POSTER PRESENTATIONS
Session 1

P1. Understanding Valuation of Personal Information
Lane Skutt, Sanchari Das, and Sameer Patil (IU Bloomington)

Data aggregation companies exist. There is a vast market that consumes an abundance of information from people on social networking sites. This information is easily collected for free, without permission of the providers who lack asset consciousness. At this point in time, there is little information on how people value their personal information, especially after discovering that there is a market. When people release their personal information, then are primed with the knowledge that data aggregation companies exist, people suddenly become defensive and express attachment to their personal information. By surveying Facebook users, we investigated this switch in behavior as the psychology of ownership—which was found to be a significant influence on the valuation of information.

Mentors: Sanchari Das and Sameer Patil, Privacy and Security, School of Informatics, Computing and Engineering, IU Bloomington

P2. The Experience of Racial Discrimination on Health Outcomes: the Moderating Impact of Mindfulness
Micah T. Faidley, Marcy Beutlich, **Adam Barnhill**, Tamika C.B. Zapolski (IUPUI)

Research shows that racial discrimination results in negative health outcomes for African Americans. It has been observed that these outcomes result from heightened distress as a consequence of discrimination. Having high levels of mindfulness can lower levels of psychological distress, however few studies have examined the moderating effect of mindfulness on the relationship between discrimination and health outcomes. The current study aimed to fill this gap in the literature. 397 African Americans (M=20.6, 61% female) recruited from a Midwestern university completed measures assessing past year experiences of racial discrimination, depressive symptoms, anxiety symptoms, and trait mindfulness. A positive correlation was found between racial discrimination and the health outcomes, as well as a negative correlation between mindfulness and the health outcomes. Moreover, mindfulness was found to significantly buffer the effect of racial discrimination on anxiety symptoms. Although a buffering effect of mindfulness on depressive symptoms and substance use as a consequence of discrimination was observed, the effect was not statistically significant. In line with previous literature, discrimination was shown to have a negative impact on psycho- logical and behavioral health outcomes among African Americans, with a protective association found for mindfulness. Moreover, given the buffering effect of mindfulness on anxiety as a consequence of discrimination, it may prove to be an effective strategy to be included in interventions for African American young adults. However, alternative strategies may be more appropriate to address depressive symptoms and substance use as a consequence of racial discrimination.

Mentor: Tamika C.B. Zapolski, Department of Psychology, School of Science, IUPUI

P3. Are Great Researchers Terrible Teachers? — How Research and Teaching Performance Relate at U.S. Universities

Huimeng Zhao, Dakota Murray, Vanessa Minik, Nicolas Bérubé, Vincent Larivière, and Cassidy R. Sugimoto (IU Bloomington)

University professors engage in a variety of tasks in the domains of research, teaching, and service. There exists an abundance of research exploring a professor's performance in any one of these domains, yet few have explored how they affect each other. To explore the relationship between a scholar's research and teaching performance, we merged a dataset provided by the company Academic Analytics, which provides research performance data to U.S. universities, with another dataset collected from the popular teacher-evaluation website Rate My Professor. Using these data, we find that, controlling for all other variables, gender, discipline, age, and class difficulty were significant predictors of professor rating. Differences are found by gender and by discipline, with women with the highest teaching evaluations tending to have the lowest research performance. The average quality scores of men are higher across all the broad disciplinary areas, with a wide gap in Engineering but the smallest in the Medical Sciences. Male professors are also rated as having more difficult classes, except in the humanities. This research is only the beginning of what large-scale quantitative analysis promises to contribute to the understanding of research and teaching performance.

Mentor: Cassidy R. Sugimoto, Department of Informatics, IU School of Informatics and Computing, IUB

P4. No Title

Holly Ware (IU Kokomo)

In the United States, there are numerous cases of African American women falling victim to domestic violence within their household. Domestic and family violence is an important matter to comprehend so that people can empathize with the individuals who endure it. Recognizing the full extent of abuse that victims may go through allows for professionals to properly treat them for help. It also enables citizens with knowledge on how to approach and talk with victims they may know. By delving into the social constructs and environmental factors that specifically affect African American women, it allows for conversation that may elude to ways that this problem can be eradicated. This paper seeks to determine the underlying themes that occur within these circumstances.

P5. Family and Peer Influences on Substance Use among Juvenile Justice Involved Youth

Ian W. Carson, Tamika C. B. Zapolski, Richelle Clifton, Devin E. Banks, Alexandra Hershberger, Matthew Aalsma (IUPUI)

Juvenile justice youth experience high rates of substance use, which is associated with negative consequences, including health and functional deficits. Family and peer factors are associated with a high risk of substance use among the general population of adolescents. It is hypothesized that this risk process operates through pro-drug attitudes. However, limited research has been conducted on family/peer risk of substance use among detained youth and the mechanisms through which it may operate. The current study aims to fill this gap by examining the direct effect of family/peer risk on substance use in this population and the indirect effect of pro-social attitudes. We examined whether this relationship differs by race. 226 detained youth (81.9% male; 74.3% Black) were recruited from an urban county in the Midwest and completed a clinical interview and substance use assessment battery. A direct effect of family/peer risk on substance use was found for Black and White youth, though the effect was stronger among White youth. Results sup- ported the mediation pathway from family/peer risk to substance use through pro-drug attitudes. This indirect pathway did not vary by race. Family/peer risk is key in understanding substance use among detained youth, and the results suggest that this pathway operates through pro-drug attitudes. These findings suggest that interventions should focus on both risk factors to reduce substance use. Given the racial difference on the direct effect of family/peer risk on substance use, there may be other factors that influence risk more strongly for White youth, which warrants further investigation.

Mentor: Tamika Zapolski, Department of Psychology, School of Science, IUPUI

P6. Perceived Masculinity, Substance Use, Depression and Sexual Anxiety among Adolescent Males
Andrew P. Zervos and Devon J. Hensel (IUPUI)

Previous literature broadly links hyper-masculine ideology to adverse mental (e.g. depression) and physical health outcomes (e.g. violence) in young men, but does not examine the impact that masculine beliefs on day-to-day issues such as potential substance use, or the negotiation of emerging romantic and sexual relationships. We address this dearth in the literature be linking masculinity to measures of alcohol and drug use, as well as to depression and sexual anxiety. Data were drawn from a longitudinal cohort study examining sexual relationships, sexual behaviors, and STIs among adolescent men in middle to late adolescents. Participants contributed 676 quarterly interviews. Alcohol (35%), marijuana (36%) tobacco (24%) were the most frequently used substances; heroin was the least frequent (1%). Controlling for age, race/ethnicity and past sexual experience, higher masculinity was associated with higher odds of marijuana (OR=1.05) and heroin use (OR=1.56), as well as higher levels of sexual anxiety (b=0.22; p=.034) and depression (b=0.07, p=.08). Masculinity was not found to be associated with higher levels of alcohol, tobacco, prescription pill, inhalant, and ecstasy use. This research sheds light on the idea that traditional gender roles may encourage young men to pursue behaviors and to develop beliefs that are harmful to their physical and mental health. The specific relationships examined, namely sexual anxiety and depression were anticipated in the hypothesis. This research expands the current literature to involve analysis of day-to-day interaction with substance use / sexual anxiety and depression to general relationship masculinity.

Mentor: Devon J. Hensel (Department of Sociology, IU School of Liberal Arts, IUPUI)

P7. WITHDRAWN

P8. Law Enforcement Brutality and Race
Emily Hoover (IU Kokomo)

The purpose of this review is to examine police violence and police-perpetrated homicides in the context of race and racism in the United States. The ideologies of racism are entrenched in the societal structure of the United States and the impact of police violence and racialized policing practices are often not only portrayed but also endorsed as acceptable in media coverage. Perceptions of law enforcement and violence display a discrepancy from community to community and impacts citizen crime reporting. Perceptions of law enforcement include the following categories: disapproval of law enforcement, suspicion of law enforcement, viewing law enforcement as agents of brutality, and respect of law enforcement. Community members of neighborhoods that are predominately African American often report that they feel there is a lack of justice and accountability in treatment by law enforcement. Connecting the Jim Crow of the south with present policing practices continues the United States legacy of racialized social control that is enacted in daily interactions to the advantage of White Americans.

P9. Neural Correlates of Executive Functioning in Toddlers
Esther (Ye Eun) Yoon (IU Bloomington)

Executive functions (EFs) are a series of top-down mental processes involved in the regulation of thought, action, and emotion that are critical in predicting children's academic and social achievements. Previous studies suggest that three core EFs, response inhibition, working memory, and attention shifting, are not functionally independent during the preschool years. It may be possible to assess each measure more independently by examining neural activity through electroencephaography (EEG). Thus, the aim of this study was to test the hypothesis that two event-related potentials (ERPs), N2 and P3, are neurological indices of response inhibition and working memory, respectively, that covary with behavioral performance in toddlers. Children between 36 and 39 months of age (N=7) completed a battery of behavioral tasks and a respond inhibition (Go/NoGo) EEG task. In the visual Fish Shark task, subjects were instructed to "catch the fish" by pressing a button when presented with a fish stimuli (Go) but inhibit the prepotent response to catch a shark (NoGo). Spin the Pots, a multi-location search task, was used to assess working memory. The NoGo N2 amplitude and latency negatively correlated with performance in the Fish Shark task and the NoGo P3 amplitude negatively correlated with performance in the Spin the Pots task, supporting the hypotheses that the N2 and P3 serve as correlates of specific EFs. These results suggest that electrophysiological indices of EFs are somewhat distinguishable from each other as early as 3-years-old, and could serve as a more sensitive measure of executive function development in children.

Mentor: Bennett I. Bertenthal, Department of Psychological and Brain Sciences, IU Bloomington

P10. The Moderating Effect of Relationship Status on Hazardous Alcohol Use and Risky Sexual Behavior among College Students
Taylor A. Pemberton, Devin E. Banks, Tamika C.B. Zapolski (IUPUI)

Alcohol use is commonly associated with increased risky sexual behavior (RSB) in young adults. There is evidence that being in committed romantic relationship decreases risk for hazardous alcohol consumption and engagement in RSBs. However limited research has examined the interactive effect of alcohol use and relationship status on sexual risk taking. The current study aims to do so. 79 sexually active college students (59.5% females, 86.1% White, 58.2% in committed relationship) were assessed on alcohol use and RSB (i.e., number of sexual partners, sex with a stranger, condom use, and sex with a person in a relationship with someone else). People in a committed relationship were less likely to drink hazardously and have sex with a stranger, and were more likely to have sex with a condom. A non-significant moderating effect of relationship status on the effect of alcohol use and the RSBs was observed. However, based on observing condition-al effects of relationship status, differences were observed for the number of sexual partners (significant effect found for those in a committed relationship) and concurrent status (significant effect for those not in a committed relationship). Although an overall non-significant moderating effect of relationship status was observed, it is believed that given evidence of conditional effects that a significant effect would be observed with a larger sample size. These findings suggest that relationship status may be an important determinant as to whether young adults engage in RSB, particularly when the RSB is associated with alcohol use.

Mentor: Tamika C.B. Zapolski, Department of Psychology, School of Science, IUPUI

P11. Social Norms and Charitable Donations

Meagan Borchelt, Edward Hirt , Julie Eyink, and Janelle Sherman (IU Bloomington)

Social norms are what is seen as acceptable behavior by society. Two social norms that have been extensively studied are injunctive and descriptive norms. Injunctive norms are behaviors seen as the right thing to do, whereas descriptive norms are characterized by the behaviors the majority of others are doing. We tested these norms in a charitable donation setting to see how people responded when both are present and in conflict; specifically, we examined if the responses of men and women differed in adherence to the different types of norms. Participants took an online survey through Amazon's Mechanical Turk in which they read information that varied both the injunctive and descriptive norms about donating to a specific charity (Red Cross). Then, participants were asked to decide how to allocate $100 given to them to three different charitable organizations (Red Cross, Direct Relief, Internet Hotspot Fund). Results revealed there was a significant main effect on the injunctive norm, but the descriptive norm had no effect on charitable donation. Our findings indicate that men and women responded the same to the injunctive norm and clearly favored doing the right thing. The implications of these findings for the use of social norms to direct behavior are discussed.

Mentors: Edward Hirt, Julie Eyink, and Janelle Sherman, Department of Psychological and Brain Sciences, IU Bloomington

P12. The Relationship Between Psychological Factors and Cognitive Performance in People with Schizophrenia

Coffin, G., Salyers M.P., and Luther, L. (IUPUI)

There has been a renewal of interest on the influence of psychological factors on laboratory-based cognitive performance in people with schizophrenia. The current study aimed to assess the relationships between laboratory-based cognitive performance (i.e., on working memory and processing speed tasks) and self-reported motivation, clinician-rated motivation, and self-reported defeatist performance beliefs. To date, 39 people with a schizophrenia-spectrum disorder have completed the study measures. Analyses indicate that neither self-reported motivation nor defeatist performance beliefs were significantly related to participants' performance on the working memory or processing speed tasks. Higher levels of clinician-rated motivation were significantly related to greater working memory but not processing speed. Results indicate that levels of clinician-rated motivation may impact a person's performance on working memory tasks completed in a laboratory setting. Self-reported motivation and defeatist performance beliefs do not seem to impact cognitive performance on working memory or processing speed tasks. Performance on laboratory-based processing speed tasks may be less influenced by psychological factors than working memory tasks. Additional psychological factors and cognitive domains should be explored in future studies.

Mentors: Michelle Salyers and Lauren Luther, Department of Psychology, School of Science, IUPUI

P13. NMR Spectroscopy of Serotonin Interacting with Lipid Vesicles
Tial Tin Rem (IU Bloominton), Horia I. Petrache, and Bruce D. Ray

High levels of serotonin (5-hydroxytryptamine), a naturally occurring neurotransmitter, have been implicated in sudden infant death syndrome. In order to perform their functions, neurotransmitters must interact with membranes, and with transport and receptor proteins on the membranes of glial cells, of neuronal dendrites and of axonal buttons. Despite neurotransmitters being encapsulated in vesicles and released by exocytosis, the extent of direct interaction between neurotransmitters and lipid membranes has not been extensively investigated. Recently, in our laboratory, changes in NMR chemical shift with respect to hydrophobicity have been calibrated and used to measure interactions of dopamine with model membranes. Here we report on similar findings with measurements of serotonin interaction with lipid vesicles that show inter- action with both PC and PS lipids. Further investigation of these interactions in-vivo could help in medical research into serotonergic related disorders.

Mentors: Horia I. Petrache and Bruce D. Ray, Department of Physics, School of Science, IUPUI

P14. The Composition of *Salvadora Persica* Using an HPLC-MS Method
Winyu Sheriff (IUPUI)

Salvadora Persica, also called "Miswak" meaning "Tooth cleaning stick", is a member of the genus *Salvadora* that grows in the Arabian Peninsula and its surrounding countries. The stick of the *S. Persica* is known to have significant benefits when used orally to clean and maintain the teeth and gums and in some cases, has proven to be more beneficial to its user than the conventional toothbrush and toothpaste used widely today. The purpose of this project is to identify the molecule that is the root cause of the oral effects that the stick gives to its users. Currently it is believed to be Quercetin, a molecule found in many vegetables that is an anti-inflammatory and has effects on the skin and oral health. Using a High Performance Liquid Chromatography tandem Mass Spectrometry method, the molecular composition of the *Salvadora Persica* can be found as well as the abundance of Quercetin within it. Currently, the percent abundance of Quercetin in *S. Persica* has been found to be extremely low and the current machines are not picking up a significant enough signal from the molecule to determine whether or not Quercetin is in the *S. Persica*; therefore, the properties that *Salvadora Persica* display cannot be yet contributed to the presence of Quercetin. In the near future, more sensitive machines will be used to conduct the tests and come up with conclusive results and present them to scientists to then use to benefit the hygiene of individuals around the world

Mentors: Nick Manicke, Department of Chemistry and Chemical Biology, School of Science, IUPUI; Jack L. Windsor, Department of Biomedical and Applied Sciences, IU School of Dentistry

P15. Decoupling an Endosymbiotic Mutualism
Will Remington Austin (IU Bloomington)

The purpose of this experiment is to breed Steinernema nematodes that are isolated from their naturally occurring endosymbiotic bacteria Xenorhabdus. The process of developing axenic nematodes is the first step to evolving novel nematode and bacteria lines. We plated bacteria and added nematodes in order to obtain nematode eggs. The eggs were bleached, clearing them of bacteria, and then placed on liver agar plates to develop. We successfully developed a strain of nematodes free of their endosymbiotic bacteria. Our results allow for the selection of combinations of nematodes and bacteria, which may be utilized for evolutionary research, environmental research, and potentially offer farmers an eco-friendly pesticide.

Mentor: Zoe Dinges, Department of Biology, IU Bloomington

P16. Examining *Dyrk1a* Levels in Young Trisomic and Euploid Male Mice
Andrew Folz, Megan Stringer, Randall J. Roper, Charles R. Goodlett (IUPUI)

Trisomy 21, also known as Down syndrome (DS), occurs when the human chromosome 21 (Hsa21) is triplicated. Some of the attributes, or phenotypes, shown by individuals with DS are weakened bones and cognitive impairment. The Ts65Dn DS mouse, the most commonly studied DS mouse model, has about half of the Hsa21 orthologs in three copies. One of the genes in three copies in individuals with DS, and in the Ts65Dn mouse model, is Dual-specificity tyrosine phosphorylation-regulated kinase 1A (Dyrk1a). It is believed that Dyrk1a overexpression is one of the contributing factors to the decreased cognitive functions found in individuals with DS, and Dyrk1a has been touted as a target for drug development in DS. Normalization of Dyrk1a via genetic knockdowns has shown some cognitive and behavioral improvements in Ts65Dn mice, but attempts to normalize Dyrk1a pharmacologically have been met with more limited success. We hypothesize that the reason Dyrk1a inhibitors haven't been as effective is due to the limited knowledge of when and in what tissues Dyrk1a is overexpressed and protein concentrated elevated, especially early in development. To address this gap in knowledge, we aimed to measure Dyrk1a levels in three different brain regions at the perinatal (P) ages of P6, P12, and P15in male Ts65Dn and euploid littermate mice. We hypothesized that the Dyrk1a levels will be elevated in Ts65Dn mice at the three ages due to the strong role of Dyrk1a in neurodevelopment. To date, we found that Dyrk1a protein levels of Ts65Dn as compared to control littermates are elevated at P15in all brain regions, but they are not elevated at P12. We are currently examining Dyrk1a protein levels at P6. This research will be important because knowing when and where Dyrk1a is elevated will help further DS studies and will lead to advancements in potential treatments of DS.

Mentors: Randall Roper, Department of Biology; Charles Goodlett, Department of Psychology, School of Science, IUPUI

P17. Contrasting Bone Phenotypes in the Different Mouse Models of Down Syndrome Suggests Trisomic *Dyrk1a* Does Not Act Alone
Sean Turner, Jared Thomas, Jonathan LaCombe, Eva Lana-Elola, Sheona Watson-Scales, Elizabeth M. C. Fisher, Victor Tybulewicz, and Randall J. Roper (IUPUI)

Down Syndrome (DS) is a genetic disorder in which there is a triplication of human chromosome 21 (Hsa21) causing skeletal abnormalities such as decreased bone mineral density (BMD), trabecular and cortical bone deficits. Trisomic mouse models recapitulate some skeletal and cognitive abnormalities associated with DS. Ts65Dn (~104), Dp1Tyb (~148) and Ts1Rhr (~33) are trisomic for gene segments found on mouse chromosome 16. Dyrk1a is found in three copies in individuals with DS and in these mouse models, and is hypothesized to be involved in skeletal deficits. The aforementioned mouse models display similarities and differences in the trabecular, cortical and mechanical strength bone phenotypes. Genetic normalization of Dyrk1a in otherwise trisomic Ts65Dn mice rescues some, but not all, skeletal deficits associated with DS. This suggests that there are trisomic genes in addition to Dyrk1a contributing to the abnormal bone phenotypes seen in DS. Mouse models Dp2Tyb, Dp3Tyb, and Dp9Tyb combined share all the triplicated genes that the Dp1Tyb model contains but they are broken down into smaller segments. Dp3Tyb mice contain three copies of Dyrk1a whereas the Dp2Tyb and Dp9Tyb models do not. We hypothesize that Micro CT and three-point bending tests will provide the comparative data in trabecular and cortical BMD and mechanical strength to contrast the phenotypes displayed by these additional mouse models that contain different segments of Mmu16 in three copies. This comparison may help explain how different trisomic genes interact to causes appendicular skeletal deficits.

Mentor: Randall Roper, Department of Biology, School of Science, IUPUI

P18. Lactate Utilization by the Bacterium *Rhodopseudomonas palustris* Through Either Conditioning or Co-Consumption with Other Organic Acids

Alekhya Govindaraju, Breah LaSarre, Jake McKinlay (IU Bloomington)

Many bacteria in anaerobic environments rely on organic acids as their main source of carbon and thereby play an important role in global carbon cycles. However, even in model organisms such as *Rhodopseudomonas palustris*, the sequential or simultaneous consumption of multiple organic acids is poorly characterized. Previous results from our lab revealed that *R. palustris* can readily consume succinate, acetate, and lactate when grown in an engineered co-culture system with the fermentative bacterium, Escherichia coli. This was surprising because *R. palustris* does not readily consume lactate when provided as the sole carbon source. We hypothesized that the presence of other organic acids allowed for the immediate co-consumption of lactate. Using anaerobic culturing techniques and high-performance liquid chromatography, we show that lactate is readily consumed simultaneously with succinate, acetate, or a combination of both. *R. palustris* can also be conditioned to consume lactate alone through prolonged incubation and/or a series of transfers with lactate as the sole carbon source. Co-consumption of lactate with succinate and acetate does not eliminate the need for conditioning *R. palustris* to consume lactate alone, indicating that independent mechanisms are used in each lactate consumption condition. These results provide insight into the temporal patterns of organic acid consumption by *R. palustris* and will help us redefine how we view the range of substrates that a single bacterial species can consume in natural anaerobic environments.

Mentors: Breah LaSarre and Jake McKinlay, Department of Biology, IU Bloomington

P19. Phytoplankton Community Dynamics: response to thermal alteration of an unidentified picoeukaryote

Katelyn Doyle (IU Bloomington), Joshua Kling, David Hutchins

Rising oceanic temperatures due to anthropogenic climate change have been shown to affect growth rates and community dynamics for marine phytoplankton – which comprise the base of the marine food web, and are major contributors to the Earth's atmospheric oxygen. Current diatom driven production regimes may be replaced by smaller, nano- or picophytoplankton regimes. Shifts in dominant phytoplankton species could have drastic effects on both marine ecosystems and biogeochemical cycles. Analyzing the physiological characteristics of potential dominant species could give insight into the implications of shifts in phytoplankton community dynamics. In this project, we isolated an unidentified species of pavlophyte, "K," from com- munity thermal response experiments involving phytoplankton from the San Pedro Ocean Time Series. Previous work suggests that "K" is capable of outcompeting larger diatoms at higher temperatures. This study collected thermal response data for "K" based on the assumption that "K" was an autotrophic species. The results suggest that "K" growth rates peak at the outer ranges of the thermal period tested (14°C and 28°C). Additionally, the lack of chlorophyll a at higher temperatures indicates "K" could be mixotrophic – meaning that it may be autotrophic at lower temperatures, but heterotrophic at higher temperatures. If this is true, "K," and similar picoeukaryotes may be able to adapt to oceanic conditions that current major phytoplankton species cannot – and therefore may be the future for the food chain in a warming environment.

Mentor: Joshua Kling – Wrigely Institute for Environmental Sciences, University of Southern California

P20. Researching a Pharmaceutical Treatment ForHydrocephalus

Symphony Davis, Alexander Hochstetler, Daniel Preston, Stefanie Simpson, Caleb Danko, Bonnie Blazer-Yost (IUPUI)

Hydrocephalus is caused by the enlargement of brain ventricles caused by excessive buildup of cerebrospinal fluid (CSF). This devastating disease affects approximately 1 baby out of every 1000 born with side affects like delayed development, loss of coordination, cognitive difficulties, or even death. Hydrocephalus can also affect adults in an underdiagnosed disease of the elderly called normal pressure hydrocephalus and can be a secondary consequence of stroke or traumatic brain injury. The formation of CSF by the choroid plexus of the brain ventricles and the absorption of CSF back into the blood is constantly regulated and maintained in a normal brain. This regulation, however, does not occur normally when someone is affected by hydrocephalus, causing swelling of the ventricles and pressure to be put on brain tissue from the over-accumulation of CSF. Our laboratory has found that by blocking a specific ion channel called the transient receptor potential, vanilloid type 4 (TRPV4) with an antagonist for the channel, there is a substantial decrease in the development of hydrocephalus in a rat model of the disease. The details of the biochemical mechanism of action of the antagonist as well as potential drug side effects are unknown. The PCP-R cell line is a tissue culture model of the choroid plexus epithelial cells. We are researching all the mechanisms of these chemicals in the cell line. The results of this study can potentially be used to develop a drug that will be a much better treatment plan for those with hydrocephalus than the current standard of care, which involves surgical intervention.

Mentors: Bonnie Blazer-Yost and Alexander Hochstetler, Department of Biology, School of Science, IUPUI;

P21. Mechanism of osteoclast differentiation induced by apoptotic osteocytes

Sinai Valdez, Hannah M. Davis, and Lilian I. Plotkin (IUPUI)

Osteocytes are embedded in fully formed bone. These cells are the key in controlling the function of bone-forming and reabsorbing cells. From previous work a very specific gap junction protein called connexin 43 was observed to be a very important component of the signaling pathway controlling osteocyte survival. Since aging decreases connexin43 then the deletion of this protein was found to mimics the skeletal phenotype of old mice. This experiment was design to examine the particular link between osteocyte apoptosis and osteoclast differentiation. As well as to determine the molecular signals responsible for mediating these effects in mice lacking osteocytic Cx43 and in old mice. In order to address this problem a molecule called HMGB1, a pro-inflammatory cytokine, which has shown to mediate osteoclast recruitment/differentiation was used on osteoclasts. To test the effects of HMGB1 osteoclasts were scored that were treated with conditioned media collected from MLO-Y4 osteocytic cells treated with anit-HMGB1. This concluded that osteocytes treated with anti-HMGB1 decreased the number of osteoclasts. Additionally, treating the osteoclasts with anti-HMGB1 had no effect on the number of osteoclasts, which tells us the osteoclast-derived HMGB1 is no required for osteoclast differentiation, but osteocyte-derived HMGB1 stimulates osteoclast formation. The data collected so far further confirms the role of apoptotic osteocyte-derived HMGB1 in stimulating osteoclast differentiation. These findings further demonstrate the link between osteocyte apoptosis and osteoclasts recruitment/differentiation.

Mentors: Hannah M. Davis and Lilian I. Plotkin, Department of Anatomy and Cell Biology, Indiana University School of Medicine

P22. Fluoroamide-Directed Fluorination of Unactivated C–H Bonds
Jenna Bingham, Brian Groendyke, Silas Cook (IU Bloomington)

Organofluorine compounds possess unique and desirable properties with applications spanning the pharmaceutical, agricultural, and materials industries. Despite being ideal transformations, methods to selectively fluorinate Csp3–H bonds are still scarce and in need of development. Previous work in the Cook Group demonstrated that N-fluoro-2-methylbenzamides selectively transfer fluorine upon reaction with iron(II) triflate to provide the benzyl fluoride in yields up to 93%. Attempts to change from the rigid 2 methyl-benzamide class to linear alkyl systems caused the yields to plummet to around 20%. This work presents the current investigations of these open-chain, unactivated systems with improved yields up to 48%. To increase the yield, the reaction temperature and concentration were decreased, catalyst loading increased, and external triflate source was added. Through this continuing work, the goal of being able to selectively functionalize any unactivated C–H bonds in a targeted fashion will be one step closer to a reality.

Mentor: Silas Cook, Department of Chemistry, IU Bloomington

P23. Why do stars become red giants?
Thomas Dean Crail (IU Kokomo)

This research project investigates an instability that may arise in stars that can be modeled as composite polytropes such as occurs in the case of a red giant star with a core – envelope structure. A polytrope is a fluid with an equation of state where the pressure of the fluid depends only on the density raised to a particular power. In our work, we are interested in bipolytropes, that is to say composite polytropes with two regions where a particular polytropic equation of state holds in each. Schonberg and Chandrasekhar identified a stability limit for the maximum mass that an isothermal core could have as a fraction of the total mass of the star. In this work, we investigate whether a star undergoes an instability on a dynamical time scale when it passes beyond the regime of stable core mass fractions.

Mentor: Patrick Motl, School of Sciences, IU Kokomo

P24. Automated Derivatization of Methamphetamine Using Total Vaporization Solid Phase Microextraction (TV-SPME)
Mikaela A. L. Greer, Logan Hickey, and John Goodpaster (IUPUI)

Methamphetamine is a highly addictive stimulant widely abused in the United States. Over 12 million Americans said that they have tried methamphetamine at least once. This Schedule I drug is well known for its negative health effects including, but not limited to, memory loss, aggression, psychotic behavior, damage to the cardiovascular system, malnutrition, and severe dental problems. The responsibility of the forensic chemist is to properly identify the drug after it has been confiscated by police. It is a rare occurrence to receive a "street" sample that is 100% pure meth. Methamphetamine is concocted from many different ingredients including ephedrine or pseudoephedrine, found in over the counter medicine, and caffeine to increase the stimulation to make the drug appear to be purer than it really is. In this experiment, total Vaporization Solid Phase Microextraction (TV SPME) is used along with derivatization to make the compounds more thermally stable and volatile allowing detection through a Gas Chromatograph/Mass Spectrometer (GC/MS). To date, methamphetamine, ephedrine and caffeine have been identified "as is" in solution using TV SPME and methamphetamine has also been identified as its derivative formed from trifluoroacetic acid (TFAA). Samples where the sample is a dry powder have also been successfully analyzed.

Mentor: John V. Goodpaster, Forensic and Investigative Sciences Program, School of Science, IUPUI

P25. Effects of the Interaction Between Lipid Membranes and Neurotransmitters
Christina B. Martin, Horia I. Petrache, Bruce D. Ray, and Ryan Lybarger (IUPUI)

Measuring the interactions between lipid membranes and neurotransmitters can provide useful information for those creating new medications in the medical field. The purpose of time spent in the Biomembrane Physics Laboratory was to measure the effects of the interaction between lipid membranes (DLPC) and the inhibitory neurotransmitter Gamma-Aminobutyric Acid (GABA). A Malvern Zeta Sizer instrument was used to preform dynamic light scattering measurements. This instrument measures the amount of light that is scattered by lipid vesicles in solution as a function of time. From this information, one can determine the size of lipid vesicles and the electrostatic potential on their surfaces. I have learned how to properly use and record measurements with the Zeta Sizer instrument and learned how to prepare samples containing the appropriate amount of lipid material to allow for accurate light scattering measurements. Future work can include measurements for different classes of phospholipids, in particular phosphatidylserine, which has been shown to play important roles in cell signaling.

Mentors: Horia I. Petrache and Bruce D. Ray, Department of Physics, School of Science, IUPUI

P26. Characterization of Endocannabinoid Signaling on Cerebellar Development
Ricardo Martinez, Kylie Black, Luis Dominguez, Ken Mackie, and Anna Kalinovsky (IU Bloomington)

Endocannabinoid system (ECS) encompassing cannabinoid receptors and enzymes involved in synthesis and degradation of the endogenous cannabinoid signaling lipids is highly expressed in the cerebellar cortex of adult humans and rodents. In addition to the well-established role in neuromodulation, endocannabinoids (eCBs) have been shown to play a key role in neurogenesis, migration, and synapse specification in the fore- and mid-brain. However, the role of ECS in cerebellar development has not yet been explored in detail. The purpose of this study is to characterize the pattern of expression of ECS during cerebellar development. Immunohistochemical characterization of ECS components has been carried out utilizing antibodies generated and validated in the Mackie lab in combination with cerebellar cell type markers. Our results reveal temporally, spatially, and cytologically dynamic pattern of ECS expression. Production, receptor binding, and degradation of eCBs is tightly controlled, thus localization of eCB receptors and the complementary cannabinoid signaling machinery determines the direction, duration, and ultimately the outcome of eCB signaling. The insights gained from this study lay down the foundation for investigation of specific cellular and molecular mechanisms regulated by eCB signaling during cerebellar development.

Mentors: Anna Kalinovsky, Department of Psychology and Brain Sciences; Ken Mackie, The Gill Center for Neuroscience, IU Bloomington

P27. Interactions Between Glutamate and Phosphocholine Lipid Bilayers
Kiyomi M. Kukoyi (IUPUI)

Amyotrophic Lateral Sclerosis (ALS) is in part caused by the excitotoxicity that is a result of glutamate over-stimulation. This study examines the binding patterns of glutamate to Dilauroyl Phosphocholine lipid bilayers under different conditions. In order to look at these interactions, the Zetasizer was used to measure the zeta potential. The zeta potential shows the change in the surface charge, which is an indication of whether or not glutamate is binding to the lipid bilayer membranes. Studying how glutamate binds to various membranes can aid in understanding how to manipulate bind patterns and hopefully find more successful treatments for ALS.

Department of Physics, School of Science, IUPUI

P28. Developing a Phenotypic Profile
Lydia Hawthorne (IUPUI)

The Walsh laboratory is a Forensic DNA Phenotyping laboratory located on IUPUI campus. DNA phenotyping is the process of predicting an individual's physical appearance using genetic information collected from DNA sequencing through genotyping. This lab has been involved in cases from ancient bones to present day samples. The DNA Phenotyping system HIrisPlex allows the prediction of human eye and hair color from ancient and modern biological samples. During my time in the laboratory I have learned to manage a large-scale sample collection. The lab collects samples from the introductory Biology class to evaluate the accuracy of HIrisPlex while letting the students use model to determine the accuracy of the models in predicting the student's eye and hair color. During this collection I gained experience through the use of important laboratory equipment such as the 3D camera and spectrophotometer all the way through DNA extraction and genetic analysis. A survey was then given to the Biology 101 students after using the HIrisPlex to see if their results were accurate or not. Through the analysis of these result surveys there were a few errors, but nothing that would result in a major flaw in the model. Some examples of error would be hair color change from age, change in eye color over time for some individuals or entry error from the individual. In order to eliminate such error, there need to be some adjustments made or ways to eliminate human error when using the prediction model to lessen inaccuracy in eye and hair color predictions.

Mentors: Susan Walsh and Krystal Breslin, Department of Biology-Forensic & Investigative Sciences Program, IUPUI School of Science

P29. Creation of Hybrid Photoactive Inorganic/Organic Interface Assemblies of Cadmium Oxide mixtures (CdO2/CdO)/Poly2,2 Bithiophene; Optical and Photoelectrochemical Investigations
Kasem K. Kasem, **Henry Worley** and Ashley Lovins (IU Kokomo)

Nanoparticles of cadmium peroxide (CdO2) were immobilized in poly 2,2 bithiophene (PBTh) to build pho- to active inorganic/organic interfaces or (I/O/I). Studies indicated that the CdO2 initially immobilized in the organic polymer partially decomposed to low band gap CdO. Therefore we refer to this mixture as CdO2/ CdO. The CdO2/CdO/PBTh assemblies were subjected to optical and photoelectrochemical investigations in aqueous electrolytes containing acetate, nitrate, or phosphate. The equilibrium mixture of CdO2/CdO influenced the optical conductivity and dielectric contents of the assemblies. Furthermore, O2 played an important role in the charge separation and transfer processes. The effects of an applied magnetic field were investigated and reported. The results were explained on basis of the formation of hybrid sub-bands due to band alignments between the assembly components. The photo-induced charge generation of PBTh was improved by occlusion of CdO2 in the polymer as was evident from the greater photocurrent generated by CdO2/CdO/PBTh than that generated by PBTh.

P30. Synthesis of U24 Nanoclusters

Meghan Russell (IU Bloomington), Sarah Hickam, Peter C. Burns

Understanding the chemistry of uranium is incredibly important to the global community for managing nuclear waste and predicting the environmental mobility of uranium. In particular U24 is fundamental in the synthesis of other uranium structures because it often must first be formed to create other synthetic clusters. U24 is a part of a group of uranyl peroxide clusters made of over 60 compounds. The purpose of this work was to synthesize U24 nanoclusters in order to perform further analysis and compare its characteristics to other actinide clusters of similar structures. To form U24, a uranyl nitrate ($UO_2(NO_3)_2$) solution was mixed with hydrogen peroxide (H_2O_2) to precipitate the uranyl peroxide mineral, studtite. Various amounts of lithium hydroxide (LiOH) were added to dissolve studtite, followed by Cesium Chloride (CsCl) or rubidium chloride (RbCl). The high pH of the solution encourages the formation of U24 as opposed to other clusters. The optimal ratios of these reactants to form U24 were explored through this process. This synthesis will be repeated to perform thermogravimetric analysis and ICP-OES (inductively coupled plasma optical emission spectrometry) in order to confirm the water content and chemical composition. The acquisition of this data is essential in order to further study its chemical and thermodynamic properties. Further work is being pursued to understand these properties in comparison to similar Neptunium clusters.

Mentors: Sarah Hickam and Peter C. Burns, Department of Civil & Environmental Engineering & Earth Sciences, University of Notre Dame