular Biology and Genetics

2:00 PM, Saturday, April 5, 2003

Brower/Frost Science 141
Dr. Beth Berger Pritts-Presiding

2:00 REGULATION OF ION CURRENTS IN PARAMECIUM TETRAURELIA BY TYPE-1 PROTEIN PHOSPHATASES W, C, AND J ISOFORMS. WHITMAN B. SCHOFIELD W@WOOSTER.EDU, (DEAR FRAGA DERAGI@WOOSTER.EDU), 1189 BEALL AVE C-2676, WOOSTER OH 44691

The understanding of excitable cell membrane responses to stimuli is dependent on the correct identification of underlying enzymatic processes that regulate the ion channels, which coordinate action potentials. The swimming behavior of Paramecium tetraurelia is controlled by a calcium-based action potential, generated by the coordinated activity of various ion channels. This study focused on the type-1 protein phosphatases (PP1) isoforms on the backward swimming behavior of Paramecium to identify which isoforms regulate which ion currents. Bacterial mediated RNA interference (RNAi) was used to knock out PP1-w, c, and j isoforms. Feeding Paramecium with bacteria engineered to express PP1-w dsRNA resulted in a significant increase in the duration of the protist’s backward swimming response to 5 mM Na+/1 mM TEA in five independent trials (SSP < 0.05). The same cell lines gave no altered response when tested in 30 mM KCl in which only the voltage-dependent Ca2+ channel is active, indicating that PP1-w does not regulate the channel. In addition, a mutant strain that lacks the calcium-dependent K+ current, also showed no significant alteration in backwards swimming response in PP1-w RNAi feeding experiments, indicating that the calcium-dependent K+ current may be regulated by PP1-w. These data are in agreement with previous PP1-w antisense silencing results, adding to the growing body of evidence that Paramecium PP1 isoforms w regulates Ca2+-dependent K+ channels. It is currently being determined if the target PP1-w is the only isoform affected in the silencing experiments. Additionally the same RNAi silencing experiments of the other PP1 isoforms, C, and J are currently in progress.

2:15 GENERATING A TISSUE SPECIFIC KNOCKOUT OF RAD51D IN MICE. KYLIE A. ROACH K-ROACH@OU.EDU, OHIO STATE UNIVERSITY, 402 W COLLEGE UNIT 2942, AEA OH 45810

When damage occurs to DNA, repair is crucial for normal cell function. Rad51d, which is part of the Rad51 family, is a gene that plays a vital role in repairing double strand breaks (DSB). The impairment of DSB repair mechanisms causes the loss of genomic stability, which is a forerunner of various cancers. In 2000 a complete knockout of Rad51d in mouse embryos was produced but absence of Rad51d resulted in embryo lethality. Therefore, in this study, a conditional disruption (CD) concerning the first four exons of the gene was employed for tissue specific studies. The Rad51d CD electroporation was utilized to transfect sixteen plates of 105 mouse embryonic stem (ES) cells. Partial incorporation of the CD indicated correctly targeted ES cell colonies since these colonies did not take up Genetricin nor FIAU. DNA from these colonies was extracted and run on a gel. The DNA was then transferred onto a membrane and hybridized with a 5′d 5′2′ Forward/Reverse probe containing a P32 label. This membrane was then exposed on x-ray film to detect the presence of bands. A positive result was considered to be the presence of two bands with sizes of 9.4kb (the wild type allele) and 6.4kb (CD). Transfections yielded approximately 180 colonies post-selection, which produced gels that displayed large amounts of extracted DNA. Although all steps prior to Southern blot were negative results, no bands were seen on the exposed film: therefore the presence and number of correctly targeted colonies could not be determined. Further experimentation will involve numerous manipulations until correctly targeted cell lines are created so that Rad51d can be studied in specific tissues.

2:30 DNA FINGERPRINTING OF NECROPHILIC FLIES FOR USE IN FORENSIC IDENTIFICATION. SARA E. CARROLL SCARROLL19@YAHOO.COM, (DR. BRETT BUNYARD BRUNYARD@URSULINE.EDU), BIOLOGY DEPT, URSULINE COLLEGE, 2550 LANDER RD, PEPPER PIKE OH 44124

The identification of necrophilic flies for the use in forensic science is very important in determining time of death. The variance in time of reemergence of species allows the forensic scientist to determine the time of death. Prior analysis of necrophilic flies in a forensic study relied on physical characteristics of the adult fly. By using gene sequencing a forensic scientist can test the DNA and achieve more accurate results. Currently there are restriction enzymes known to delineate Calliphora vicina from other necrophilic species (including C. vomitoria, Phaenicia sericata, and Sarcophaga sp.). The objective of this research was to successfully identify each species through DNA fingerprinting by using new restriction enzymes. Ten new restriction enzymes were tested, with five (Mse I, Alu I, Hpa II, Dde I, Pst I) segregation against the necrophilic fly species. Following PCR amplification of DNA and RFLP analysis, variability was found among the necrophilic fly DNA sequences. After 19 trials, the restriction enzyme Dra I was most useful in distinguishing among necrophilic flies. With this new information, it is now possible to identify all common species of North American necrophilic Diptera through DNA analysis in a shorter period of time, making the job for the forensic scientist more expedient.

3:00 Break

3:30 FUNCTIONAL ANALYSIS OF zASIP IN RETINAL DEVELOPMENT. SCOTT C. NELSON NELSONOM@OHIO.EDU, XIAOYUN WEI XIAOYUNWEI@OHIO.EDU, UNIVERSITY OF NOTRE DAME, DEPT OF BIOLOGY, OHIO STATE UNIVERSITY, DEPT OF BIOLOGY, 2199 E MAIN ST, COLUMBUS OH 43215

The zebrafish retinopathy model allows for the molecular mechanisms that control retinal patterning. A previous study indicated that nagie oko, a gene involved in maintaining cellular polarity in the retinal epithelium, is also critical for controlling cellular patterning in the retina. This suggested that other polarity genes may also be required for generating the proper cellular organization of the retina. To test this hypothesis, we isolated and investigated the function of the zebrafish gene zASIP, a homolog of the ASPB/BSK3-3 gene that is conserved from worms to humans. The zASIP protein possesses the same protein binding domains as the other homologues, which suggest that they are involved in assembly of protein complexes. Functions of zASIP protein during retinal development were studied using morpholin knock-down technology. Morpholinos are modified DNA oligonucleotides that anneal to mRNAs and reduce their translation. Injection of zASIP morpholinos into 1-2 cell zebrafish embryos revealed that the loss of zASIP function disrupted cellular patterning, but not cell specification, in the zebrafish retina. Further experiments utilizing morpholino knock-down of other polarity genes will provide efficient methods for mapping the genetic pathway involved in cellular patterning.

3:45 IMMUNOLOCALIZATION OF FAK IN NGF-TREATED PC12 CELLS. SARAH E. MEYERS MEYERS_S@DENISON.EDU (DR. CATHERINE N. SMITH SMITHC@DENISON.EDU), BIOLOGY DEPT, DENISON UNIVERSITY, SLATER BOX 1747, GRANVILLE OH 43023

Focal Adhesion Kinase (FAK), a 125 kDa non-receptor tyrosine kinase, is known to be important in intracellular signaling cascades and cell
adhesion. Although FAK has been studied in short-term focal adhesion
turnover, research into FAK's role in adhesion during long-term
neurogenesis has been limited. PC12 cells, a rat pheochromocytoma
cell line, provide an ideal system to study FAK, focal adhesions and
neurogenesis. PC12 cells can be induced to differentiate into a neuron-
like cell and project neurite extensions from the cell body within 24
hours of stimulation with Nerve Growth Factor (NGF). Previous studies
from this lab have shown that the expression of FAK in PC12 cells after
day 5 stimulation with NGF did not change; however, the amount of
activated (phosphorylated) FAK within the cells did increase (Smith and
Selickman, unpublished data). In this study, location of both FAK and
paxillin on PC12 cells was imaged on day 5. The fold increase in FAK
with NGF will be examined by immunocytochemistry and confocal
microscopy. Because activated FAK is important in cell adhesion, we
hope to observe active FAK located within the neurite extensions,
primarily the internodes, where it would be important in regulating
neurite adhesion and projection.

4:00 ISOLATION AND CHARACTERIZATION OF NOD
FACTORS THAT HAVE THE ABILITY TO INITIATE
NODULATION ON A RESTRICTIVE PHASEOLUS
VULGARIS HOST. Sarah L. Bashore sw332892@ohio.edu
and Arthur T. Tresse, Dept. of Environmental and Plant
Biology, 317 PORTER HALL, RICHLAND AVE, OHIO UNIVERSITY,
ATHENS OH 45701
Soil bacteria of the type Rhizobium are microsymbionts of Phaseolus
vulgaris. Initiation of the symbiosis begins with the transcription of the
Rhizobium nod genes that are induced by flavonoids exuded from
the plant. These nod genes encode enzymes that synthesize nod factors,
ligo-chitin oligosaccharides (LCO's), which are involved in
signaling the plant and determining host specificity. We have isolated
a spontaneous mutant of P. vulgaris that prevents nodulation. Further
experiments resulted in the isolation of 3 strains of Rhizobium that
have the ability to 'overcome' this mutation and nodulate the mutant
plant. The three 'overcoming' strains are believed to produce nod factors
with a different chemical structure than the nod factors produced by
the other strains, designated 'restricted', within their genus and species
designation. Working with both the 'overcoming' and 'restricted' strains,
the nod factor production was induced with Naringenin and LCO's were
isolated and used for extracting the high yields of nod factors.
Bioassay of the nod factors has shown that nod factors of 'restricted'
strains do not have the ability to initiate nodulation (root hair curling)
but in the mutant plant but do on the wild-type plant. 'Overcoming' strain nod factors do have the ability to initiate
nodulation on both the mutant plant and the wild-type. This suggests
that the 'overcoming' strains of bacteria have novel nod factors that
allow them to nodulate the mutant P. vulgaris.

Earth Sciences
09:00 AM, Saturday, April 5, 2003
Brewer/Frost Science 102
Dr. Daniel J. May-Presiding

9:00 FLOATING SAND AND PEBBLES - GARDEN CITY
BEACH, SOUTH CAROLINA. Jack Kovach
JACKOVACK@MUSKINGUM.EDU, GEOLOGY DEPT, MUSKINGUM COLLEGE,
NEW CONCORD OH 43762
In the afternoons of June 23 and 26, 2002, shell fragments up to 8 x
5 x 0.7 mm and sand-sized quartz grains were observed floating on
the surface of tidal pools left between tides on the beach at Garden
City, SC. The particles floated in irregularly-shaped, elongate to roughly
circular, raft-like masses or patches up to 5 cm across and one grain
thick. This phenomenon was observed at about 2:00 PM. Daylight
Savings Time on the 23rd and at about 3:00 PM DST on the 26th,
documented photographically on each occasion. Both afternoons
were sunny and hot (with a high of 31°C) and with winds of 27.8-37 km/hr.
The weight of the floating "sand" patches, regardless of their size,
produced a clearly visible depression of the water surface beneath
the surface of tidal pools left between tides on the beach at Garden
City, SC. The particles floated in irregularly-shaped, elongate to roughly
circular, raft-like masses or patches up to 5 cm across and one grain
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The weight of the floating "sand" patches, regardless of their size,
produced a clearly visible depression of the water surface beneath
remediation techniques for sulfur-rich seams and finding environmentally safe uses of fly ash by-product from coal-fired power plants. Kneller’s students completed eighteen masters theses on Ohio coals and four on the organic-rich Devonian shales. At the time of his retirement in 1999, W. A. Kneller had developed an extensive collection of Ohio and North American coals with accompanying thin sections, Ohio coal pellets, and maceral photographs. They now are housed at the museum and ready for future studies. Sadly, William A. Kneller passed away September 13, 2002.

10:00 A CLASSIFICATION SCHEME FOR THE ORIGINS OF GEOGRAPHICAL FOOD NAMES. JEFFREY J. GORDON, jef@bgsu.edu, DEPT OF GEOGRAPHY, BOWLING GREEN STATE UNIVERSITY, BOWLING GREEN OH 43403

Geographical food names have been used in the context of the professional geographical literature. The goal of this research, building upon my earlier work in compiling geographical food names (i.e., the spatial or societal names of foods given to certain foods), was to provide a taxonomy for the origins of geographical food names used in the United States. The hypothesis was that geographical food names are given such appellations because they are inherently helpful in certain ways. Thus far, 1797 examples of geographically-named foods have been found. From an etiologic examination and qualitative analysis of this total population, 14 major classes have been identified. Although unexpected and initially surprising, the resulting labeling system explains why the names are used. The classes include: 1. Alternative innovation (e.g. Buffalo Wing; Hungarian goulash), 2. Specific environment (e.g. Alaskan snow crab, Brazil nut), 3. Area of significant production (e.g. Vermont maple syrup, Florida orange), 4. Generic environment (e.g. Saltwater taffy, Sun tea), 5. Specific product (e.g. Brussels sprout, Lima bean), 6. Unique preparation (e.g. Chinese fortune cookie, Key Lime pie), 7. Significant differentiation (e.g. New England clam chowder, Manhattan chowder), 8. Regional association (e.g., Cantonese, Szechwan), 9. Prime quality (e.g. Colombian coffee, Russian caviar), 10. Authenticity (e.g. Canadian bacon, English muffin), 11. Fanciful spatial association (e.g. Hawaiian pizza, Texas toast), 12. Historic event (e.g. Chicken Marengo), 13. Shorthand designation (e.g., Baked Alaska, French toast), 14. Product identification (e.g., Hershey’s chocolate, Quaker oats).

10:15 OHIO SURVEY OF FOOD, AGRICULTURE, AND ENVIRONMENTAL ISSUES. JEROLD R. THOMAS, thomas.69@osu.edu, DEPT OF SCIENCE, OHIO STATE UNIVERSITY EXTENSION, 1219 W MAIN CROSS ST, FINDLAY OH 45840

This descriptive study was performed to provide a baseline of Ohioans’ current knowledge, attitudes, and behaviors on emerging and potentially contentious food, agricultural, and environmental issues within the state. A team comprised of individuals in the areas of sociology, agricultural communications, and extension developed the research design in 2001. Six sampling frames based on geography and metropolitan areas were used to allow for spatial comparisons of the data collected. Data were collected in the field via telephone. Using 2002 using Dillman's Tailored Design Method which yielded a response rate of 56.4 percent. Analysis of respondent characteristics indicated the sample was representative of the population except for: number of renters, renters aged 18-24 years, and number of respondents which contributed to the incidence, such as specified outdoor activities. In addition a geographical component will pinpoint locations that are likely breeding sources of mosquitoes at a county scale, such as parks or swampland areas. Our result is a behavior model and spatial model mathematically appropriate for the analysis of diffusion of disease emanating from multiple sources in a defined geographical space. The Cleveland study is an example of practical and timely significance. The approach outlined in the Plain Dealer has wide potential applications for emerging health threats in a global economy increasingly characterized by urbanization processes that result in giant cities.

Education - Chemistry

02:00 PM, Saturday, April 5, 2003

Brewer/Frost Science 102

Dr. Kenneth A. LaSota-Prending

2:00 USING CAS STANDARDS AND GUIDELINES AS AN ASSESSMENT TOOL FOR HIGHER EDUCATION PROGRAMS. DIANNE WRIGHT, PH.D. D.WRIGHT@RMU.EDU, COLLEGE OF EDUCATIONAL FOUNDATIONS AND LEADERSHIP, 301-C ZOOK HALL, UNIVERSITY OF AKRON, AKRON OH 44325-4208

Few guidelines and/or standards are needed for academic programs, particularly those related to advanced study. Programs of study in higher education administration are no exception. Relatedly there should be a clear articulation of mission and objectives for any given program of study, as well as easily accessible information regarding number and qualifications of faculty, admissions criteria, number of students selected for admission, curriculum and graduation requirements, records of student’s persistence, graduation, and job placement. Each higher education administration program director in state of Florida and the state of Ohio was administered an e-mail survey. The survey was conducted in March of 2001. Using SPSS, simple statistics were calculated to determine the extent to which CAS standards were used relative to higher education programs of study. It was hypothesized that CAS standards and guidelines are used as criteria for course offerings such as in higher education programs of study. It was further hypothesized that this practice is perceived to be used by higher education program directors in the nation. Survey results failed to reject the null hypothesis. The researcher purports that formal use of CAS or similar standards and guidelines are critical to the future survival of higher education programs.

2:15 COURSES COMMON TO BACHELOR OF NURSING DEGREE PROGRAMS IN WESTERN PENNSYLVANIA. KENNETH A. LA SOTA, la.sota@rmu.edu, MARIA KALEVITCH, kalevitch@rmu.edu, AND DANIEL SHORT, SHORT@RMU.EDU, DEPT OF NATURAL SCIENCES, ROBERT MORRIS UNIVERSITY, 600 FIFTH AVE, PITTSBURGH PA 15219-3099

As part of the process of developing a bachelor of science in nursing degree program, Robert Morris University surveyed 45 colleges and universities within a 150 mile radius of Pittsburgh and found 23 offered a bachelor of science degree program. The curricula of the 23 programs were reviewed to determine the number and type of science courses included. Only those science courses offered by the science faculty of the host institution were tabulated. Science courses offered by nursing faculty were not counted, solely for their own students were not included. Analysis found that all 23 programs required at least one course in anatomy and physiology and while 18 required two such courses. Microbiology was required by 22 of 23 programs and a chemistry course was required by 21 of the programs. Thirteen of the programs utilized a general introduction to chemistry course as its chemistry requirement. Eight of the programs required one general chemistry course and six in bio/organic chemistry as a substitute for general chemistry. Only eight of the programs required a second course in chemistry, an organic chemistry course. Few of the programs required a dedicated course in...
pharmacology (six) and only two required a statistics course. For a mathematics requirement, only five programs required a mathematics course that was uniquely designed for the nursing program or was different than the mathematics course of the host institution’s general education core. The data collected here may be useful to other institutions designing bachelor of science in nursing degree programs in the western Pennsylvania area.

2:30 SYNTHESIS AND CHARACTERIZATION OF CYANIDE COORDINATION COMPLEXES AS PRECURSORS TO COMPOUNDS WITH MAGNETIC PROPERTIES. SHIGEMI MATSUI, MATSUI@EXCITE.COM, (PAUL S. SZALAY)

The field of cyanide coordination chemistry has developed over three centuries based on the versatile bridging capabilities of cyanide that were first discovered in Prussian Blue. Despite these efforts, little progress has been reported in the preparation of homoleptic cyanide compounds composed of low-valent transition metals and lanthanides and cyanide. These compounds’ inner spheres are comprised solely of the ligand, cyanide. The goal of this research is to synthesize coordination complexes of these metals that will be utilized as building blocks in future experiments to create clusters or solid state compounds with magnetic properties. Initially, cyanide salts of potassium, tetrathionate, and thioacetate were used in reactions with metal starting materials such as gadoxindolil (III) nitrate and tetrabutylammonium octachlorodihydrine. The resulting coordination complexes’ structures and physical properties will be elucidated using UV-Vis spectrophotometry, nuclear magnetic resonance spectrometry, and single crystal X-ray diffraction.

2:45 NUCLEOPHILIC METAL-ORGANIC FRAMEWORKS AND POLYMERS. PAUL SZALAY, PSALAY@MUSKINGUM.EDU, MATTHIAS ZELLER, ALLEN HUNTER, * MUSKINGUM COLLEGE, DEPT OF CHEMISTRY, NEW CONCORD, OH 43762, * YOUNGSTOWN STATE UNIVERSITY

Research activity in recent years has lead to significant developments in the preparation and chemical property characterization of metal-organic frameworks (MOFs). These compounds have interest from several parts, from the fact that the pores created in these metal-organic frameworks may be tailored for the inclusion of specific guest molecules. An application may include purification of water through sequestration of metal ion contaminants. Crystalline in situ produced MOFs have low density and are synthesized through reactions of solvated transition metal ions with organic ligands that served as linking units. The organic linkers employed were the nitrogen donor macrocycle with dangling acetyl groups, 1,4,7,10-tetraazacyclododecane - N,N',N''N''' tetraacetic acid (DOTA), and tetrabutylammonium 4,4'-diaminostilbene -2,2' disulfonate ([Bu-N]_2[DOTASO_4]). Resulting products were characterized using single crystal X-ray diffraction and spectroscopic techniques such as infrared spectrophotometry.

Soil - Water - Wetlands

9:00 AM, Saturday, April 5, 2003
Brewer Science 138
Mr. James J. Hoorman-Presiding

9:00 RAINFALL SURVEY FOR HARDIN COUNTY OHIO (1993-2002). GENE E. MCLUIER, MCLUIJER.1@OSU.EDU AND JAMES J. HOORMAN, OHIO STATE UNIVERSITY EXTENSION, ONE COURTHOUSE SQ STE 40, KENTON OH 43326-2399

Cash receipts from marketing crops is 54.5 million dollars per year in Hardin County, Ohio (1997 U.S. Census). Crop production is dependant on rainfall. Rainfall data were collected in a ten-year period (January 1993-1999) during the growing season (April 15th to October 15th) in fifteen townships and the City of Kenton in Hardin County, Ohio. The purpose was to document differences in growing season rainfall for agricultural producers. Producers could modify crop management practices if significant differences in rainfall exist. The null hypothesis is that there is no difference by township in mean growing season rainfall. Volunteers used a Tri-Color gauge per township and city to measure rainfall with .01 inch graduated measurements. Over the 1993-2002 period, the average growing season rainfall was 19.77 inches with a standard deviation of 3.99 inches. A standard F-test for analysis of variance for mean growing season rainfall by township indicated significant differences with a critical value for comparison (LSD) of 1.99. A Tukey's comparison (using a larger critical value to avoid Type I errors) of mean growing season rainfall by township indicated significant differences with an HSD of 3.45. Using Tukey's, Hale (Southeast) received significantly less rainfall than Lynn, Washington and Jackson townships (North and North Central) and Buck (Southeast) received significantly less rainfall than Lynn township in Hardin County. Knowing significant differences in rainfall per township exist, agricultural producers could modify crop practices (selection of crops, tillage, planting date, spacing, cash rents) to maximize crop yields and profit.

9:15 ANALYSIS OF pH LEVELS ON AMISH FARMS IN NORTH CENTRAL OHIO. JAMES J. HOORMAN, HOORMAN.1@OSU.EDU, OHIO STATE UNIVERSITY EXTENSION, ONE COURTHOUSE SQ STE 40, KENTON OH 43326-2399

Using a United States Dept of Agriculture (USDA) grant, three Amish communities in North Central Ohio participated in a soil test program to improve nutrient management. In a three-year period (1998-2000), 871 soil samples were analyzed from 89 Amish farms. Samples were tested for pH, exchangeable potassium (K) by extraction with ammonium acetate (1 Normal, pH 7.0). Sample sizes were Belize Center-139, Kenton-587, and DeGraff-145. The null hypothesis is that there is no difference by Amish community in average K levels. Using a standard t-test for mean comparison, the Belize Center and Kenton potassium averages were significantly different from the DeGraff potassium average but there was no difference between each other at the 5% level of significance. One hundred forty-eight (17.0%) samples tested below 100 Parts Per Million (PPM) K, considered low for optimal crop yields. Five hundred thirty-two (61.1%) samples tested between 100 and 199 PPM K, (21.3%) samples tested greater than 200 PPM K (high). Associated with high K were fields planted to vegetable crops and permanent pastures, barn floor solids located closer to barns, barns not dispersed with a high ratio of livestock per acre (<1 animal unit/acre). Associated with low K were fields rotated to hay crops, low commercial fertilizer usage, fields with long hauling distances from the barn for mineral and applied to barn yard (hay). Analyzing Amish K soil levels assists USDA in making recommendations to improve nutrient management and increase water quality.

9:30 POTASSIUM SOIL LEVELS ON AMISH FARMS IN NORTH CENTRAL OHIO. JAMES J. HOORMAN, HOORMAN.1@OSU.EDU, OHIO STATE UNIVERSITY EXTENSION, ONE COURTHOUSE SQUARE, SUITE 40, KENTON OH 43326-2399

Using a United States Dept of Agriculture (USDA) grant, three Amish communities in North Central Ohio participated in a soil test program to improve nutrient management. In a three-year period (1998-2000), 871 soil samples from 89 Amish farms were analyzed. The purpose was to identify Amish cultural practices that enhance organic matter (OM) levels. OM content in most light-colored Ohio soils is between 1.5 and 3.0 percent and OM provides nitrogen, phosphorous, and some micronutrients as OM oxizes (Ohio Agronomy Guide). In a three-year period (1998-2000), 833 soil samples from 86 Amish farms were tested using the loss on ignition of oven dried soil method. Sample sizes were Belize Center-127, Kenton-561, and DeGraff-145. The null hypothesis is that there is no difference by Amish community in average OM levels. OM content in most light-colored Ohio soils is between 1.5 and 3.0 percent and OM provides nitrogen, phosphorous, and some micronutrients as OM oxizes (Ohio Agronomy Guide). In a three-year period (1998-2000), 833 soil samples from 86 Amish farms were tested using the loss on ignition of oven dried soil method. Sample sizes were Belize Center-127, Kenton-561, and DeGraff-145. The null hypothesis is that there is no difference by Amish community in average OM levels. One hundred ninety-one (21.9%) samples tested greater than a pH of 7.0 (high). Associated with high pH levels were fields with lime, row crops and permanent pastures, short Amish farm tenure. Associated with high pH levels were fields with lime, row crops and permanent pastures, short Amish farm tenure. The Belle Center, Kenton, and DeGraff mean pH levels were not significantly different from each other at the 5% level of significance using a standard F-test for mean comparison. One hundred four (11.9%) soil samples tested below a pH of 6.0, low for optimal crop yields. Four hundred forty-one (50.6%) samples tested between a pH of 6.0 and 7.0 (optimum for corn and soybeans) and three hundred ninety-two (45.4%) samples tested greater than a pH of 7.0 (high) (e.g. for hay crops). Associated with low pH levels were fields with lime, row crops and permanent pastures, low Amish farm tenure. Associated with high pH levels were fields with lime, row crops and permanent pastures, short Amish farm tenure. The null hypothesis is that there is no difference by Amish community in average K levels. Using a standard t-test for mean comparison, the Belize Center and Kenton potassium averages were significantly different from the DeGraff potassium average but there was no difference between each other at the 5% level of significance. One hundred forty-eight (17.0%) samples tested below 100 Parts Per Million (PPM) K, considered low for optimal crop yields. Five hundred thirty-two (61.1%) samples tested between 100 and 199 PPM K, (21.3%) samples tested greater than 200 PPM K (high). Associated with high K were fields planted to vegetable crops and permanent pastures, barn floor solids located closer to barns, barns not dispersed with a high ratio of livestock per acre (<1 animal unit/acre). Associated with low K were fields rotated to hay crops, low commercial fertilizer usage, fields with long hauling distances from the barn for mineral and applied to barn yard (hay). Analyzing Amish K soil levels assists USDA in making recommendations to improve nutrient management and increase water quality.
high OM was permanent pasture and hay fields, barn feedlots, fields located close to the barn, vegetable crop fields with high manure applications, or young Amish farm tenure. Amish crop management practices that increase OM soil levels have implications for nitrogen and phosphorous nutrient management and water quality.

10:00 BASEFLOW ANALYSIS OF THE UPPER BLACKLICK CREEK IN CENTRAL OHIO, MEGAN A. JAMES MREGJAMES@AOL.COM, (TERRY LAHM TLHARM@CAPITAL.EDU), CAPITOL UNIVERSITY, 2199 E MAIN ST, COLUMBUS OH 43209

The observations of local residents in the northern reaches of Blacklick Creek and the historical evidence of water use to drive mills indicate a possible temperature increase in overall flow. One explanation for the decreased flow is that recent construction in the creek’s watershed has increased surface runoff and subsequently reduced infiltration of precipitation to the groundwater system. If this process is occurring, it would cause a reduction in baseflow and no gain across the glacial till reach. Conclusions from this study will act as an initial field analysis for future work examining the movement of water within the hydrologic cycle of the watershed.

10:15 DETERMINING THE LT50 OF COPPER AND ALUMINUM TO AMMONIA FOR HYBOPIS AMBLOPS, REBECCA L. KLAESN REBECA@EAGLE-CAPITAL.EDU, (Dennis McINTYRE DmcINTYRE@GLEC-OH.COM), CU491 CAPITAL UNIVERSITY, 2199 E MAIN ST, COLUMBUS OH 43209

The bigeye chub (Hybopis amblops) is a rare, intolerant fish species in Ohio inhabiting riffles and shallow areas where flow runs in small to mid-size streams. It is currently not known whether their absence in streams suitable for their occurrence is due to excessive chemical sensitivity, or to some other anthropogenic cause such as siltation/sedimentation. The purpose of this research is to determine the sensitivity of bigeye chub to copper and ammonia in relation to other commonly tested freshwater fish species, such as the fathead minnow (Pimephales promelas). It is hypothesized that bigeye chub are more sensitive than fathead minnows. Chemical sensitivity will be assessed using two common EPA priority pollutants, copper and ammonia. Both of these pollutants are known to be toxic to freshwater fish species at low concentration. Median lethal time to death (LT50) values will be obtained using static exposures. Prior to testing, sexually mature adult bigeye chub captured in the wild will be maintained in the laboratory. If survival of fish will be deemed possible, LT50 tests will be used to determine acute LT50 tests. Tests with larvae are desirable as larval stages are generally more sensitive to chemical pollutants. Research and investigations are needed in the bigeye chub species. Since there is no information about breeding this species in the laboratory, this objective of the study was to determine the removal efficiency of arsenic from drinking water by using Fenton’s reagent followed by passage through zero valent iron. Contaminated drinking water by arsenic has received world wide attention. More than 100 million people in the world have been shown to be at risk for consuming arsenic contaminated water. In this study drinking water and groundwater samples were spiked with Arsenic (+3) and As(III) using arsenic powder respectively. The initial water contained 0.5 to 2.5 mg/L As(III). Results indicated that addition of 300 mg/L Fe2+ and 500-750 mg/L H2O2 reduced arsenic to 20 μg/L. In the two-stage treatment system using Fenton’s reagent followed by passage through zero valent iron reduced initial As(III) of 2.5 mg/L to a final concentration of 10 μg/L. In the 2-stage treatment system using 100 mg/L Fe2+, 100 mg/L H2O2, were added and reacted for 10 minutes with raw water followed by passage through the iron scrap at a flow rate of 150 mL/min and then filtered through sand. The 2-stage treatment system can produce treated water meeting U.S. EPA drinking water guideline value of 10 μg/L of arsenic.

10:30 EVALUATION OF DRINKING WATER SUPPLIES BY BIOASSAYS, Yung-Tse Hung-Y.Hung@CSUOHIO.EDU AND UtSav NAVNITBHAI SOMANT utsava22@yahoom.com, CIVIL AND ENVIRONMENTAL ENGINEERING DEPT, CLEVELAND STATE UNIVERSITY, CLEVELAND OH 44115-2214

The objective of the study was to determine the removal efficiency of arsenic from drinking water by using Fenton’s reagent followed by passage through zero valent iron. This study examined the bioassay system using the iron scrap at a flow rate of 150 mL/min and then filtered through sand. The 2-stage treatment system can produce treated water meeting U.S. EPA drinking water guideline value of 10 μg/L of arsenic.

2:00 WATER QUALITY AND TREATMENT SESSION

The Ohio Journal of Science
bioassays. When all bioassays are considered, the percentage of raw samples showing toxicity with at least one bioassay increased to 60%. Based on the overall ranking of responses for both COD and the morphology of the test, the Hydra attenuata test was the most sensitive, followed by Daphnia magna. Selenastrum capricornutum was also found to be an efficient and reliable bioassay for toxicity assessment.

**2:30 BIODEGRADATION OF PETROLEUM HYDROCARBON GROUNDWATER IN AN AEROBIC PHARMACEUTICAL WASTEWATER. Yung-Tse Hung Y.HUNG@CSUOHIO.EDU and Nagasekhara Reddy Gorla Reddy@sekhara@yahoo.com, CIVIL AND ENVIRONMENTAL ENGINEERING DEPT, CLEVELAND STATE UNIVERSITY, CLEVELAND OH 44115-2214**

This paper describes a study of a laboratory anaerobic column in bioremediation of petroleum hydrocarbon contaminated groundwater. The objective of the study was to determine the treatment performance of laboratory anaerobic column reactor in removing organic pollutants from the contaminated groundwater. The laboratory anaerobic columns contained aquifer material from a diesel fuel contaminated aquifer. The columns were operated for 65 days at 25°C with artificial groundwater that contained only SO₄²⁻ and CO₃⁻ which served as externally supplied oxidants. After 31 days of column operation, a steady state operation was obtained. For a 14 hour hydraulic detention time, about 0.24 mM SO₄²⁻ were consumed and up to 0.012 mM of dissolved Fe²⁺, up to 0.66 mM of Mn⁴⁺, and up to 0.38 mM of CH₄ were produced. The COD and the organic carbon concentration increased. In the column, n-alkanes were selectively removed while branched alkanes persisted. The contaminated aquifer material contained total hydrocarbon concentration of 1412 mg hydrocarbon/kg of dry weight of aquifer materials. During the 65 days column study 200 mg hydrocarbon/kg dry weight of aquifer materials was removed by biodegradation. The hydrocarbon concentration in the influent effluent of the column reactor was 0.64 mg/L at day 65 of the study. Results indicated that the anaerobic column can be used to remove toluene, p-xylene and naphthalene from contaminated groundwater effectively.

**2:45 BATCH AEROBIC TREATMENT OF A PHARMACEUTICAL WASTEWATER. Yung-Tse Hung Y.HUNG@CSUOHIO.EDU and Ravinder Chowdari V.javanakanti ravisuvanakanti@yahoo.com, CIVIL AND ENVIRONMENTAL ENGINEERING DEPT, CLEVELAND STATE UNIVERSITY, CLEVELAND OH 44115-2214, Ruth Yu-Li Yeh, CHEMICAL ENGINEERING DEPT, MING-HSIN UNIVERSITY OF SCIENCE AND TECHNOLOGY, HSINCHU, TAIWAN**

This objective of the study was to determine the effect of temperature on the treatment efficiency of COD (chemical oxygen demand) from pharmaceutical wastewater by batch activated sludge reactors and a two stage activated sludge reactors. Batch activated sludge reactors were operated at various temperatures from 30 to 70 °C. Soluble COD removal efficiency decreased from 62% to 38% as temperature increased from 30 °C to 60 °C. When temperature was higher than 60°C the aerobic biological treatment was not effective. For the two stage system, the first stage treatment was effective when both reactors were operated at 30 °C compared to the 2 stage treatment system where the temperature was maintained at 55°C and 30°C for the first and second stage, respectively. The first 2-stage system (30 °C and 30 °C) reduced COD from 2800 to 1450 mg/L, while the second 2-stage system (55 °C and 30 °C) reduced COD from 3650 to 1900 mg/L. The results indicated the maximum temperature for pharmaceutical wastewater treatment was from about 60-65 °C. A two stage aerobic treatment system produced a good quality of effluent when both reactors were operated at 30 °C compared to a system where the 2 stage reactors were consecutively operated at 55 and 30 °C, respectively.

**3:00 TREATMENT OF LANDFILL LEACHATE WITH REVERSE OSMOSIS. Yung-Tse Hung Y.HUNG@CSUOHIO.EDU and Rama Krishna Jayavari jayashri123@hotmail.com, CIVIL AND ENVIRONMENTAL ENGINEERING DEPT, CLEVELAND STATE UNIVERSITY, CLEVELAND OH 44115-2214, Howard L. Lo h.lo@csuohio.edu, DEPT OF BIOLOGICAL GEOLOGICAL AND ENVIRONMENTAL SCIENCE, CLEVELAND STATE UNIVERSITY, CLEVELAND OH 44115-2214**

This paper describes the study of landfill leachate by reverse osmosis process. The objective of the study was to determine the treatment efficiency of landfill leachate by membrane processes. Three different types of landfill leachate studied included one leachate from a conventional landfill and two leachates from biodegradable waste. The landfill leachate was from a biodegradable waste site. Dense, composite RO membrane used in the study had 99% NaCl retention at 0.5 wt % NaCl, 4 Mpa, and 15 °C. A linear correlation was found between flux and conductivity for leachate from both the conventional landfill and biodegradable waste sites. The flux was between 3 and 48 L/m²/h. Membrane fouling by CaCO₃ caused reduction of flux. By adjusting pH to below 6.5 membrane fouling was reduced and the flux for biodegradable waste was maintained above 35 L/m²/h. RO membrane removed more than 98% of COD (chemical oxygen demand), and NH₄⁻ from leachate from both the conventional landfill and the biodegradable waste. The salt rejection and osmotic pressure were very high for leachate from the cell containing special waste. The flux was too low for effective RO treatment for this type of leachate.

**3:15 BATCH AND CONTINUOUS REACTOR TREATMENT OF BLACK LIQUOR FROM PULP AND PAPER MILL WASTEWATER. Yung-Tse Hung Y.HUNG@CSUOHIO.EDU and Majid Zarrinafsar, CIVIL AND ENVIRONMENTAL ENGINEERING DEPT, CLEVELAND STATE UNIVERSITY, CLEVELAND OH 44115-2214**

This paper describes the treatment of black liquor from a Kraft pulp and paper mill wastewater by biological treatment processes using Aeromomas formicans. Batch and continuous activated sludge reactors were used in the study. Compressed air was used for mixing and for providing dissolved oxygen for bio-oxidation in the reactors. The black liquor had 11.36 pH, 5400 mg/L COD, 7640 color unit, 2.18 mg/L lignin. The results of batch studies showed that the strain, Aeromomas formicans, removed 71% of COD and 78% of lignin, and 86% color during 10 days of hydraulic detention time. The removal efficiency of COD, color and lignin obtained in continuous reactor studies was 73, 88, and 77%, respectively, during 8 days of hydraulic detention time. First order kinetics was observed for COD, color and lignin removal. The first order rate constant k was 0.43, 0.66, k for COD, color and lignin, respectively. A linear relationship was observed between COD and lignin removal efficiency, and between color and lignin removal efficiency. The bacterial strain used in the study was effective in removing COD, color and lignin from black liquor in pulp and paper mill wastewater.

**3:30 EFFECTS OF HEAVY METAL ON ACTIVATED SLUDGE TREATMENT PROCESS. Yung-Tse Hung Y.HUNG@CSUOHIO.EDU and Majid Zarrinafsar, CIVIL AND ENVIRONMENTAL ENGINEERING DEPT, CLEVELAND STATE UNIVERSITY, CLEVELAND OH 44115-2214, Ruth Yu-Li Yeh, CHEMICAL ENGINEERING DEPT, MING-HSIN UNIVERSITY OF SCIENCE AND TECHNOLOGY, HSINCHU, TAIWAN**

This paper describes the investigation of the effect of selected heavy metals on the treatment performance of activated sludge process. Oxygen uptake rates were measured and heavy metal speciation was determined by the dialysis method. The extracellular polymer of biomass floc was determined by biochemical analysis. The affinity series of the metals in the sludge flocs was: Cu > Cd > Co > Ni > Sb > Zn. Copper was the metal bound most strongly by activated sludge flocs, followed by Cd, Co and Ni. The oxygen uptake measurement were made at 2 concentrations of 1 and 10 mg/l of heavy metal concentration and at 3 levels of MLVSS (mixed liquor volatile suspended solids) of 600, 900 and 1500 mg/L. Duplicate measurements were made. Results indicated that Cu, Cd and Co were inhibitory to the activated sludge process. Zn was not inhibitory at the MLVSS concentrations investigated. The inhibitory effect of Ca, Co and Zn decreased as the MLVSS concentration increased.

**3:45 MICROTOX BIOASSAY OF FOUNDRY SAND RESIDUALS. Yung-Tse Hung Y.HUNG@CSUOHIO.EDU and Zhiqiang Ji Jiang Z.JIANG1@CSUOHIO.EDU, CIVIL AND ENVIRONMENTAL ENGINEERING DEPT, CLEVELAND STATE UNIVERSITY, CLEVELAND OH 44115-2214**

The objective of this paper is to describe the application of a bioassay in assessing the toxicity of foundry sand residuals. The pH ranges between 6.8 and 7.3. The soluble COD for virgin sand leachate was 1410 mg/L, while the second 2-stage system (55 °C and 30 °C) reduced COD from 3650 to 1900 mg/L. The results indicated that 1 mg/l Co and Sb and 10 mg/l Zn were the most inhibitory to the activated sludge process. Zn was not inhibitory at the MLVSS concentrations investigated. The inhibition effect of Ca, Co and Zn decreased as the MLVSS concentration increased.

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4:00 BIOREMEDIATION OF SOIL CONTAMINATED WITH EXPLOSIVES. Yung-Tse Hung y.hung@csuohio.edu AND Sudheer Gudka gudkadesh@gmail.com, Civil and Environmental Engineering Dept, Cleveland State University, Cleveland OH 44115-2214.

This paper describes a study on the remediation of explosive contaminated soils by biograduation processes. The objective was to determine the efficiency of biological treatment methods in removing organic pollutants from the explosive contaminated soils. Explosive contamination soil can be treated with biograduation, phytoremediation, solidification and stabilisation, electro-aided soil washing, treatment of organic waste with bioproduction, membrane technologies, and surfactant enhanced treatment technologies. The biograduation treatment processes described in this study included IOC slurry reactor and soil columns. The soil used in this study had an organic carbon content of 4 to 5%. Soil columns used in the study contained soil of effective size of 0.1 mm and a uniformity coefficient of 4.3. Soil used in the study was mainly contaminated with 4000 to 12,000 mg TNT (2,4,6-trinitrotoluene)/kg soil, 6 to 12 mg NO₃/kg soil. The soil slurry reactors were operated with 15% (w/v) TNT contaminated soil. Molasses was used as co-substrates in both soil columns to enhance bacterial growth and to maximize organic material removal.

4:15 BIOLOGICAL TREATMENT OF EXPLOSIVE CONTAMINATED WASTEWATERS. Yung-Tse Hung y.hung@csuohio.edu and Muhammad Musa Mereb Mereb7@yahoo.com, Civil and Environmental Engineering Dept, Cleveland State University, Cleveland OH 44115-2214.

This paper describes a study on the treatment of explosive contaminated wastewaters by biological treatment processes. The objective of the study was to determine the removal efficiency of organic pollutant from explosive contaminated wastewater by biological treatment method. Treatment methods of explosive contaminated wastewater treatment systems consist of biological treatment processes and physio-chemical treatment processes, which include activated carbon adsorption and UV destruction. A two-stage treatment system consisting of anoxic reactor followed by aerobic reactor was used in the study. The anaerobic stage was used to remove nitrate by denitrification, while the aerobic stage is used for organic pollutant removal by aerobic bacteria. The raw wastewater had 150 mg/L DOC (dissolved organic carbon), 25 mg/L RDX (hexahydro-1,3,5-nitro-1,3,5-triazine), and 450 mg/L nitrate. Fill and draw mode was used in the study. The hydraulic detention time was about 10 days in both anaerobic and aerobic reactors. The sludge age was longer than 30 days for aerobic reactors. MLVSS (mixed liquor volatile suspended solids) in the anoxic and aerobic reactor, respectively, was 760 and 2680 mg/L in the anoxic and aerobic reactor, respectively. Results indicated that the anoxic reactor effluent contained 350 mg/L DOC, 0.1 mg/L nitrate, 2.1 mg/L nitrate, and 7.4 mg/L RDX. The aerobic reactor effluent contained 60.8 mg/L DOC, 1.7 mg/L nitrate, 1.8 mg/L nitrate, and less than 0.5 mg/L RDX. The 2-stage biological treatment process was effective in removing pollutants from explosive containing wastewaters.

4:30 FOOD WASTEWATER TREATMENT BY CHEMICAL COAGULATION. Howard H. Lo h.ho@csuohio.edu, Biological Geographical and Environmental Sciences Dept, Mahdavi latha Batchu mahdahsi@yahoom.com, and Yung-Tse Hung y.hung@csuohio.edu, Civil Engineering Dept, Cleveland State University, Cleveland OH 44115-2214.

This study is to determine the effectiveness of various coagulants on the removal of organic pollutants from food wastewater. Standard jar test was used in the laboratory experiment. The procedures included one minute for rapid mixing, followed by 30 minutes of slow mixing and one hour settling. Supernatant was taken for determination of turbidity and TOC (total organic carbon) tests. Turbidity was measured by a turbidity meter and TOC was determined by TOC analyzer process. Potato wastewater, sugar wastewater, and combined potato/sugar wastewater. The experimental parameters used in this study including three organic strength of wastewater and types and dosage of coagulant. Three organic strength of food wastewater consisted of 50, 125 and 200 mg/L TOC. The coagulants used included aluminum sulfate, ferric sulfate, and ferric chloride with dosages of 2, 4, 6, and 8 mg/L. The lowest turbidity of treated wastewater was 2, 10, and 25 TU (turbidity unit), respectively, with aluminum sulfate, ferric sulfate, and ferric chloride as coagulant. It was found that the low organic strength wastewater had a higher turbidity removal efficiency than the medium and high organic strength wastewater. The highest percent of TOC removal for aluminum sulfate, ferric sulfate, and ferric chloride were 89, 88, and 95%, respectively. The results of this study showed that the ferric chloride had the best TOC removal efficiency, and the aluminum sulfate had the highest rate of turbidity removal among the three types of coagulants used in the study. The low organic strength wastewater had a better TOC and turbidity removal efficiencies than the medium and high organic strength wastewater. The general trend indicated that as the organic strength of wastewater increased the removal efficiency of TOC and turbidity decreased.

4:45 THE SECTION 404 OF THE CLEAN WATER ACT AND MITIGATION ACTIVITIES IN NORTHERN OHIO. Emmanuel K. Mobee emboo@stark.kent.edu, Dept of Geography, Kent State University Stark, 6000 Frank Ave NW, Canton OH 44720.

Section 404 of the Clean Water Act regulates the discharge of dredged and fill material into waters of the United States, including wetlands. This study attempts to determine if proposed mitigation is adhered to after the Section 404 permit process. Data from six Northern Ohio counties (Lucas, Ottawa, Wood, Portage, Summit and Stark) were obtained from the Army Corps of Engineers (ACOE) and examined. The data includes applications received, those issued, those that were denied, applications that were withdrawn, the acreage requested, the number authorized and proposed mitigation between 1990 and 2001. According to the data, these counties requested the filling of 283.5 acres, which the ACOE approved 238.4 acres for filling, and 586.82 acres were proposed for mitigation. The mitigation data is unavailable from the ACOE due to the lack of sufficient manpower to collect the information. Monitoring of mitigation activities is conducted by private environmental organizations within the state of Ohio. Mitigation data is obtained from a private environmental company and indicates that 51.3 acres of wetlands have been mitigated since 2000 through wetland banking. Data from 1990 to 2000 are unavailable.
THE OHIO ENVIRONMENTAL SCIENCE & ENVIRONMENTAL ENGINEERING SCHOLARSHIP PROGRAM

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(3) Attach an *essay describing your reasons for choosing a career in environmental science or environmental engineering and how this scholarship will help you.
(4) Attach an *essay detailing any original research, scholarship, employment and/or internships, or other unique contributions to environmental science or environmental engineering.
(5) Attach an *essay describing your extra curricular activities and participation in organizations that demonstrates your leadership and interpersonal skills and social responsibility.
(6) Attach two letters of recommendation from education or environmental professionals, addressed to Scholarship Review Committee. One must be from a faculty member at your institution.
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15 Bare Residence Hall 52 Robert A. Malcolm Athletic Center
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17 Morey Residence Hall 53 University Bookstore
18 North Cory Street Gazebo 54 Dr. Frank R. and Mary Jane Cosiano Health Center
19 Faculty Offices – Humanities 55 Glenn and Helen Stout Alumni Center
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21 Faculty Offices – Teacher Education 56 Student Housing
22 Faculty Offices – Math 60 Physical Plant Office
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24 Faculty Offices – Graduate Programs 62 Nuclear Medicine Institute
25 International Affairs 63 Frederick Kramer Jr. Memorial Field
26 Offices of Career Placement, Student Employment and Professional Experience Programs 64 Faculty Offices
27 Faculty Offices – Physical Therapy 65-66 Student Housing
28 Faculty Offices – Occupational Therapy 67 Teaching, Learning and Technology Center
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29a W. Robert and Marilyn Y. Brewer Lecture Hall (BCHS100) 69a Marilyn and Gordon Macklin Intergenerational Institute
30 Faculty Offices – Physician Assistant 69b Winnebunner Residence Hall
31 Nature Center 70 Zahler Townhouses
32 Bucher Center/Counseling Services 71-72 University Townhouses
33 Denning Residence Hall 73 Owens Community College Findlay Camus
33a Rosewood Room 74 Physical Plant Shipping & Receiving
34 Henderson Dining Hall 75 University Townhouses
35 Lovett Residence Hall 76-77 Student Housing
36 Winnebunner Theological Seminary 78 Physical Therapy
37 Faculty Offices – History & Political Science 79 Occupational Therapy

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From Toledo, Michigan, Canada (Approximately 1 hour from Toledo)
- I-75 south to Findlay, Exit 159
- Left (east) on US 224
- Right on Morey Ave.
- Left on Davis St.

From Cleveland, Northern PA, New York (Approximately 2 hours from Cleveland)
- Ohio Turnpike west to Toledo, Exit 84
- Exit 64 to I-75 south
- I-75 south to Findlay, Exit 159
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From Akron, Youngstown, Pennsylvania (Approximately 2.5 hours from Akron)
- US 224 west into Findlay
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- Left on Frazer St.
- Right on Morey Ave.
- Right on Davis St.

From Dayton, Cincinnati, Kentucky (Approximately 3.5 hours from Cincinnati)
- I-75 north to Findlay, Exit 159
- Right (east) on US 224
- Right on Morey Ave.
- Left on Davis St.

From Fort Wayne (Approximately 2 hours from Fort Wayne)
- SR 30 east on US 224 (Ohio into Findlay)
- Right on Morey Ave.
- Left on Davis St.

From Northern Indiana, Chicago (Approximately 5 hours from Chicago)
- Indiana Toll Road (I-80, I-90 east) to Ohio Turnpike
- Ohio Turnpike east to I-75 south at Toledo
- I-75 south to Findlay, exit 159
- Left on Frazer St.
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- Left on