

XAVIER

Department of Biology

Senior Research Symposium

April 26, 27, 28, 29, 2004

Albers Hall - 307

Session One: Monday, April 26, 2004 10:30 a.m.
Section 01 lab

Moderator: Mr. Nourian

10:30 Introduction

10:40 EVALUATING THE RELATIONSHIP BETWEEN H₂O₂-ASSOCIATED
OXIDATIVE STRESS AND VHL PROTEIN
Lauren Ashbrook and Patrick Owski (Dr. Waltke Paulding)

Many environmental factors, including hypoxia, can induce oxidative stress. Cells that are subjected to oxidative stress often generate reactive oxygen species (ROS), which include hydrogen peroxide (H₂O₂). Familial von Hippel-Lindau (VHL) disease develops in individuals who are born heterotrophic for the wild-type VHL gene, and who subsequently lose the remaining wt-VHL allele due to mutation. Excessive, unregulated quantities of ROS are known to damage cellular macromolecules, including proteins, lipids, and nucleic acids. We are currently examining the oxidative status of cells that express (wt-VHL) or lack (mut-VHL) the VHL protein, as a decrease in a cell's ability to maintain "oxidative homeostasis" may be related to DNA damage, and expression of VHL pathology. Results from experiments in which H₂O₂ production was measured in VHL(+) or VHL(-) cell lines, under either normoxic (21% O₂) or hypoxic (1% O₂) conditions, revealed higher, basal amounts of H₂O₂ in VHL(-) cells in normoxic conditions, as contrasted to VHL(+) cells. Hypoxia reduced production of H₂O₂ in both VHL(+) and VHL(-) cell lines. Confirmation of these results using a different method of H₂O₂ measurement and the evaluation of expression levels of enzymes involved in the oxidative stress pathway continue.

11:00 THE EFFECT OF STREAM MODIFICATIONS ON MACROINVERTEBRATE DIVERSITY IN THE MILL CREEK.

Xerxeser I. Kayode. (Dr. Stanley Hedeem)

In order to evaluate the effects of stream modifications such as channelization on the diversity of macroinvertebrate species in the Mill Creek, 19 different macroinvertebrates were collected from seven sites along the Mill Creek. Organisms were identified and compared with their respective site. Stream modifications were expected to produce a lower population size in diversity than those areas that did not possess, or minimally possessed, any kind of stream modification. The effects of pollution were eliminated as a variable because pollution-sensitive macroinvertebrates were found at each sampling site. The study showed that diverse communities of macroinvertebrate species were more abundant in the natural sites than in channelized sites.

11:20 THE EFFECT OF WAVELENGTH OF LIGHT ON NITROGEN FIXATION RATE IN *ANABAENA*

Kevin P Hartman and Domantas Gurevicius (Dr. Linda Finke)

Previous studies have shown that light intensity and quality of light have an impact on the rate of nitrogen fixation in phototrophic, nitrogen fixing organisms. *Anabaena* was chosen for this study because it is a commonly studied nitrogen fixing organism, it is found abundantly, and it is easily cultured. This study was performed to determine if *Anabaena* exposed to different wavelengths of light from the visible spectrum would exhibit different rates of nitrogen fixation. Cultures were exposed to light from the red, green and blue portions of the visible spectrum, as well as to white light, for one week. Acetylene reduction assays were performed daily for three days to measure the rate of nitrogen fixation in each culture. Over the duration of the experiment, the control sample with white light fixed nitrogen at the highest rate. Of the experimental samples, the red sample fixed nitrogen at the highest rate.

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Session Two: Monday, April 26, 2004 2:30 p.m.

Section 02 lab

Moderator: Mr. Farnsworth

2:30 Introduction

2:40 MANATEE DIRECTIONAL RESPONSE TO SOUND. AVOIDANCE AND BEHAVIORAL EFFECTS OF AUDIBLE VS ULTRAHIGH FREQUENCIES.

Christopher Kluener, Sara Nine, Thomas Oppold, Matthew Palmer, Allegra Tenkman, Whitney Thornton (Dr. Charles Grossman)

Our group has been studying acoustical responses and associated behaviors in manatees to learn why they are killed in boat collisions in Florida. Previously we reported (U. Utah, 2003 NCUR) that manatees at the Cincinnati Zoo demonstrated significant positive avoidance responses (Stoneman $p=0.035$, Douglas $p=0.01$) when exposed to audible mixed frequencies (10 kHz, 15 kHz, 2 Hz repeat). We now report on the effects to ultrahigh mixed frequencies (25 kHz, 35 kHz, 2 Hz repeat) in these same animals. Generated sounds at 130 dB were projected in the manatee tank which was divided into 13 quadrants and behaviors were videotaped and transcribed by observers, and vocalizations recorded. Data was transferred into Excel spread sheets and analyzed statistically. In studying quadrants traversed there was no significant differences between ultrasonics (0.038 ± 1.063 $n=238$) and controls (0.026 ± 1.326 , $n=62$) nor was there any differences in the stress behavior we describe as huddling responses. However, we are still reviewing the data on positive avoidance responses. As in our previous studies Stoneman demonstrated significantly greater general motility than did Douglas ($p=0.0000005$). We are also in the process of reviewing our behavioral video tapes to ascertain time/quadrant/location utilizing the J Watcher program.

3:00 IDENTIFICATION OF SEROTONIN RECEPTORS LOCATED ON LACTATING
MOUSE MAMMARY GLAND EPITHELIUM

Brett Friesen, Chereasa Re'nee Williams (Dr. George Jacob)

Mammary gland epithelia grow and differentiate in response to prolactin, which induces the production of serotonin. It is known that these mammary cells not only produce serotonin but also have mRNA for serotonin receptors, specifically 5-HT_{2A} (Matsuda, *et al.* 2004). Therefore, serotonin may have an autocrine/paracrine function. Lactating mouse mammary gland was homogenized; membranes were purified via centrifugation and assayed by immunoblot using anti-5-HT_{2A} antibodies. It was anticipated that receptor 5-HT_{2A}, a 55 kD protein would be present in immunoblot analysis of mammary gland epithelial membrane extracts since the mRNA for this receptor was found in the mammary gland epithelium. However, our initial analysis failed to support this prediction.

3:20 SEQUENCING OF A POSSIBLE INTERMEDIATE FILAMENT GENE IN
ASPERGILLUS NIDULANS

Melissa Klabunde, Abby Loftus, Cory Mehl, Victoria Raymond, Jeremy Sullenberger
(Dr. Dorothy Engle)

Intermediate filaments in vertebrates are a component of the cytoskeleton that function to maintain cell shape and hold organelles and the nucleus in the cell. A PCR fragment from mouse intermediate filament DNA was used to mark a similar genetic sequence in *Aspergillus nidulans*. The genetic sequence that was marked was isolated and then partially sequenced. There were no similar gene sequences found when the isolated sequence was run through online databases. Future research will be needed to complete sequencing and to find the function of this gene in *Aspergillus nidulans*.

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Session Three: Monday, April 26, 2004 4:30 p.m.

Section 03 lab

Moderator: Mr. Hinn

4:30 Introduction

4:40 EFFECTS OF INTERLEUKIN-6 SOLUBLE RECEPTOR FRAGMENT ON BOVINE LEFT ANTERIOR DESCENDING CORONARY ARTERIES
Rob Alunday, Jackie Carpenter, Angela DiCarlo, Kristen Habash, Jeff Hill, Kat Muhlbachler, Christy Miller (Dr. Lisa Close-Jacob)

Previous studies have shown a relationship between increased interleukin-6 (IL-6) levels and a reduction in endothelium-dependent relaxation in coronary arteries. Although the mechanism of this reduction is unknown, cell reception of IL-6 involves the release of Interleukin-6 soluble receptor fragment (IL-6 SRF). Changes in force in rings of bovine left anterior descending coronary arteries were measured during the administration of U46619, experimental treatments, and bradykinin. Relaxation with the addition of bradykinin was expressed as a percentage of U46619-induced contraction. Results showed no reduction of bradykinin-induced relaxation by IL-6 (65.75%) or IL-6 SRF (71.70%) as compared to a vehicle only control (65.37%). These results suggest that IL-6 does not hinder bradykinin-induced relaxation and that IL-6 SRF may actually promote such relaxation.

5:00

THE EFFECT OF THE INSECTICIDE MALATHION ON NITROGEN FIXATION
IN *ANABAENA*

Tara M. Weinmann and Jeffrey M. Callis (Dr. Linda Finke)

The purpose of this investigation was to study the effects of the insecticide Malathion on the ability of *Anabaena* to fix nitrogen. It was hypothesized that because of the high toxicity of Malathion, the nitrogen fixing ability of *Anabaena* would decrease as the concentration of Malathion increased. Malathion was added to cultures of *Anabaena* in concentrations of 0.2%, 0.02%, and 0.002%. Immediately following the addition of Malathion, the cultures were tested for nitrogen fixing ability every 30 minutes over a three hour period. The ability of *Anabaena* to fix nitrogen was measured using an acetylene reduction assay. At the lowest concentration (0.002%) no change in nitrogen fixing ability was seen. At 0.02% concentration nitrogen fixation was slightly inhibited. At recommended dosage (0.2%) nitrogen fixation was almost completely inhibited.

5:20

SEQUENCING OF A POSSIBLE INTERMEDIATE FILAMENT GENE IN
ASPERGILLUS NIDULANS

Melissa Klabunde, Abby Loftus, Cory Mehl, Victoria Raymond, Jeremy Sullenberger
(Dr. Dorothy Engle)

Intermediate filaments in vertebrates are a component of the cytoskeleton that function to maintain cell shape and hold organelles and the nucleus in the cell. A PCR fragment from mouse intermediate filament DNA was used to mark a similar genetic sequence in *Aspergillus nidulans*. The genetic sequence that was marked was isolated and then partially sequenced. There were no similar gene sequences found when the isolated sequence was run through online databases. Future research will be needed to complete sequencing and to find the function of this gene in *Aspergillus nidulans*.

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Session Four: Tuesday, April 27, 2004 8:00 a.m.

Section 04 lab

Moderator: Mr. Nourian

8:00 Introduction

8:10 EFFECTS OF STREAM MODIFICATIONS ON MACROINVERTEBRATE
DIVERSITY IN THE MILL CREEK, CINCINNATI, OHIO
Lauren M. Gertz (Dr. Stanley Hedeon)

The purpose of this experiment was to study the effects of channelization on macroinvertebrate diversity. Seven different sites on the Mill Creek and its tributaries in Cincinnati, Ohio were the location of the gathering of these different species. At these sites as many macroinvertebrate organisms were collected as possible. The species were identified and then classified as either pollution-sensitive, pollution-intermediate, or pollution-tolerant. Macroinvertebrate diversity seemed to decrease in urban settings, characterized by channelization, compared to more natural, unchannelized areas. The average number of different species found in the unchannelized areas was nine species and the average number of different species found in the channelized areas was six species.

8:30

THE EFFECT OF THE INSECTICIDE MALATHION ON NITROGEN FIXATION
IN *ANABAENA*

Tara M. Weinmann and Jeffrey M. Callis (Dr. Linda Finke)

The purpose of this investigation was to study the effects of the insecticide Malathion on the ability of *Anabaena* to fix nitrogen. It was hypothesized that because of the high toxicity of Malathion, the nitrogen fixing ability of *Anabaena* would decrease as the concentration of Malathion increased. Malathion was added to cultures of *Anabaena* in concentrations of 0.2%, 0.02%, and 0.002%. Immediately following the addition of Malathion, the cultures were tested for nitrogen fixing ability every 30 minutes over a three hour period. The ability of *Anabaena* to fix nitrogen was measured using an acetylene reduction assay. At the lowest concentration (0.002%) no change in nitrogen fixing ability was seen. At 0.02% concentration nitrogen fixation was slightly inhibited. At recommended dosage (0.2%) nitrogen fixation was almost completely inhibited.

8:50

SEQUENCING OF A POSSIBLE INTERMEDIATE FILAMENT GENE IN
ASPERGILLUS NIDULANS

Melissa Klabunde, Abby Loftus, Cory Mehl, Victoria Raymond, Jeremy Sullenberger (Dr. Dorothy Engle)

Intermediate filaments in vertebrates are a component of the cytoskeleton that function to maintain cell shape and hold organelles and the nucleus in the cell. A PCR fragment from mouse intermediate filament DNA was used to mark a similar genetic sequence in *Aspergillus nidulans*. The genetic sequence that was marked was isolated and then partially sequenced. There were no similar gene sequences found when the isolated sequence was run through online databases. Future research will be needed to complete sequencing and to find the function of this gene in *Aspergillus nidulans*.

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Session Five: Tuesday, April 27, 2004 10:10 a.m.

Section 05 lab

Moderator: Mr. Nourian

10:10 Introduction

10:20 THE PHARMACOGENOMICS OF METHOTREXATE: A DISEASE MODIFYING
ANTI-RHEUMATIC DRUG USED IN THE TREATMENT OF JUVENILE
RHEUMATOID ARTHRITIS
Jon Lenihan, (Paul Rosen M.D., David Glass M.D)

Juvenile Rheumatoid Arthritis (JRA) is the most common chronic joint disease among children, affecting approximately 1-3 children per 1000. Disease etiology is not completely known, but genetic and environmental factors are known to contribute to disease onset, course response to medication, and eventual outcome. In patients with JRA, methotrexate (MTX) often alleviates arthritic joint inflammation by actively inhibiting several enzymes involved in the biosynthesis of purines, pyrimidines, and polyamines, thereby preventing further cell growth and proliferation through the inhibition of DNA synthesis. Unfortunately, some 30-40% of patients do not benefit from treatment with MTX or respond adversely. It is likely that the capacity to respond or fail to respond to MTX is genetically determined. Using a cohort of 193 JRA patients, this study aims to help optimize treatment with MTX by determining which genetic factors, if any, are associated with efficacy of MTX treatment. Thirty-three genes known to be involved in folate metabolism, drug transport and receptor molecules, and drug metabolizing enzymes were identified from earlier studies and the literature. Preliminary data analysis show statistical significance ($p = 0.0057$, $\chi^2 = 7.635$) concerning the potential involvement of the UGT2b gene cluster on chromosome 4q13 in drug responder phenotype. This gene family has not been extensively studied and requires further and more thorough investigation.

10:40

MANATEE DIRECTIONAL RESPONSE TO SOUND. AVOIDANCE AND BEHAVIORAL EFFECTS OF AUDIBLE VS ULTRAHIGH FREQUENCIES.

Christopher Kluener, Sara Nine, Thomas Oppold, **Matthew Palmer**, Allegra Tenkman, Whitney Thornton (Dr. Charles Grossman)

Our group has been studying acoustical responses and associated behaviors in manatees to learn why they are killed in boat collisions in Florida. Previously we reported (U. Utah, 2003 NCUR) that manatees at the Cincinnati Zoo demonstrated significant positive avoidance responses (Stoneman $p=0.035$, Douglas $p=0.01$) when exposed to audible mixed frequencies (10 kHz, 15 kHz, 2 Hz repeat). We now report on the effects to ultrahigh mixed frequencies (25 kHz, 35 kHz, 2 Hz repeat) in these same animals. Generated sounds at 130 dB were projected in the manatee tank which was divided into 13 quadrants and behaviors were videotaped and transcribed by observers, and vocalizations recorded. Data was transferred into Excel spread sheets and analyzed statistically. In studying quadrants traversed there was no significant differences between ultrasonics (0.038 ± 1.063 $n=238$) and controls (0.026 ± 1.326 , $n=62$) nor was there any differences in the stress behavior we describe as huddling responses. However, we are still reviewing the data on positive avoidance responses. As in our previous studies Stoneman demonstrated significantly greater general motility than did Douglas ($p=0.0000005$). We are also in the process of reviewing our behavioral video tapes to ascertain time/quadrant/location utilizing the J Watcher program.

11:00

THE EFFECTS OF STREAM CHANNELIZATION ON THE MACROINVERTEBRATE DIVERSITY AT SEVEN SITES ALONG THE MILL CREEK IN HAMILTON COUNTY, OHIO

Elizabeth J. Norris (Dr. Stanley Hedeon)

The quality of a free flowing body of water can be affected by a number of factors including pollution and channelization, both of which have been found in past studies to decrease the quantity of macroinvertebrates and their habitat. Channelization can result in a decreased availability of suitable stream bottom substrate for aquatic organisms. This study found a greater number of macroinvertebrate species in unchannelized areas when compared to channelized areas of the same section of stream. No overall trend was observed between channelized and unchannelized stream segments in different areas. Streams are complex ecosystems with many variables and factors at play and perhaps some other variable such as the degree of urbanization or time of sampling could explain the difference between the actual and the expected results.

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Session Six: Tuesday, April 27, 2004 2:30 p.m.

Section 06 lab

Moderator: Mr. Nourian

2:30 Introduction

2:40 **THE EFFECTS OF IL-6SRF ON BOVINE LAD CORONARY ARTERIES**
Rob Alunday, Jacqueline Carpenter, Angela DiCarlo, Kristen Habash, Jeffery Hill,
Kat Muhlbachler, Christy Miller (Dr. Lisa Close-Jacob)

Previous studies have shown a relationship between increased interleukin-6 (IL-6) levels and a reduction in endothelium-dependent relaxation in coronary arteries. Although the mechanism of this reduction is not known, cell reception of IL-6 involves the release of interleukin-6 soluble receptor fragment (IL-6sRF). Changes in force in rings of bovine left anterior descending coronary arteries were measured during the administration of U46619, experimental treatments, and bradykinin. Relaxation with the addition of bradykinin was expressed as a percentage of U46619-induced contraction. Results showed no reduction of bradykinin-induced relaxation by IL-6 (66.6%) or IL-6sRF (78.12%) as compared to a vehicle-only control (65.98%).

3:00

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ASPERGILLUS NIDULANS

Melissa Klabunde, Abby Loftus, Cory Mehl, Victoria Raymond, Jeremy Sullenberger
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3:20

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BEHAVIORAL EFFECTS OF AUDIBLE VS ULTRAHIGH FREQUENCIES.

Christopher Kluener, Sara Nine, Thomas Oppold, Matthew Palmer, Allegra Tenkman,
Whitney Thornton (Grossman)

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Session Seven: Tuesday, April 27, 2004 4:30 p.m.

Section 07 lab

Moderator: Mr. Hinn

4:30 Introduction

4:40 SERUM NEUROBIOMARKERS AS A POSSIBLE DIAGNOSTIC TOOL IN CASES OF CLOSED HEAD INJURY IN CHILDREN

Andrea L. Jester, Dena K. Krishnan (Dr. Daniel Lindberg)

The objective of this study was to determine if the neurobiomarker, C-tau, would be a feasible indicator of head injury in children, specifically in children who have been shaken. C-tau is a cleaved form of the protein MAP-tau, a cytoskeletal protein found in neurons, which can be found in the serum. The presence of C-tau in the serum was expected in the children who had a known head injury while it was not expected in children with no head injury. Children under the age of three were recruited from the Cincinnati Children's Hospital Medical Center, and serum was collected from patients who met the inclusion/exclusion criteria and whose family consented to participate. Levels of C-tau were detected in a significant number of children with closed head injury ($p \leq 0.01$) while children without a head injury had no detectable levels of C-tau.

5:00

THE EFFECT OF INTERLEUKIN-6 SOLUBLE RECEPTOR FRAGMENT ON BOVINE CORONARY ARTERIES

Robert Alunday, Jacqueline Carpenter, Angela DiCarlo, **Kristen Habash**, Jeffrey Hill, Kat Mihlbachler, Christy Miller (Dr. Lisa Close-Jacob)

Previous studies have shown a relationship between increased interleukin-6 (IL-6) levels and a reduction in endothelium-dependent relaxation in coronary arteries. Although the mechanism of this reduction is not known, cell reception of IL-6 involves the release of interleukin-6 soluble receptor fragment (IL-6sRF). Changes in force in rings of bovine left anterior descending coronary arteries were measured during the administration of U46619, experimental treatments, and bradykinin. Relaxation with the addition of bradykinin was expressed as a percentage of U46619-induced contraction. Results showed no reduction of bradykinin-induced relaxation by IL-6 (65.75%) or IL-6sRF (71.70%) as compared to a vehicle-only control (65.37%).

5:20

FREQUENCY MODULATION IN MALE-TO-MALE ACOUSTICAL COMMUNICATION IN THE FLORIDA MANATEE

Christopher J. Klueners (Dr. Charles J. Grossman)

Since Florida manatees are solitary mammals, it is assumed there is little communication between adults. Thus, most manatee vocalizations are believed to be primarily between mothers and calves. Current research focuses on identifying individual manatees according to their vocalizations, as well as comparing vocalization differences between subspecies of West Indian manatees. However the extent of adult vocal communication and the call structure of manatee vocalizations are unknown. The aim of this research is to determine if frequency modulation is used as an information vehicle in male-to-male communication of the Florida manatee. Two male manatees are housed at the Cincinnati Zoo and Botanical Garden where digital recordings, between 10Hz and 50 kHz, were obtained twice weekly for 6 months. Currently, vocalizations have been collected for two manatees and collection on a third continues. The recordings are then paused into individual vocalizations and multiple frequency-based variables are measured using a custom designed computer program. Next, the vocalizations will be categorized according to different frequency modulation patterns using a multivariate statistical analysis, such as principle component analysis. Preliminary data heavily suggests that vocalizations are more varied than the stereotypical frequency modulating aching pattern current papers suggest, with some harmonics reaching 50 kHz.

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Department of Biology

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Albers Hall - 307

Session Eight: Wednesday, April 28, 2004 10:30 a.m.

Section 01 lab

Moderator: Mr. Nourian

10:30

THE EFFECTS OF INTERLEUKIN-6 SOLUBLE RECEPTOR FRAGMENT ON BOVINE CORONARY ARTERIES

Robert L. Alunday, **Jacqueline M. Carpenter**, Angela M. DiCarlo, Kristen B. Habash, Jeffery M. Hill, Kathryn A. Mihlbachler, Christine M. Miller (Dr. Lisa Close-Jacob)

Previous studies have shown a relationship between increased interleukin-6 (IL-6) levels and a reduction in endothelium-dependent relaxation in coronary arteries. Although the mechanism of this reduction is not known, cell reception of IL-6 involves the release of interleukin-6 soluble receptor fragment (IL-6sRF). Changes in force in rings of bovine left anterior descending coronary arteries were measured during the administration of U46619, experimental treatments, and bradykinin. Relaxation with the addition of bradykinin was expressed as a percentage of U46619-induced contraction. Results showed no reduction of bradykinin-induced relaxation by IL-6 (65.75%) or IL-6sRF (71.70%) as compared to a vehicle-only control (65.37%).

10:50

COMPARISON OF THE CRANIODENTAL MORPHOLOGY AMONG FOUR SPECIES OF HERBIVOROUS AND OMNIVOROUS CARNIVORES.

Angelica A. Falcone (Dr. William Anyonge)

The mammalian order Carnivora consists predominantly of species that ingest meat as the major component of their diet. A few species such as the black bear (*Ursus americanus*) and raccoon (*Procyon lotor*) display omnivorous feeding behavior, whereas others such as the red panda (*Ailurus fulgens*) and the giant panda (*Ailuropoda melanolueca*) are herbivorous. In this study, the relationship between diet and craniodental morphology was investigated within these feeding groups. It was hypothesized that the red and giant pandas would show similar adaptations for feeding on their specialized diet (bamboo). Similarly, the omnivorous black bear and raccoon would be expected to show convergence in craniodental morphology. Our results indicate that the herbivorous species have larger moment arms for jaw muscles, and shorter out-levers to the cheek teeth compared to the omnivorous species. These features are consistent with adaptations for feeding on tough diets that requires increased mechanical advantage of jaw musculature.

11:10

MANATEE DIRECTIONAL RESPONSE TO SOUND. AVOIDANCE AND BEHAVIORAL EFFECTS OF AUDIBLE VS ULTRAHIGH FREQUENCIES.

Christopher Kluener, Sara Nine, Thomas Oppold, Matthew Palmer, Allegra Tenkman, **Whitney Thornton** (Dr. Charles Grossman)

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Session Nine: Wednesday, April 28, 2004 2:30 p.m.

Section 02 lab

Moderator: Dr. Farnsworth

2:30 EFFECTS OF IL-6sRF ON BOVINE LAD CORONARY ARTERIES
Rob Alunday, Jacqueline Carpenter, Angela DiCarlo, Kristen Habash, Jeffery Hill, Kat Mihlbachler, Christy Miller (Dr. Lisa Close-Jacob)

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2:50 **EFFECTS OF STREAM MODIFICATIONS ON MACROINVERTEBRATE
DIVERSITY IN THE MILL CREEK AND ITS TRIBUTARIES**
Joseph C. Cionni (Dr. Stanley Heeden)

This study attempted to discover what effects, if any, urbanization, or stream modifications, had on the macroinvertebrate diversity of the Mill Creek and its tributaries. Stream modifications, namely pollution and channelization, were both expected to cause a decrease in macroinvertebrate diversity. Seven sites were sampled along the Mill Creek with half being modified and half unmodified. Species were collected, sorted, and identified followed by another identification as to which species were able to live with pollution and which were not. The effects of channelization caused a smaller group of macroinvertebrates to be collected from channelized sites than unchannelized, while pollution intolerant macroinvertebrates were found at all sites.

3:10 Elliott Blodgett – Abstract not available.

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Department of Biology

Senior Research Symposium

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Albers Hall - 307

Session Ten: Wednesday, April 28, 2004 4:30 p.m.
Section 03 lab

Moderator: Mr. Hinn

4:30 THE EFFECTS OF STREAM MODIFICATIONS ON MACROINVERTEBRATE
DIVERSITY IN THE MILL CREEK
Katherine E. Kling (Dr. Stanley Hedeon)

The assessment of the macroinvertebrate diversity of the Mill Creek in Cincinnati, OH was undertaken in order to determine how the modifications of the creek had affected the biodiversity of the stream. The factors affecting biodiversity were pollution and the channelization of the creek bed. Categorizing the fauna samples according to level of pollution tolerance showed no correlation between pollution and lack of biodiversity. The data showed that the primary factor resulting in the decrease in macroinvertebrate diversity was the channelization of the creek.

4:50 IDENTIFICATION OF SEROTONIN RECEPTORS LOCATED ON LACTATING MOUSE MAMMARY GLAND EPITHELIUM

Brett Friesen, Chereasa Re'nee Williams (Dr. George Jacob)

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5:10 MANATEE DIRECTIONAL RESPONSE TO SOUND. AVOIDANCE AND BEHAVIORAL EFFECTS OF AUDIBLE VS ULTRAHIGH FREQUENCIES.

Christopher Kluener, Sara Nine, Thomas Oppold, Matthew Palmer, Allegra Tenkman, Whitney Thornton (Dr. Charles Grossman)

Our group has been studying acoustical responses and associated behaviors in manatees to learn why they are killed in boat collisions in Florida. Previously we reported (U. Utah, 2003 NCUR) that manatees at the Cincinnati Zoo demonstrated significant positive avoidance responses (Stoneman $p=0.035$, Douglas $p=0.01$) when exposed to audible mixed frequencies (10 kHz, 15 kHz, 2 Hz repeat). We now report on the effects to ultrahigh mixed frequencies (25 kHz, 35 kHz, 2 Hz repeat) in these same animals. Generated sounds at 130 dB were projected in the manatee tank which was divided into 13 quadrants and behaviors were videotaped and transcribed by observers, and vocalizations recorded. Data was transferred into Excel spread sheets and analyzed statistically. In studying quadrants traversed there was no significant differences between ultrasonics (0.038 ± 1.063 $n=238$) and controls (0.026 ± 1.326 , $n=62$) nor was there any differences in the stress behavior we describe as huddling responses. However, we are still reviewing the data on positive avoidance responses. As in our previous studies Stoneman demonstrated significantly greater general motility than did Douglas ($p=0.0000005$). We are also in the process of reviewing our behavioral video tapes to ascertain time/quadrant/location utilizing the J Watcher program.

XAVIER

Department of Biology

Senior Research Symposium

April 26, 27, 28, 29, 2004

Albers Hall - 307

Session Eleven: Thursday, April 29, 2004 8:00 p.m.

Section 04 lab

Moderator: Mr. Nourian

8:00 THE EFFECT OF CHANNELIZATION AND POLLUTION ON
MACROINVERTEBRATE DIVERSITY IN THE MILL CREEK
Michael J. Rahn (Dr. Stanley Hedeem)

The purpose of this study was to find the effect of channelization and pollution on the macroinvertebrate population of the Mill Creek. This was carried out by collecting macroinvertebrates from seven different sites along the creek. The species collected at each site were identified and recorded. Pollution was determined by the presence or absence of pollution intolerant macroinvertebrates. The Mill Creek was found to be unpolluted at all sites tested. The hypothesis was supported by the results: sites that were unchannelized had a greater diversity of macroinvertebrates than sites that were channelized.

- 8:20 Effects of IL-6sRF on Bovine LAD Coronary Arteries
Rob Alunday, Jacqueline Carpenter, Angela DiCarlo, Kristen Habash, Jeffrey Hill,
Kat Mihlbachler, and **Christy Miller** (Dr. Lisa Close-Jacob)

Previous studies have shown a relationship between increased interleukin-6 (IL-6) levels and a reduction in endothelium-dependent relaxation in coronary arteries. Although the mechanism of this reduction is not known, cell reception of IL-6 involves the release of interleukin-6 soluble receptor fragment (IL-6sRF). Changes in force in rings of bovine left anterior descending coronary arteries were measured during the administration of U46619, experimental treatments, and bradykinin. Relaxation with the addition of bradykinin was expressed as a percentage of U46619-induced contraction. Results showed no reduction of bradykinin-induced relaxation by IL-6 (65.75%) or IL-6sRF (71.70%) as compared to a vehicle only control (65.37%).

- 8:40 THE PREVELANCE OF AUTISM IN THE SOUTHWEST REGION OF OHIO
William J. Freeman II (Dr. Cynthia Molloy)

This center-based surveillance study attempted to determine the prevalence of Autism Spectrum Disorders (ASD) in children within the southwest region of Ohio. According to recent studies, ASD prevalent rates are significantly higher than similar prevalent rates recorded just 11 years ago. The population of this study was children that were between the ages of 6 and 10 at any point throughout the 2003 study year and whose parents were residents of Butler, Clermont, Hamilton, Montgomery, and Warren counties in the southwest region of Ohio. All cases were acquired through the clinical database at The Kelly O'Leary Center for Autism Spectrum Disorders (TKOC) at the Cincinnati Children's Hospital Medical Center. The prevalence estimate for all five counties was 2.2 per 1000. However, Montgomery County's prevalent rate was significantly different from the other four counties at a 95% confidence interval. Thus, the estimated prevalent rate for the four counties other than Montgomery was 2.7 per 1000 (95% CI = 2.4 – 3.0). A prevalent rate of 2.7 per 1000 suggests that ASD has become more prevalent compared to the prevalent rates from just 11 years ago.

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Senior Research Symposium

April 26, 27, 28, 29, 2004

Albers Hall - 307

Session Twelve: Thursday, April 29, 2004 10:10 p.m.

Section 05 lab

Moderator: Mr. Nourian

10:10 EFFECTS OF INTERLEUKIN 6 SOLUBLE RECEPTOR FRAGMENT ON BOVINE CORONARY ARTERIES

Robert L. Alunday, Jacqueline Carpenter, Angela DiCarlo, Kristen Habash, Jeffery M. Hill, Kat Mihlbachler, Christy Miller (Close-Jacob)

Previous studies have shown a relationship between increased interleukin-6 (IL-6) levels and a reduction in endothelium-dependent relaxation in coronary arteries. Although the mechanism of this reduction is not known, cell reception of IL-6 involves the release of interleukin-6 soluble receptor fragment (IL-6sRF). Changes in force in rings of bovine left anterior descending coronary arteries were measured during the administration of U46619, experimental treatments, and bradykinin. Relaxation with the addition of bradykinin was expressed as a percentage of U46619-induced contraction. Results showed no reduction of bradykinin-induced relaxation by IL-6 (65.75%) or IL-6sRF (71.70%) as compared to a vehicle-only control (65.37%).

10:30 THE EFFECT OF WAVELENGTH OF LIGHT ON NITROGEN FIXATION RATE
IN *ANABAENA*

Kevin P Hartman and Domantas Gurevicius (Dr. Linda Finke)

Previous studies have shown that light intensity and quality of light have an impact on the rate of nitrogen fixation in phototrophic, nitrogen fixing organisms. *Anabaena* was chosen for this study because it is a commonly studied nitrogen fixing organism, it is found abundantly, and it is easily cultured. This study was performed to determine if *Anabaena* exposed to different wavelengths of light from the visible spectrum would exhibit different rates of nitrogen fixation. Cultures were exposed to light from the red, green and blue portions of the visible spectrum, as well as to white light, for one week. Acetylene reduction assays were performed daily for three days to measure the rate of nitrogen fixation in each culture. Over the duration of the experiment, the control sample with white light fixed nitrogen at the highest rate. Of the experimental samples, the red sample fixed nitrogen at the highest rate.

Aspergillus nidulans.

10:50 PEAK FLOW METER USE AND FUNCTIONAL OUTCOME IN CHILDREN WITH
ASTHMA

Peter J. Dowiatt (Michelle D. Stevenson, MD, Jocelyn Biagini, Richard M. Ruddy, MD, Gurjit Khurana Hershey, MD PhD)

Asthma is a chronic airway inflammatory disorder characterized by tightening of the chest, wheezing, and breathlessness. Our study aimed to determine the relationship between peak-flow meter usage compliance and quality of life. We expected more stringent compliance with peak-flow meter use would correlate to a higher physical outcome score, indicating a better quality of life. Children between the ages of five and twelve with a history of asthma were enrolled in the study. Children were recruited as part of a convenience sample from the CCHMC Emergency Department and Allergy Clinic. Primary caregivers completed the Children's Health Survey for Asthma, a quality of life measure. Survey data was analyzed using SAS system for windows version 8.02 statistical package, using PROC REG, a method of linear regression. We found that stringent compliance with peak flow meter use did not result in higher physical outcome scores.

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Session Thirteen: Thursday, April 29, 2004 2:30 p.m.

Section 06 lab

Moderator: Mr. Nourian

2:30 SERUM NEUROBIOMARKIERS AS A POSSIBLE DIAGNOSTIC TOOL IN CASES OF CLOSED HEAD INJURY IN CHILDREN

Dena K. Krishnan, Andrea L. Jester (Dr. Daniel Lindberg)

By comparing the levels of the C-tau protein in the sera of children who have suffered head trauma against well and ill children without head injury, our objective is to determine if C-tau can determine whether an apparent or occult head injury in a young child is consistent with inflicted head injury, termed shaken baby syndrome. The presence of C-tau, a neurobiomarker cleaved from the protein MAP-tau, was expected in the sera of children who had suffered head injury in comparison to children who had not suffered head injury. Children of both genders under the age of three, meeting the inclusion/exclusion criteria were enrolled at Cincinnati Children's Hospital Medical Center to represent the population of children who are victims of shaken baby syndrome. Significant levels of serum C-tau, $p \leq 0.01$, was observed in children with head injuries.

2:50 EFFECTS OF STREAM MODIFICATIONS ON MACROINVERTEBRATE DIVERSITY IN THE MILL CREEK (HAMILTON COUNTY, OHIO)
Brady J. Hall (Dr. Stanley Hedeem)

Macroinvertebrates from seven sites along the Mill Creek in Hamilton County, Ohio were sampled to determine the relative biodiversity of the aquatic environment in relation to urban development. The presence of pollution sensitive macroinvertebrates at all of the locations indicated that pollution was not responsible for the reduction in species diversity. Lesser diversity at the test locations that had been modified indicated that channelization in urban areas was responsible for any reduction in macroinvertebrate species diversity in the Mill Creek.

3:10 EVALUATING THE RELATIONSHIP BETWEEN H₂O₂-ASSOCIATED OXIDATIVE STRESS AND VHL PROTEIN
Lauren Ashbrook and Patrick Owsiak (Dr. Waltke Paulding)

Many environmental factors, including hypoxia, can induce oxidative stress. Cells that are subjected to oxidative stress often generate reactive oxygen species (ROS), which include hydrogen peroxide (H₂O₂). Familial von Hippel-Lindau (VHL) disease develops in individuals that are born heterozygous for the wild-type VHL gene, and who subsequently lose the remaining wt-VHL allele due to mutation. Excessive, unregulated quantities of ROS are known to damage cellular macromolecules, including proteins lipids and nucleic acids. We are currently examining the oxidative status of cells that express (wt-VHL) or lack (mut-VHL) the VHL protein, as a decrease in a cell's ability to maintain "oxidative homeostasis" may be related to DNA damage, and expression of VHL pathology. Results from experiments in which H₂O₂ production was measured in VHL(+) or VHL(-) cell lines, under either normoxic (21% O₂) or hypoxic (1% O₂) conditions, revealed higher, basal amounts of H₂O₂ in VHL(-) cells in normoxic conditions, as contrasted to VHL(+) cells. Hypoxia reduced production of H₂O₂ in both VHL(+) and VHL(-) cell lines. Confirmation of these results using a different method of H₂O₂ measurement and the evaluation of expression levels of enzymes involved in the oxidative stress pathway continue.

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April 26, 27, 28, 29, 2004

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Session Fourteen: Thursday, April 29, 2004 4:30 p.m.

Section 07 lab

Moderator: Mr. Hinn

4:30 EFFECTS OF CHANNELIZATION ON MACROINVERTEBRATE DIVERSITY IN
 THE MILL CREEK, HAMILTON COUNTY, OHIO
 David Murphy (Dr. Stanley Hedeon)

A six-week study was conducted at seven sites along the Mill Creek and its tributaries to determine if channelization causes a decrease in macroinvertebrate diversity. Three of the sample sites were along the main stem of the Mill Creek, two on the West Fork and two on the West Fork Mill Creek. Four of the sites were unchannelized, while three of the sites were channelized. Representatives of all species found were collected, identified, and compared. Results show a positive correlation between channelization and decreased macroinvertebrate diversity. Pollution was not responsible for the decreased diversity, since pollution-sensitive species were found at all sites.

4:50

SEQUENCING OF A POSSIBLE INTERMEDIATE FILAMENT GENE IN
ASPERGILLUS NIDULANS

Melissa Klabunde, Abby Loftus, Cory Mehl, **Victoria Raymond**, Jeremy Sullenberger
(Dr. Dorothy Engle)

Intermediate filaments in vertebrates are a component of the cytoskeleton that function to maintain cell shape and hold organelles and the nucleus in the cell. A PCR fragment from mouse intermediate filament DNA was used to mark a similar genetic sequence in *Aspergillus nidulans*. The genetic sequence that was marked was isolated and then partially sequenced. There were no similar gene sequences found when the isolated sequence was run through online databases. Future research will be needed to complete sequencing and to find the function of this gene in *Aspergillus nidulans*.

5:10

SKULL AND BODY SIZE RELATEDNESS OF PLEISTOCENE AND CURRENT
COYOTES (*CANIS LATRANS*)

William Penn (Dr. William Anyonge)

The coyote, *Canis latrans*, is a solitary canid that occasionally hunts in pairs. Presently, coyotes inhabit North America, a region in which they have existed for over 10,000 years. The ancestry of coyotes can be traced back to a Pleistocene canid species known as *Canis lepophagus*. Fossils of Pleistocene coyotes have been recovered from the Rancho La Brea deposits in California. The goal of this study was to determine whether there has been a change in the body form and feeding habits of *C. latrans* over the past 10,000 years. Several craniodental variables were measured and evaluated to determine whether there was any significant difference in the musculoskeletal anatomy of recent and ancient coyotes. In addition, the body size in ancient coyotes was estimated from linear measures of principal limb bones and compared to that of modern coyotes. The results indicate that Pleistocene coyotes were heavier than modern coyotes and had enhanced jaw musculature. These characteristics suggest that ancient coyotes were adapted to hunting and manipulating larger prey species than their modern relatives.