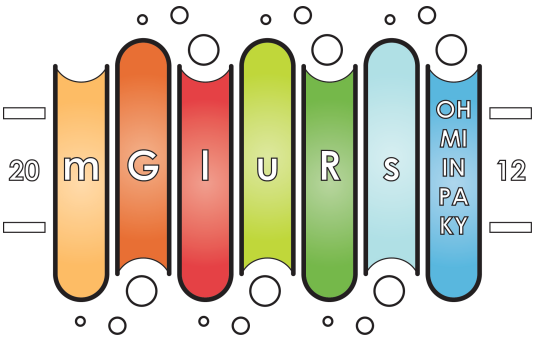
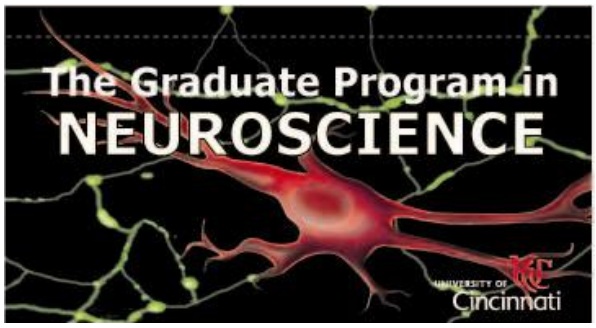


4th Annual mGluRs Midwest/Great Lakes Undergraduate Research Symposium in Neuroscience

Hosted by The College of Wooster

September 29, 2012

Generously Sponsored by:



mGluRs 2012 Schedule

Saturday, September 29, 2012

Time	Activity	Location
8:30-9:00 am	Registration	Wishart Lobby
	Breakfast	Freedlander Lobby
9:00 am	Welcome by Provost Carolyn Newton	Lean Lecture Hall
	Presentation by Peter Erdi, Kalamazoo College Co-Director of the Budapest Semester in Cognitive Science	
	Announcement by 2013 mGluRs host, Karen Gunther, Wabash College	
9:30-10:30 am	Breakout Session I:	
	Alternative Careers in Science	Wishart 104
	Laura Grimm, M.S. Plant Pathology, The Ohio State University 8th grade science teacher, Dalton OH Intermediate	
	Donald M. Steffy, Senior Technical Writer, Ethicon Endo-Surgery, Inc., a Johnson & Johnson Company	
	Kathy Corcoran, D.V.M. The Ohio State University, J.D. Case Western Reserve University, Program Manager Veterinary Technology, Cuyahoga Community College	
	Medical School Panel	Wishart 101
	Paul Bonvallet, Ph.D. University of Wisconsin College of Wooster Pre-Health Advisor	
	Charu Swamy, Case Western Reserve University Residency in Orthodontics, The Ohio State University D.D.S. Program	
	Lakshmana Swamy, College of Wooster '05 5th year M.D./M.B.A. student at the Boonshoft School of Medicine at Wright State University	
	Warren Swegal, College of Wooster '08 5th year M.D. student at Cleveland Clinic Lerner College of Medicine of Case Western Reserve University	
	Faculty Discussion	Wishart 102
	Council on Undergraduate Research: Characteristics of Excellence in Undergraduate Research	
	Karen Gunther, Ph.D., Wabash College, CUR councilor	
	Meagen Pollock, Ph.D., College of Wooster, CUR councilor	
10:30-11:30 am	Poster Session 1 and Coffee Break Posters #1 through #17	Freedlander Lobby
11:30-12:15 pm	Buffet Style Lunch	Lean Lecture Hall

Time	Activity	Location

12:15-1:15 pm — Keynote Address: Scott Thompson, Ph.D. — Lean Lecture Hall

Department of Physiology, University of Maryland School of Medicine

"Excitatory synapses get the blues: a new way to think about depression"

Summary: The 'serotonin hypothesis of depression' has been with us for more than 50 years, and has led to the development of Prozac and other effective medications, but what is really wrong in the depressed brain? What does serotonin do that is so important for keeping the brain working right? Join us for a re-examination of these questions!

1:15-2:30 pm — Breakout Session II:

Graduate School Sponsor Panel — Wishart 102

Daniel Wesson, Ph.D.
Case Western Reserve University

James Eliassen, Ph.D. and Kim Seroogy, Ph.D.
University of Cincinnati

Kathrin Engisch, Ph.D.
Wright State University

Taryn Aubrecht, College of Wooster '11
The Ohio State University, 2nd year graduate student

Scott Thompson, Ph.D.
University of Maryland School of Medicine, Baltimore

Faculty Discussion — Wishart 104

Introduction to Neuroscience course:
best practices and common problems

2:45-3:30 pm — Student Platform Presentations — Lean Lecture Hall

David George, Duquesne University
"Inhibition of metabotropic glutamate receptor 5 reduces on-going spontaneous pain as measured by conditioned place preference in mice."

Zane Kalik, Youngtown State University
"Regulation of the L-type calcium current by sex steroids: a mechanism for increased arrhythmia vulnerability in the female heart."

Greg Norris, College of Wooster
"*Administration of a novel chemotherapy agent in a pediatric brain tumor mouse model."*

3:30-4:30 pm — Poster Session #2 and Dessert — Freedlander Lobby

Posters #18 through #34

4:30PM — Presentation of the BSCS Prize
Wrap-up, Thank you and Goodbye

POSTER PRESENTATION SESSION ONE - 10:30 to 11:30 am, Freedlander Lobby

1. Leah Efferson, Thomas Koehnle & Layla Banihashemi
Department of Neuroscience, Hiram College

Psychopathy is a personality disorder that involves emotional dysfunctions and anti-social behaviors with a prevalence of slightly less than 1 percent in the general population (Coid, Yang, Ullrich, Roberts, & Hare, 2009). Those with lesions in the orbitofrontal cortex (OFC) and psychopathy exhibit reactive aggression and impairments in response reversal, or altering behavior after reinforcement contingencies has changed (Blair, 2007a). In this study, I performed a meta-analysis to determine if psychopaths have decreased gray matter volumes in the OFC compared to non-psychopaths using magnetic resonance imaging (MRI). Search terms 'psychopathy and orbitofrontal cortex,' 'psychopathy and MRI,' and 'psychopathy and ventromedial cortex,' were entered into PubMed, PsychInfo and ISI Web of Science which generated 82 results with a final inclusion of five articles. To be included, studies must have examined gray matter differences using magnetic resonance imaging (MRI) in the orbitofrontal cortex (OFC) of diagnosed psychopaths and non-psychopaths using a form of the Psychopathy-Checklist. Cohen's D analysis found large effect sizes and a decreased volume of left and right OFC in psychopaths compared to non-psychopaths. Z scores reported 2.88 for the left OFC and 2.69 for the right OFC. The hypothesis that psychopaths possess less gray matter in the OFC compared to non-psychopaths was supported, however, the number of studies was too small. Less gray matter in the OFC may contribute to impairments in response reversal that lead toward reactive aggression in psychopaths. Further research is needed to determine if decreased OFC volume constitutes a holistic picture of psychopathy.

2. Enimielen Aligbe, Brady Eggleston, Leslie Kwakye
Department of Neuroscience, Oberlin College
ATTENTION IS NECESSARY FOR THE INTEGRATION OF MULTISENSORY SPEECH STIMULI DURING THE MCGURK ILLUSION

As we interact with the world around us, many different events continuously assail each of our senses. How do we select and integrate relevant information across senses, when our attention is being drawn by so many different happenings? To study the role of attention in multisensory integration (combining information across senses), we utilized a well-known illusion called the McGurk Effect. In this illusion, participants perceive a different syllable (e.g. 'Tha' or 'Da') than what was presented visually ('Ga') or aurally ('Ba'). We created videos that produced the illusion and incrementally diverted attention away from the videos using low and high attentional load conditions. We found that participants were much less likely to report the illusion during the attentional load conditions with reports of the illusion being the lowest for the high attentional load condition. Participants also showed a small decrease in lip-reading accuracy during the high attentional load condition; however, this small decrease in visual accuracy is unlikely to account for the much larger decrease in report of the McGurk illusion. Collectively, these results show that attention is necessary for the integration of multisensory speech stimuli. Through this research we hope to gain a better understand of the complicated relationship between attention and multisensory integration.

3. Jonathan Wong[1], Paul Moes[2], Loren Harsma[3]
[1]Department of Chemistry, [2] Department of Psychology, [3]Department of Physics, Calvin College
ELECTROPHYSIOLOGICAL EVIDENCE FOR NORMAL EXCITATORY INTRA-HEMISPHERIC SYNAPTIC CONNECTIONS FOLLOWING ABNORMAL DEVELOPMENT OF CORPUS CALLOSUM AXONS

Agenesis of the corpus callosum (AgCC) occurs in humans and mice when developing axons fail to cross the midline to connect left and right cortical areas. These misguided fibers form bilateral pathways, known as Probst Bundles (PB's), which run anterior-to-posterior near the medial cortical surface. AgCC symptoms overlap with autism-spectrum disorder traits, but researchers have speculated that individuals with PB's have fewer symptoms than those without. Previous research has established that PB axon fibers conduct action potentials, but no studies have determined if PB fibers make functional connections

with layer V pyramidal cells. The present study used electrical stimulation of PB axons in mouse brain slices and patch-clamp electrophysiology to verify the existence of monosynaptic connections to cortical cells from PB axons, and to examine the location and nature of excitatory post-synaptic currents. Results verified the existence of functional excitatory monosynaptic responses in layer V pyramidal cells following stimulation of PB's and surrounding intra-cortical tissue rostral to the target cell - similar to responses seen with normal inter-hemispheric corpus callosum stimulation. Significantly fewer monosynaptic excitatory responses were identified when stimulating caudally to the target cell confirming that the heterotypical pathway is established in an anterior-to-posterior direction. The existence a large number of monosynaptic excitatory responses from intra-cortical stimulation (in addition to PB stimulation) suggests that some anterior-to-posterior fibers travel outside of PB. These results confirm that PB fibers make functional intra-hemispheric connections to layer V pyramidal cells that mirror the properties of normal inter-hemispheric synaptic connections.

4. Andrew Clement & Nestor Matthews
Department of Psychology, Denison University
THE LEFT VISUAL FIELD ADVANTAGE IN DUAL-STREAM RSVP TASKS: AN INVESTIGATION OF POTENTIAL NEURAL MECHANISMS

The present study investigated the temporal dynamics of vision by examining left visual field (LVF) advantages in situations with high attentional demands. Notably, these hemifield asymmetries have been shown to occur in both high-level identification tasks and low-level simultaneity tasks. Here, we attempted to synthesize this range of approaches by using a single experimental paradigm. This paradigm, known as dual-stream rapid serial visual presentation (RSVP), presented two streams of visual stimuli (separate sequences of black letters) at a relatively high temporal frequency and asked participants to identify two targets within the streams (a red letter and black digit, respectively). However, to vary presentation rates within and across hemifields, we used several novel variations of the RSVP paradigm that modified the synchrony of the stimuli. We also modified the identification requirements and presence of the first target (red letter) to examine the role of exogenous attention on LVF advantages. Moreover, we created a simultaneity task that utilized the dual-stream RSVP framework. By performing these manipulations, we first of all found that the temporal frequency of visual attention is set locally (independently in the LVF and right visual field, or RVF) rather than globally (across hemifields). We also discovered that neither attention to an exogenous cue nor the physical presence of such a cue are necessary for LVF advantages to occur. Furthermore, the results from our simultaneity task confirmed that LVF advantages likely result from faster neural responses for LVF stimuli relative to those for RVF stimuli.

5. Michael T. Moran, Meghana Tare, Oorvashi Roy Puli & Amit Singh
Department of Biology, University of Dayton
THE ROLE OF TEASHIRT(TSH) AND TIPTOP(TIO) IN AMYLOID BETA-42 MEDIATED NEURODEGENERATION IN THE DROSOPHILA RETINA

The neurodegeneration that results from Alzheimer's disease (AD) is caused by the improper cleavage of APP to form the polypeptide amyloid beta 42 (Aβ42). Being hydrophobic, Aβ42 clumps together forming plaques which in turn accumulate around the neurons of the brain causing many cellular disturbances and, eventually, neuronal death. The characteristically slow degeneration of neurons in AD has been accredited to this accumulation of Aβ42 in the brain. However, the exact mechanisms of how and why this accumulation happens are not yet fully understood. To develop mechanistic insights into this process, we have developed a *Drosophila* eye model where high levels of Aβ42 are expressed in the *Drosophila* retina, resulting in neuronal cell death. Using this model we have found that the retinal determination (RD) gene *teashirt* (*tsh*) is able to significantly rescue the *Drosophila* eye from neurodegeneration caused by the accumulation of Aβ42. We have also found that the paralogue of *tsh*, *tiptop* (*tio*), is able to rescue the Aβ42 phenotype to the same extent as *tsh.* Furthermore, we have determined the role each of *tsh* and *tio*'s zinc fingers play in the neuroprotective function of these genes. The results of these studies will be presented.

6. Tereza Tomankova[1] & Michaela Jansen[2]
[1]Department of Cell Physiology and Molecular Biophysics, Texas Tech University Health Sciences Center, [2]Biology Department, Muskingum University
STUDIES OF PROKARYOTIC CYS-LOOP RECEPTORS WITH INSERTED EUKARYOTIC INTRACELLULAR DOMAIN: IMPLICATIONS FOR CHOLINERGIC AND SEROTONERGIC RECEPTORS

Cys-loop receptors are neurotransmitter-gated ion channels that consist of extracellular (ECD), transmembrane (TMD) and intracellular (ICD) domains. The ECD and TMD are targets for all drugs in current clinical use that target Cys-loop receptors. However, these domains show significant sequence identities between subtypes of one family and also between members of other families within the Cys-loop superfamily, which results in side effects caused by interference with off-target subunits. The ICD is a promising target for future drug design since it is the most diverse domain with regard to length and amino acid composition. At present, the knowledge about the structure and function of ICD is limited. Therefore, current studies are targeted to study the structure and function of ICD. Two sets of chimeras, each consisting of 12 different constructs, were generated by adding the ICD of eukaryotic 5-HT_{3A} and nAChR α7 receptors to the prokaryotic *Gloeobacter violaceus* ligand-gated ion channel (GLIC) that does not contain an ICD itself. Chimeras are commonly used in research to combine two genetically distinct types of cells of different species which here showed the independence of ICD on the functions of ECD and TMD. Two of the GLIC-5-HT3A-ICD chimeras and 11 of the GLIC-α7-ICD chimeras were functional when expressed in *Xenopus laevis* oocytes and showed proton-induced currents upon the change in the extracellular pH. We wanted to investigate whether the non-functional chimeras are expressed on the plasma membrane, which we performed and confirmed with the optimized protocol for surface-biotinylation of plasma membrane and Western blotting.

7. Yunan Charles Wu, Logan C. Goodrich, Daniel S. Ranschaert & Karen L. Gunther
Psychology Department, Wabash College
RED:GREEN CONE RATIO AFFECTS RED/GREEN VISUAL SEARCH FOR LOW CONTRAST SERIAL SEARCHES BUT NOT FOR HIGH CONTRAST POPOUT SEARCHES

Large variations in red:green cone ratio exist in people with normal color vision, and cone ratio has been shown to affect red/green contrast sensitivity. We examined the effect of red:green cone ratio on red/green visual search contrast and set size. In Study 1, we hypothesized that the critical color contrast that separates serial from popout visual searches would vary with cone ratio. In 17 color normal subjects, we estimated red:green cone ratio. These subjects showed clear serial search and popout search regions (measuring reaction times across 10 red/green contrasts from 1.5% to 4.25%), but did not show a significant correlation between cone ratio and critical color contrast ($r = -0.31$, $p = 0.23$). In Study 2 we hypothesized that variations in red:green cone ratio would affect set size slope (4 vs. 12 dots). In 21 subjects and at three red/green contrasts (2.0%, 2.5%, and 4.5%), the only contrast to yield a significant correlation between reaction time set size slope and cone ratio was the contrast in the serial search range (2%; $r = -0.77$; $p = 0.009$). At 2% contrast we obtained the usual set size effect of slower reaction times for subjects with more symmetrical cone ratios (~1 red:1 green). Cone ratios around 2:1 yielded flat set size slopes. Asymmetrical cone ratios (red>>green) yielded set size facilitation ‚Äì faster reaction times with more distractors. In conclusion, although differences in red:green cone ratio appear to be mostly normalized by the visual system, in difficult visual circumstances, differences can be revealed.

8. Heather Wilcox, Clarissa Muere, Suzanne Neumueller, Samantha Olesiak, Justin Miller, Matthew R. Hodges & Hubert V. Forster
Department of Physiology, Medical College of Wisconsin
THE EFFECT ON BREATHING OF ATROPINE MICRODIALYSIS INTO THE PRE-BötZINGER COMPLEX IN GOATS DURING WAKEFULNESS AND SLEEP

Evidence from reduced preparations suggests that the pre-Bötzinger Complex (preBötC) is necessary for respiratory rhythm generation, and that input from a variety of neurochemicals modulates the output of the respiratory network. Recent data from the Forster laboratory demonstrate that microdialysis of

atropine (50mM), a non-selective muscarinic acetylcholine receptor antagonist, into a region of the medulla containing the preBötC of adult goats causes an increase in breathing frequency. The increase in breathing was postulated to be due to observed local increases in serotonin and substance P during atropine microdialysis. Furthermore, the increase in breathing was greater in the awake state than during NREM sleep, i.e. the effects on breathing were state-dependent. One goat (Goat 729) appeared to have the guide cannula for microdialysis placed outside of the preBötC region. Therefore, we microdialyzed atropine into this goat to determine if the effects of atropine on breathing and neurochemical concentration were site-specific. We found that microdialysis of 50mM atropine in Goat 729 increased substance P concentration, but the effects on breathing were delayed and/or blunted, and were not state-dependent.

9. Celynn A. Vaughn, Tracy A. Bedrosian, Zachary M. Weil & Randy J. Nelson
Department of Neuroscience, The Ohio State University
CHRONIC EXPOSURE TO SHORT WAVELENGTH LIGHT AT NIGHT PROVOKES DEPRESSIVE-LIKE RESPONSES IN HAMSTERS

Humans and other organisms have adapted to discrete rhythms of light and dark in response to life on Earth. Since the advent of electric light, however, humans are increasingly exposed to artificial light at night (LAN) related to cities, technology, and shift work. LAN has the potential to disrupt the circadian system and behavior. Accumulating evidence suggests that the modern light environment has profound consequences for human health. We previously found that LAN provokes depressive-like responses in hamsters, as well as altered neuronal structure and gene expression. LAN likely acts through melanopsin-containing cells in the retina, which are most sensitive to short wavelength, blue light in both rodents and humans. Objective: We hypothesized that using longer wavelength light at night would prevent depressive-like behavior and altered neuronal structure and gene expression. Methods: Female hamsters were ovariectomized, then housed for 4 weeks in dark nights or dim white, blue or red light at night (all 5 lux). Hamsters were tested in the forced swim test and brains were collected for gene expression analyses and Golgi staining. Results: Blue and white light at night increased total immobility, whereas red light had no effect. We expect to find that red light at night also prevents altered neuronal structure and gene expression. Conclusions: Altering the spectrum of light may be an effective prevention for individuals exposed to unavoidable LAN, such as nurses and other shift workers.

10. Alyssa Lesko, Shilpi Verghese, Indrayani Waghmare & Madhuri Kango-Singh
Biology Department, University of Dayton
DIFFERENTIAL HIPPO SIGNALING IN COMPENSATORY PROLIFERATION IN A DROSOPHILA TUMOR MODEL

The Hippo pathway has recently been identified to regulate the proliferation and survival of cells. Scribble, scrib, is a tumor suppressor gene that is involved in cell polarity. There is evidence that cell death induction in the scrib mutant cells is correlated to an increase in Jun N-terminal Kinase (JNK) signaling due to activation of cell competition. Increased survival of scrib mutant cells leads to the growth of massive tumors. One way in which dying cells stimulate proliferation is compensatory proliferation. My project will investigate how changes in Hippo signaling are important to cell-cell interactions. Our previous work showed that the JNK and Hippo pathway interact, and it was seen through Western Blot experiments that scrib mutants showed increased levels of phosphorylated proteins that belong to these pathways compared to wild type and double mutant cells. We hypothesize that this interaction determines if tumor cells survive or are eliminated. I will use genetic experiments to look at the role of JNK when it is activated and down regulated in the Hippo pathway, as well as, its interaction with scrib. Hippo signaling levels will be modulated in flies by over-expressing Hpo [nubGal4 UASHpoŒîINH], and by down-regulating Hpo [nubGal4 UASHpoRNAi], which will be crossed to several transcriptional reporters of Hippo pathway. These targets are diap14.3GFP, ex-lacZ, fj-lacZ, and dronc1-7kb-lacZ. The phenotypes of these crosses will be studied, and antibody staining of the eye and wing discs will be used to investigate cell-cell interactions. Our findings from these studies will be presented.

11. Mojtaba Akhavantafti[1] & Vaibhav Diwadkar[2]
[1]Physics and Computer Science Department, Kalamazoo College, [2]Department of Psychiatry & Behavioral Neurosciences, Wayne State University
CLASSIFICATION OF FMRI ACTIVATION IN ADOLESCENT DEVELOPMENT USING PROBABILISTIC CYTOARCHITECTONIC MAPS

Brain regions and brain networks appear to have a prolonged and heterochronous neurodevelopment profiles through adolescence. Understanding fMRI activation changes has been a question of importance particularly because the neurodevelopmental immaturities do not significantly impede performance on simple memory tasks. These fMRI activation changes have been typically characterized using deterministic maps of regions of interest across the brain. Yet, these deterministic schemes are not informed by empirically quantified variations across subjects in the spatial mapping of brain regions to stereotactic space. These limitations are addressed in recent probabilistic approaches to classifying brain activation. It is now possible to classify activation clusters to brain regions using probabilistic cytoarchitectonic maps, which provide stereotaxic information on the location of cortical areas in a standard reference space. The application of these approaches can provide new avenues of information in the understanding of developmental changes through adolescence; yet have never been applied before. In this study, the fMRI images of 46 adolescents were analyzed to investigate changes in the extent of activation between younger and older subjects during a working memory task. Activation patterns were quantified using Anatomy Toolbox, an atlas for probabilistic classification scheme for cortico-cerebellar activation. Analyses demonstrated that probabilistic approaches were highly sensitive to detecting age-related changes in fMRI activation, particularly in the parietal cortex and the cerebellum. Probabilistic schemes for voxel classification appear sensitive to developmental trends, and by virtue of being informed by variations in anatomy, may be superior to deterministic classification approaches.

12. Patricia Bohls
Neuroscience Department, Hiram College
ANALYZING PERSONALITY OF THE EASTERN GRAY SQUIRREL (SCIURUS CAROLINESIS) BASED ON ANTI-PREDATOR BEHAVIOR BY COAT COLORATION

In mammals, expression of melanocortin receptor ligands is correlated with both dark pigmentation and increased stress resistance and higher levels of aggression. Though many studies of captive and laboratory animals have explored this pleiotropic interaction, few studies of animal personality have occurred in free-living wild animals. The Eastern gray squirrel (Sciurus carolinensis), with both gray and black morphs, may provide a good model system to explore personality in a wild population. This play back study focused on the anti-predator behavior differences between black and gray morphs in Hiram, Ohio. Over several weeks I recorded vigilance, freezing, awareness, tail flagging, lateral escape, and vertical escape behaviors in response to digital playback of robin calls, a car alarm, or a red tailed hawk call. All squirrels exhibited increased anti-predator behavior after hearing increasingly threatening stimuli, in the order of increasingly threatening: American Robin call, Car Alarm, Red Tail Hawk call. Consistent with prior findings in this and other labs, gray morphs were more likely to run up a tree after hearing a threatening call. Black squirrels were more likely to heighten their awareness than attempt to escape. Habitat use also differed between color morphs, indicating better risk assessment capabilities in the black morph, or perhaps differential competitive capability. In summary, a growing body of evidence indicates that it is possible to study aspects of animal personality in free-living gray squirrels, and to use this model to examine pleiotropic effects of genes on animal behavior.

13. Jonathan Reeves, Bryan Karazsia, & Amy Jo Stavnezer
Neuroscience Program and Psychology Department, The College of Wooster
GRADUATE ADMISSIONS IN CLINICAL NEUROPSYCHOLOGY: THE IMPORTANCE OF UNDERGRADUATE TRAINING

Discussions of and recommendations for training of clinical neuropsychologists exist at the doctoral, internship, and postdoctoral level. With few exceptions, the literature on undergraduate preparations in

clinical neuropsychology is sparse and lacks empirical evidence. In the present study, graduate-level faculty and current trainees completed surveys about expectations for graduate preparations. Faculty expectations of minimum and ideal undergraduate training were highest for research methods, statistics, and assessment. Various indices of 'goodness of fit' also emerged as important admissions factors. These results offer empirical evidence for desirable undergraduate preparations for advanced study in clinical neuropsychology. Although undergraduate training in psychology is intentionally broad, results from this study suggest that students who desire advanced study in clinical neuropsychology need to tailor their experiences to be competitive in the application process. The findings have implications for prospective graduate students, faculty who train and mentor undergraduates, and faculty who serve on admissions committees.

14. O. Hecmarie Melendez-Fernandez , Laura K. Fonken & Randy J. Nelson
Department of Neuroscience, Wexner Medical Center at the Ohio State University
EFFECTS OF EXERCISE ON DEPRESSIVE-LIKE BEHAVIOR AND OBESITY IN MALE MICE EXPOSED TO EITHER DARK OR DIM LIGHT DURING NIGHT

The incidence of depression and metabolic disorders are rapidly increasing worldwide. This phenomenon coincides with the surge in light pollution most individuals experience daily. Disruption of the natural light/dark cycle by exposure to even dim light at night (dLAN) causes multiple physiological and psychological effects such as depressive-like responses and body-mass gain in rodents. These symptoms can potentially be diminished through physical activity. A mechanistic factor that may interact with these symptoms is fluctuation in leptin concentrations. To assess the effects that exercise has on the dLAN phenotype we provided mice with running wheels to determine changes in depressive-like behaviors, body mass gain, and hormone changes caused by dLAN as compared to mice in standard light/dark (LD) cycles. Behavioral tests, histology, hormone concentrations, and gene expression will be reported as variables provoked by exposure to light at night.

15. Stephanie Schumaker & Dr. Tom Koehnle
Neuroscience Program, Hiram College
FEEDING BEHAVIOR OF ACHETA DOMESTICUS

Neuromodulation is a growing field. Past studies explain how neuropeptides and neurotransmitters have an impact on the feeding behavior in species. The experimental approach consisted of fasting the domestic cricket, Acheta domestica, in order to generate an appropriate starvation period and to define a meal suitable for generating a meal pattern analysis. Fasting occurred for twelve, twenty-four, and forty-eight hours, revealing that the female crickets had longer latencies in approaching the food across the full set of fasting times. As for the meal pattern analysis conducted using digital video recording, the crickets underwent a twenty-four hour starvation period to reduce an overlap for the future studies. The analysis showed the opposite effects of the fasting protocol, revealing that the male species had longer latencies approaching the food. Serotonin has been shown to suppress feeding behavior having an effect on the organs associated with feeding and the diet choice of the species. Future studies consist of anesthetizing the cricket by freezing to inject serotonin into the foregut with the purpose of replicating the study described above to support the idea that serotonin modulates the feeding behavior of the species.

16. Stephanie Fountain-Zaragoza
Psychology Department, Denison University
EFFECTS OF NEONATAL SOCIAL ISOLATION AND METHYLPHENIDATE (RITALIN) ON ANXIETY IN JUVENILE RATS.

Neonatal social isolation elicits a number of physiological and behavioral changes in rats including HPA activation and sensitization of the dopaminergic mesolimbic region in the brain, less exploration, increased stereotyped behaviors, and heightened anxiety as they develop. Methylphenidate (the stimulant drug Ritalin) cross-sensitizes with stress to exacerbate these effects by altering anxiety-related brain processes. The current study examined the interaction of early isolation and later methylphenidate

administration on anxiety levels throughout development in rats. We hypothesized that isolates would show increased anxiety throughout a series of methylphenidate challenges. Forty-three rats were randomly assigned by litter to one of three social conditions: isolated, handled, and undisturbed. Rats were later randomly assigned to either Methylphenidate administration (2.0 mg/kg) or control (saline solution). Anxiety was assessed at three time points by recording rats' behavior in a light-dark transition apparatus, with less anxiety defined as spending more time exploring the white compartment. Duration data were natural log transformed and tested with repeated-measures ANOVAs. The handled group data was excluded after initial analyses revealed that it was anomalous. Our results yielded a significant main effect of day and a significant interaction of social and drug conditions. While Ritalin alone had an anxiolytic effect, rats that were isolated early in life and later exposed to Ritalin showed pronounced anxiety. Interestingly, this anxiogenic effect only emerged later in development. These findings suggest that the anxiolytic and anxiogenic properties of Ritalin are altered by early social experience, providing evidence for a cross-sensitization between stimulant use and early stress.

17. Patricia Bohls
Department of Neuroscience, Hiram College

ANALYZING PERSONALITY OF THE EASTERN GRAY SQUIRREL (SCIURUS CAROLINESIS) BASED ON ANTI-PREDATOR BEHAVIOR BY COAT COLORATION

In mammals, expression of melanocortin receptor ligands is correlated with both dark pigmentation and increased stress resistance and higher levels of aggression. Though many studies of captive and laboratory animals have explored this pleiotropic interaction, few studies of animal personality have occurred in free-living wild animals. The Eastern gray squirrel (Sciurus carolinensis), with both gray and black morphs, may provide a good model system to explore personality in a wild population. This play back study focused on the anti-predator behavior differences between black and gray morphs in Hiram, Ohio. Over several weeks I recorded vigilance, freezing, awareness, tail flagging, lateral escape, and vertical escape behaviors in response to digital playback of robin calls, a car alarm, or a red tailed hawk call. All squirrels exhibited increased anti-predator behavior after hearing increasingly threatening stimuli, in the order of increasingly threatening: American Robin call, Car Alarm, Red Tail Hawk call. Consistent with prior findings in this and other labs, gray morphs were more likely to run up a tree after hearing a threatening call. Black squirrels were more likely to heighten their awareness than attempt to escape. Habitat use also differed between color morphs, indicating better risk assessment capabilities in the black morph, or perhaps differential competitive capability. In summary, a growing body of evidence indicates that it is possible to study aspects of animal personality in free-living gray squirrels, and to use this model to examine pleiotropic effects of genes on animal behavior.

PLATFORM PRESENTATIONS – 2:45 to 3:30 pm, Lean Lecture Hall

David C. George, Benedict J. Kolber
Department of Biological Sciences and Chronic Pain Research Consortium, Duquesne University,

INHIBITION OF METABOTROPIC GLUTAMATE RECEPTOR 5 REDUCES ON-GOING SPONTANEOUS PAIN AS MEASURED BY CONDITIONED PLACE PREFERENCE IN MICE

Our lab has been investigating the role of metabotropic glutamate receptor 5 (mGluR5) in the modulation of pain. We hypothesize that signaling through mGluR5 promotes pain and/or nocifensive behavior. Here, we examined the efficacy of mGluR5 inhibition in reducing on-going spontaneous pain. Specifically, we used a new assay that uses conditioned place preference (CPP) in the context of chronic pain. The classic CPP assay is an established animal model widely used to examine learning associated with drugs of abuse. Using this CPP assay we are currently evaluating the analgesic properties of the novel mGluR5 antagonist Fenobam [N-(3-chlorophenyl)-N'-(4,5-dihydro-1-methyl-4-oxo-1H-imidazole-2-yl)urea] to induce conditioned preference in mice when paired with a chronic injury (Spared Nerve Injury (SNI)). After the establishment of the injury, we repeatedly pair Fenobam, the unconditioned stimulus, with a specific physical environment, the conditioned stimulus. We hypothesized that if mice were treated with Fenobam (30 mg/kg intraperitoneal) once daily for 3 days and placed in a distinctive box after each injection that a preference for the Fenobam-associated environment would develop if and only if Fenobam resulted in a reduction in pain. Based on preliminary trials, we have found support for this hypothesis. SNI mice were found to spend more time in the Fenobam-paired box compared to a control-paired box. In contrast, sham-injured mice did not show a preference for the Fenobam-paired box. The next step is to repeat the initial experiment and gather more data in order to conclusively prove the analgesic effects of Fenobam in the CPP/SNI model.

Zane Kalik[1], Josh Mike[1,2], Jozsi Jalics[2], Guy Salama[3], and Mark Womble[1]
1 Department of Biological Sciences, Youngstown State University, Youngstown OH, 2 Department of Mathematics and Statistics, Youngstown State University, Youngstown OH, 3 Department of Cell Biology and Physiology, University of Pittsburgh School of Medicine, Pittsburgh PA

REGULATION OF THE L-TYPE CALCIUM CURRENT BY SEX STEROIDS: A MECHANISM FOR INCREASED ARRHYTHMIA VULNERABILITY IN THE FEMALE HEART

Sudden cardiac death results in over 300,000 deaths per year in the US and many may be due to cardiac arrhythmias. Boys are more vulnerable than girls, but after puberty, adult women are more vulnerable to fatal arrhythmias, including Long QT Syndrome (LQTS). LQTS is characterized by prolonged ventricular depolarizations, and may result in arrhythmogenic early afterdepolarization (EAD) formation during the cardiac action potential (AP). Using electrophysiological recordings from isolated adult rabbit ventricular myocytes and mathematical modeling of the cardiac AP, we have found that elevated L-type calcium current (ICa-L) in female myocytes may contribute to EAD formation. Recordings revealed that female myocytes had ICa-L levels up to 85% higher than male myocytes. AP simulations, using a 50% suppression of the rapidly inactivating delayed rectifier potassium current to model LQTS, found that female myocytes exhibited longer duration APs and increased EAD vulnerability compared to males. To test the effects of female hormones, cultured female myocytes were treated for 2 days with 17Î²-estradiol (1.0 nM). This treatment resulted in significantly higher ICa-L levels. Progesterone (80 nM or 10 ÂµM) treatment had no effect on ICa-L levels. However, progesterone plus 17Î²-estradiol prevented the ICa-L increase observed with estradiol-only treatment. These findings suggest that the high ICa-L levels found in adult female myocytes may be induced by estrogen, an effect that can be modulated by progesterone. Thus, postpubertal female sex hormones may play a critical role in arrhythmia susceptibility.

Gregory A. Norris[1,2], Michelle Cook Sangar[2], James M. Olson[2]
1 The College of Wooster, Wooster, OH, 2 Fred Hutchinson Cancer Research Center, Seattle, WA
ADMINISTRATION OF A NOVEL CHEMOTHERAPY AGENT IN A PEDIATRIC BRAIN TUMOR MOUSE MODEL

Atypical teratoid rhabdoid tumor (ATRT) is a highly malignant pediatric central nervous system tumor. The prognosis is often poor, with a 2-year survival rate estimated at 15%. ATRTs often possess a hallmark mutation in the SMARCB1 gene, which leads to the upregulation of key cell cycle regulatory proteins. We tested the Pfizer-developed, targeted chemotherapy agent PD-0332991, which functions by inhibiting cyclin-dependent kinase 4 and 6. These cyclin-dependent kinases phosphorylate retinoblastoma, a tumor suppressor protein responsible for regulating entry into the S phase of the cell cycle. Fragments of human pediatric ATRTs were xenografted into mice to create a mouse model of the disease, and tumor cells were propagated in vitro. The drug reduced levels of phosphorlyated retinoblastoma both in vitro and in vivo, suggesting that the drug was hitting the desired target. PD-0332991 treatment was also found to significantly reduce levels of the proliferation marker Ki-67 ($p < 0.0001$), indicating that the drug suppressed proliferation in vivo. Mice bearing ATRT flank tumors were then treated with drug (n=5) or vehicle (n=5) daily for 60 days. The drug-treated group showed complete tumor regression, while the vehicle-treated group showed aggressive tumor growth. These results demonstrate that PD-0332991 is efficacious for the treatment of atypical teratoid rhabdoid tumor, and warrant further study in the treatment of this disease.

POSTER PRESENTATION SESSION TWO – 3:30 to 4:30 pm, Freedlander Lobby

18. Brady Eggleston, Enimielen Aligbe, Leslie D. Kwakye
Department of Neuroscience, Oberlin College
ATTENTION SHIFTS THE TEMPORAL RELATIONSHIP BETWEEN VISUAL AND AUDITORY STIMUI IN THE CROSSMODAL TEMPORAL ORDER JUDGEMENT TASK

Many previous studies have discovered that individuals with developmental disorders such as autism, developmental dyslexia, and schizophrenia show an enlargement in the temporal window of multisensory integration, the time interval during which we are likely to bind information across the senses. However, disruptions in the regulation of attention are also a common component in many developmental disorders, and the effect of attention on the temporal window is currently unknown. To begin exploring this important relationship, we utilized a cross-modal temporal order judgment (CTOJ), which is well known for its ability to delineate the temporal window of integration. Participants were asked to determine which occurred first: a flash or a beep. The stimulus onset asynchrony (SOA) was varied systematically such that either the visual or auditory stimulus was presented first or the two were presented simultaneously. Attention was diverted away from the CTOJ task by a concurrent task in which participants identified whether they saw a target in a rapid stream of letters. We found the expected sigmoidal relationship between the SOA between the flash and beep and the likely that the participant would report perceiving the flash as first. Interestingly, we found that the sigmoidal curve shifted to the left such that participants were much more likely to report the flash occurring first when attention was diverted away from the CTOJ task. Our data shows that attention is not primarily acting on the width of the temporal window but rather changing the temporal relationship between visual and auditory stimuli.

19. Kara B. Ruder, James C. Walton, Zach M. Weil, Randy J. Nelson
Wexner Medical Center at The Ohio State University
ROLE OF ANDROGENS IN NEUROPLASTICITY OF BRAINS OF PEROMYSCUS LEUCOPUS SUBJECTED TO DIFFERENT PHOTOPERIODS

Mammalian species in non-tropical regions undergo seasonal brain and behavioral changes in response to the annual cycle of changing photoperiods (hours of light per day). In one such species, white-footed mice (Peromyscus leucopus), short-days are correlated with impaired hippocampal activities such as spatial learning and memory, decreased reproductive function, and decreased gonadal steroid concentrations. Reproduction and hippocampal functions are energetically expensive, so decreasing these processes may be adaptive to conserve energy for survival during short-day, winter-like months. Decreased androgen concentrations may be causing this short-day regression of hippocampal function. If gonadal steroids drive the long-day increase in hippocampal function, then gonadal steroid replacement should improve learning and memory in short days. We subjected gonadectomized adult male Peromyscus leucopus to either short- or long-photoperiods, and treated them either with testosterone (T), dihydrotestosterone (DHT), estradiol (E), and cholesterol to test the effects of T, or its primary metabolites (DHT and E, respectively) on photoperiodic changes in spatial learning and memory using the Barnes Maze. The effects of E and T were opposite depending on photoperiod; E enhanced spatial ability in LD, whereas T enhanced spatial performance in SD. During the probe trial, the errors and latency were similarly dependent on both photoperiod and the treatment of E or T. T and DHT reduced latency and errors in SD, and E reduced latency and errors in LD. This suggests that gonadal steroid enhancement of hippocampal function in LD is mediated by estrogen receptors, whereas SD enhancements are mediated by androgen receptors.

20. Jennifer Greenwood[1], Misty Smith[2], Steve White[2], Grzegorz Bulaj[4]
[1]Neuroscience Program, Muskingum University, [2]ADD Program, Department of Pharmacology and Toxicology, University of Utah [4] Department of Medicinal Chemistry, University of Utah
CONTULAKIN-G, A CONE SNAIL NEUROTENSIN PEPTIDE, EXHIBITS ANTI-NOCICEPTIVE EFFECTS WHEN ADMINISTERED INTRAPERITONALLY IN MICE

The Anticonvulsant Drug Development (ADD) Program at the University of Utah is responsible for screening drugs for their potential anticonvulsant effects as well as their potential for treating the comorbidities of epilepsy including pain and depression. The ADD program utilizes a wide range of animal models in order to test the compounds, including the 6-Hertz (32 mA) seizure test, the Porsolt forced swim test, and the writhing test. The goal of this study was to evaluate the cone snail peptide, Contulakin-G's bioavailability and efficacy, when combined with the sugar memantine, in several animal models of epilepsy and its comorbidities. Contulakin-G is a neurotensin peptide that has been shown to possess potent anti-nociceptive effects when administered intracerebroventricularly or intrathecally, however, it appears to have limited effectiveness when administered systemically. Recent work concerning contulakin-G has combined it with the sugar memantine, which is has been shown to have anti-epileptic effects. Memantine functions as a non-competitive NMDA open channel blocker and is well tolerated and effective when administered systemically. By combining the contulakin-G with the memantine it is proposed that the efficacy and bioavailability of the Contulakin-G, when given through intraperitoneal injection, will be greatly improved in the conjugated analogs of the two compounds. The following study showed that the combined Contulakin G-Memantine analogue possessed greater anti-nociceptive effects than when the compounds were administered separately.

21. Josiah Sinclair, Loren Haarsma, Paul Moes
Department of Physics, Calvin College
ELECTROPHYSIOLOGICAL EVIDENCE FOR NORMAL PROPORTIONS OF INHIBITORY (GABA) INTRA-HEMISPHERIC SYNAPTIC CONNECTIONS FOLLOWING ABNORMAL DEVELOPMENT OF CORPUS CALLOSUM AXONS

Agenesis of the corpus callosum (AgCC) occurs in humans and mice when growing axons fail to cross the midline to connect left and right cortical areas. These misguided fibers form bilateral pathways, known as Probst Bundles (PB's), which run anterior-to-posterior near the medial cortical surface. AgCC symptoms overlap with autism-spectrum disorder traits, but researchers have speculated that individuals with PB's have less severe symptoms than those without. Previous research has established that the axons of the PB fibers conduct action potentials, but no studies have determined if PB fibers make functional connections with layer V pyramidal cells. The present study used electrical stimulation of PB axons in mouse brain slices and patch-clamp electrophysiology to examine the existence of inhibitory post-synaptic currents (e.g., GABA-mediated responses) in cortical cells, and to examine the location and nature of these inhibitory responses. As with normal corpus callosum pathway stimulation, stimulation of PB axons produced very few GABA-mediated responses in layer V pyramidal cells. Together with results showing a large number of excitatory monosynaptic connections from PB axons, the low number of GABA-mediated responses suggests that the resulting intra-hemispheric connections mirror normal inter-hemispheric connections, despite their abnormal growth patterns.

22. Leah Bonath & Amber M. Chenoweth
Department of Psychology, Hiram College
SELFISHNESS AND ANTISOCIAL BEHAVIOR IN RATS

The purpose of this study was to replicate and extend upon research conducted by Bartal et al. (2011), which suggested that rats showed empathic, pro-social behavior towards one another. The present study sought to partially replicate and extend this hypothesis through three conditions: Partner vs. Stranger, Partner vs. Empty tube, and Partner vs. Fruity Cheerios. A partner rat is defined as a cagemate that was also a sibling rat and the stranger rat is defined as a non-cagemate and non-sibling rat that was housed in a separate room to prevent contact prior to the start of the study. The first and second condition yielded non-significant results suggesting that the rats did not show a preference for either trapped rat or the empty tube. In the third condition, there seemed to be a slight, yet still insignificant preference for the food reward over the partner. This is in direct contrast to the results reported by Bartal et al. (2011). Further research needs to be done to account for the differences between the present and previous studies' results.

23. Greg Mancini & Amit Singh
Department of Biology, University of Dayton
ROLE OF TRANSCRIPTIONAL CO ACTIVATOR CREB BINDING IN AMYLOID BETA-42 MEDIATED NEURODEGENERATION

Alzheimer's disease (hereafter AD), a common progressive neurodegenerative disorder in the aging population, has no early detection tests or proper cure. AD results in gradual decline of cognitive functions of learning and memory due to neurodegeneration in central and peripheral nervous system. My project focuses on understanding role of transcriptional co-activator CREB binding protein (hereafter, CBP) in preventing neurodegeneration caused by AÃŸ42 plaques in the Drosophila eye. CBP binds a variety of transcription factors and components of several signal transduction pathways. It has been observed in high throughput approaches that CBP levels are reduced in cells undergoing cell death due to stress. Therefore, we propose to test if CBP can serve as a neuroprotective agent, and can prevent neurodegeneration seen in AD using Drosophila eye model. In order to test this neuroprotective function further, the different domains found on the full length CBP have been isolated in order to test which ones provide neuroprotective or neurodegenerative effects. In order to study this interaction, the Drosophila melanogaster, the common fruit fly, genetic model is utilized to drive the experiment. Flies containing the isolated CBP domains have been crossed with flies containing the over expression of the Amyloid-Î²-42 protein to test the proteins' interaction. Preliminary results have shown that certain domains have promoted neuroprotection, while others have been shown to promote neurodegeneration. More tests are currently being done to provide definitive evidence. This evidence will help to support the current results, which will help us to understand the role of CBP in AD.

24. Anabel Galan, Tracy A. Bedrosian, Zachary M. Weil & Randy J. Nelson
Department of Neuroscience, Wexner Medical Center at The Ohio State University
CHRONIC EXPOSURE TO DIM LIGHT AT NIGHT ALTERS THE DAILY PROFILE OF CIRCADIAN CLOCK PROTEINS

The circadian system is adapted to natural rhythms of bright days and dark nights. During the past century, however, humans became exposed to almost constant nightly illumination from streetlights, indoor lighting, and technology. Exposure to light at night (LAN) is unnatural and may disrupt circadian organization, which may adversely affect human health. We previously showed that chronic exposure to dim LAN produces depressive-like behaviors in hamsters, along with changes in neuronal structure and gene expression in the hippocampus, but the direct effects of LAN on the circadian system remain unspecified. OBJECTIVE: We hypothesized that chronic exposure to dim LAN would alter clock protein expression, the diurnal cortisol rhythm, and behavior. METHODS: For this study, we ovariectomized female hamsters and exposed them to dark nights (Dark) or 5 lux dim LAN (Dim). After 4 weeks, blood samples and brains were collected every 4 h. Core clock proteins (Per1, Per2, Bmal1), were stained using IHC and quantified in the suprachiasmatic nuclei and hippocampus. Cortisol concentrations were determined by radioimmunoassay. Depressive-like behaviors were assessed in a separate group of hamsters using the forced swim and sucrose preference tests. RESULTS: Depression-like behaviors increased in hamsters exposed to dLAN, and diurnal cortisol rhythms were blunted. We expect that clock protein expression will be altered in the brains of hamsters exposed to light at night. CONCLUSIONS: These results are novel and important because they suggest the modern light environment could significantly disrupt circadian organization leading to adverse effects on human health, including mood changes.

25. Victoria Sellers & Clare Edwards
Neuroscience Program, Ohio Wesleyan University
DOSE-RESPONSE INVESTIGATION OF 6-CHLORO-TRYPTOPHAN IN REDUCING SECONDARY DEFICITS FOLLOWING SPINAL CORD INJURY

Traumatic spinal cord injury often results in motor and sensory functional deficits, affecting quality of life. Following initial injury, a number of pathological processes can cause secondary deficits, worsening

overall function. One mechanism by which this can occur is inflammation; activated immune cells release a number of chemicals at the affected area, including the neurotoxin quinolinic acid (QUIN). 6-Chloro-Tryptophan (6Cl-Trp) has been shown to interrupt the synthesis of QUIN, and therefore may attenuate these secondary deficits. In order to assess the efficacy of 6Cl-Trp, female Hartley guinea pigs received an experimental lateral compression injury to the spinal cord at thoracic level 12. Animals received intraperitoneal injections of vehicle solution, 30 mg, or 60 mg of 6Cl-Trp beginning five hours post-injury and continuing every twelve hours through post-injury day 14. A variety of motor and sensory behavioral assessments were used to evaluate functional recovery. Traditional functional measures including proprioceptive placing, hind limb toe spread, and cutaneus trunci muscle responses were supplemented with recently-adapted behaviors including contact righting, air righting, and incline plane. Control animals did not show the pattern of motor and sensory functional changes following injury seen in previous studies. Challenges in maintaining animal facilities at an ideal temperature and noise level may have caused psychological and physiological stress, thereby altering immune function in all animals, contributing to this discrepancy.

26. Hailey Kwon, Indrayani Waghmare, Shilpi Verghese & Madhuri Kango-Singh
Department of Biology, University of Dayton
INVESTIGATION OF THE GENETIC INTERACTIONS BETWEEN THE HIPPO SIGNALING PATHWAY AND DROSOPHILA C-TERMINAL SRC KINASE.

The Hippo signaling pathway is involved in regulating tissue size and diseases such as cancer. Hippo signaling coordinates a timely transition from cell proliferation to cellular quiescence, and ensures proper cellular differentiation. Aberrant Hippo pathway function (due to mutations or amplification of genes, epigenetic silencing, and oncogenic transformation) is often detected in human cancers and correlates with poor prognosis. The C-terminal Src kinase (Csk) is an identified genetic modifier of warts (wts), a tumor-suppressor gene in the Hippo pathway, and interacts with the Src oncogene. These genes are known to be mutated in various types of cancer. Previous studies have shown that Drosophila Csk regulates cell proliferation and tissue size during development. Thus, understanding the genetic interactions of Csk with the Hippo pathway is important to learn its functions in growth regulation. We hypothesized that Csk regulates growth via the Hippo pathway. To determine whether Csk requires Hippo signaling to carry out its growth regulatory functions, two approaches were used. First, we tested if Csk regulates the expression of transcriptional targets of Hippo signaling, e.g., ex-lacZ, fj-lacZ, dronc1.7kb-lacZ, and diap1-4.3GFP. Second, we tested genetic interactions between Csk and components of the Hippo pathway in order to determine the hierarchy of gene action. Here we present our progress on establishing the genetic links between Csk and the Hippo signaling pathway. These studies will reveal valuable insights about the mechanism of Csk function. Given the conservation of genes and cell biological processes between flies and humans, the outcomes of our investigation can be extrapolated to mammalian Csk function and regulation.

27. Rebecca A. Lieberman, Laura K. Fonken, Zachary M. Weil & Randy J. Nelson Department of Neuroscience, The Ohio State University
THE ROLE OF HYPOTHALAMIC INFLAMMATION IN DIM LIGHT AT NIGHT AND HIGH FAT DIET INDUCED METABOLIC DISTURBANCE

The worldwide increase in obesity and metabolic disorders correlates with increased exposure to artificial light at night (LAN). Mice exposed to dim LAN (dLAN) develop symptoms of metabolic syndrome. In western societies exposure to LAN and poor diet often occur in tandem and may contribute to the increasing obesity epidemic. We hypothesize that dLAN combined with a high fat diet (HFD) exacerbates metabolic dysfunction. Mice were assigned to four groups; either a standard light/dark cycle (LD) or dLAN and received either standard chow or HFD. After 4 experimental weeks tissue was collected for qPCR and immunohistochemical analyses of inflammatory markers in the hypothalamus and periphery. dLAN and HFD each increased body and fat pad mass compared to LD and standard chow, respectively. Additionally, both variables altered glucose levels and daytime food intake. dLAN and HFD each elevated TNFŒ± and MAC1 in white adipose tissue. Furthermore, Iba1 staining in the hypothalamus revealed

increased microglia activation in mice fed HFD. Our study shows that HFD exacerbates the effects of metabolic dysfunction caused by dLAN. This has important implications for western society, suggesting that modifying the time of food intake or spectrum of nighttime lights may be tools to reduce obesity.

28. Robert Batsell, Dana Allswede, Katherine Curley
Psychology Department, Kalamazoo College
AN INVESTIGATION OF COMPOUND ASSOCIATIONS IN FLAVOR-AVERSION CONDITIONING

Our lab uses taste-aversion learning with rat subjects as a model to explore the associations that form during compound conditioning. Three conditioning regimens were employed [a single-element conditioning group (X+), a compound conditioning group (AX+), and a preconditioned conditioning group (A+/AX+)]. This experiment used a compound of saccharin taste and almond odor followed by illness; half of the rats was tested with taste whereas the other half was tested with odor. Regardless of the test solution (odor or taste), relative to the aversion in the single-element group, the compound conditioning groups drank a significantly weaker amount whereas the preconditioned group drank a significantly stronger amount. Therefore, the results demonstrate the deleterious effects of compound conditioning on each of its elements were reversed if one of the cues had been preconditioned. The implications of these results for various models of associative learning will be discussed.

29. Jonathan D. Bomar & James J. Galligan
Department of Pharmacology and Toxicology, Michigan State University
THE SEROTONIN 5-HT1A RECEPTOR AND SYMPATHETIC NEUROTRANSMISSION IN MESENTERIC ARTERIES AND VEINS IN SALT-SENSITIVE HYPERTENSION

Salt-sensitive hypertension is prevalent in the U.S. and elsewhere. Salt acts in the brain to activate sympathetic nerves, which supply the heart and blood vessels. Increases in sympathetic nerve activity cause high blood pressure (hypertension). In the mesentery and gastrointestinal tract, the neurotransmitter serotonin modulates sympathetic activity. Previous studies showed that sympathetic control of arteries and veins is altered in deoxycorticosterone acetate (DOCA)-salt rats, an animal model of salt-sensitive hypertension. Impaired function of the serotonin 5-HT1A receptor, purportedly located on sympathetic nerve terminals in the mesentery, may lead to increased sympathetic activity. We used computer assisted video microscopy to measure changes in mesenteric blood vessel diameter caused by transmural electrical nerve stimulation in the presence of 8-OH-DPAT, a 5-HT1A receptor agonist. Ongoing studies suggest there is a decreased venous response to 8-OH-DPAT in DOCA-salt rats, relative to normotensive rats, and, to a lesser extent, a decreased arterial response in DOCA-salt rats, relative to normotensive rats. These findings support our hypothesis of impaired 5-HT1A receptor function contributing to increased blood pressure in salt-sensitive hypertension. Future work will provide additional data for these studies. Future work will also seek evidence for whether the 5-HT1A receptor is indeed located on nerve terminals in the mesentery, or if it is located on smooth muscle or endothelial cells in blood vessels. These findings will help determine the mechanism by which the 5-HT1A receptor modulates blood vessel tone in the mesentery.

30. Kate Tylicki
Neuroscience Program, Baldwin Wallace University
THE EFFECT OF DOUBLE-STRANDED PROTEIN KINASE R INHIBITION IN AN ANIMAL MODEL OF ALZHEIMER'S BETA-AMYLOIDOSIS

Alzheimer's disease (AD) is a debilitating, progressive neurodegenerative disorder characterized by amyloid-beta (Abeta) plaques, neurofibrillary tangles (NFT), and neuronal death. Accumulation of Abeta plaques is the primary event in AD and begins in the entorhinal cortex (EC), which plays a role in episodic and spatial memory acquisition and consolidation. The amyloid cascade hypothesis states that aberrant amyloid precursor protein (APP) leads to toxic Abeta peptide production and accumulation, eventually aggregating into oligomers and disrupting the cell. Abeta peptide accumulation leads to cellular stress, particularly endoplasmic reticulum (ER) stress; when the ER is stressed, apoptosis is activated. The

initiator is eIF2Œ±, which is activated by protein kinase r (PKR). Almost all of PKR's mechanisms induce apoptosis in response to cellular stress, and much of the work done on the relationship between AD and PKR implicates this kinase in the disease process. In general, heightened PKR phosphorylation has been found in both cell cultures and AD transgenic mice. Thus, the hypothesis of this study was twofold. First, animals given Abeta infusions into the entorhinal cortex would perform worse on the Morris Water Maze than control animals, and second, that animals given a PKR inhibitor would perform better on the maze task. Initial behavioral findings suggest that Abeta did create memory deficits, but PKR inhibition created more profound memory impairment than Abeta alone, contrary to established literature. These findings will be confirmed histologically.

31. Dana Pausch[1], Bradley Carter[1], James Herman[2] & Robert Thompson[3]
[1]Department of Neuroscience, University of Michigan, [2] Department of Psychiatry, University of Cincinnati, [3] Department of Psychiatry, University of Michigan

NEUROANATOMY OF GLUCOCORTICOID REGULATED mRNAs AND mRNA EXPRESSION CHANGES IN AN ANIMAL MODEL OF DEPRESSION

Depression is one of the leading disabilities worldwide, affecting 1 in 5 adults in the United States alone. While relatively little is known about the cellular pathology of depression, previous studies have found that hypercortisolemia (over production of cortisol/glucocorticoids) is common in patients with depression and that astrocyte cell numbers are reduced in the brains of depressed patients. Previous experiments in the Thompson lab have identified genes that are regulated by acute glucocorticoid exposure, both in astrocytes in vitro and in vivo. Here we have (1) investigated the basal neuroanatomical expression patterns of 2 of these genes in mouse and (2) measured mRNA expression changes in an animal model of depression. To further understand the impact of glucocorticoid mRNA regulation, we conducted a neuroanatomical mapping study to better understand basal expression of genes that had previously shown to be altered in acute and chronic glucocorticoid exposure. The selected astrocyte-enriched genes (Gjb6 and Glul) were mapped via in situ hybridization. We also tested whether the previously measured glucocorticoid-regulated genes may also be regulated in an animal model of depression known to exhibit hypercortisolemia (chronic unpredictable stress; CUS). Quantitative PCR (qPCR) studies have shown that the glucocorticoid-regulated genes were not regulated in this animal model; however, we were able to validate that a different subset of genes were regulated in this animal model. These new genes will be the focus of future studies investigating additional mechanisms associated with depression physiology.

32. Kelly Dunegan, Chelsea McGowan & Tom Koehnle
Psychology Department, Hiram College

BEHAVIORAL PHARMACOKINETICS OF SALVIA DIVINORUM AS STUDIED THROUGH YOUTUBE VIDEOS

The present study codes YouTube videos to establish behavioral pharmacokinetics of the drug Salvia divinorum. It was hypothesized: 1) That drooling is a symptom of smoking Salvia 2) Hypo-movements correlate with drooling 3) Heating correlates with drooling and 4) hypo-movements help determine potency of Salvia. Support was found for hypothesis one, which determined drooling as a symptom. For hypothesis two, there was no correlation between drooling and hypo-movements. In the case of the third hypothesis, there was no correlation between heat induction and drooling. However, there are limitations to watching videos online, so it does not rule out that hypo-movements or heating have an affect on drooling. The fourth hypothesis was supported but the correlation declined due to the removal of a high extract video. A post-hoc was conducted in order to validate hypothesis four. Five further videos were obtained and overall correlation of hypo-movement with nominal salvia strength was 0.47.

33. Jamie L. Innis[1], Laura K. Sirot[1], Anthony Fiumera[2]

[1]Department of Biology, The College of Wooster, [2]Department of Biological Sciences, Binghamton University

AFFECTS OF ATRAZINE ON DROSOPHILA MELANOGASTER COURTSHIP BEHAVIOR

Atrazine is an herbicide used throughout the United States to kill broadleaf and grassy weeds. In addition to being an herbicide, atrazine is also an endocrine-disrupting chemical (EDC), which indicates that it disrupts transport, secretion, and production of hormones in vertebrates. Although many studies have examined the affects of atrazine on vertebrates, few have looked at invertebrates. Our preliminary results showed that male Drosophila melanogaster experienced latency in mating when exposed to atrazine; therefore the purpose of this study was to test whether atrazine affects the courtship behavior of Drosophila melanogaster. Flies were reared in control, low, and high concentrations of atrazine and then paired with females in separate mating chambers. Courtship behaviors measured included: the duration of wing vibration and following, and the number of mount attempts, ovipositor extrusions and kicking events. We found no significant difference in the courtship behavior of males treated with atrazine and control males. The difference between the results of this study and those of our previous study, which suggested an effect of atrazine on mating, could be due to differences in experimental design. Our earlier study used much larger mating arenas than the current study. It is possible that the small arenas used in this study prevented females from escaping male mating attempts. In the natural environment, females are able to escape from courting males; therefore, it would be interesting to conduct the analysis of effects of atrazine on courtship behavior again, but with larger mating arenas.

34. Merissa Acerbi, Verner Bingman, Ryan Peterson, Stephanie Hylinski, Preston Stevenson, and Cordula mora.

J. P. Scott Center for Neuroscience, Mind and Behavior and the Department of Psychology, Bowling Green State University.

MORE THAN JUST A BIRD BRAIN: VISUAL WULST LESIONS AND THEIR EFFECT N DISCRIMINATION OF MAGNETIC INCLINATION IN HOMING PIGEONS (Columba Livia)

Homing pigeons are able to return to their loft from distant and unfamiliar places and have become one of the main model species to study avian navigation. To successfully fly from one point to another, pigeons need both a map and a compass. Over the last few decades considerable evidence has accumulated that pigeons possess an innate magnetic compass and can possibly learn a magnetic map during the early stages of their life. Two components of the Earth's magnetic field, inclination (angle between magnetic vector and Earth's surface) and declination (angle between magnetic vector and geographic North), have been implicated to play a role when pigeons determine direction during navigation. Recent work with migratory birds also indicated that the avian magnetic compass is light-mediated and dependent on the wavelength of the ambient light. This light-mediated system appears to be based on a chemical radical-pair mechanism in the retina of the eye. A candidate receptor molecule, cryptochrome, was recently identified and has been shown to be responsive to the orientation of the magnetic field vector. Magnetic compass information is then processed in the bird's forebrain in an area known as 'Cluster N' located in the visual Wulst. In this study, we surgically removed in seven pigeons an area in the visual Wulst equivalent to the Cluster N region to test whether this region is necessary for a pigeon's ability to discriminate magnetic inclination cues in a conditioned spatial orientation task. We found that post-surgery, discrimination performances dropped to chance level.

My sincere thanks to all of our talented presenters and faculty sponsors for sharing their work today and to our graduate school sponsors for their support!

Hope to see you all next year at Wabash College.