

15th Annual Symposium

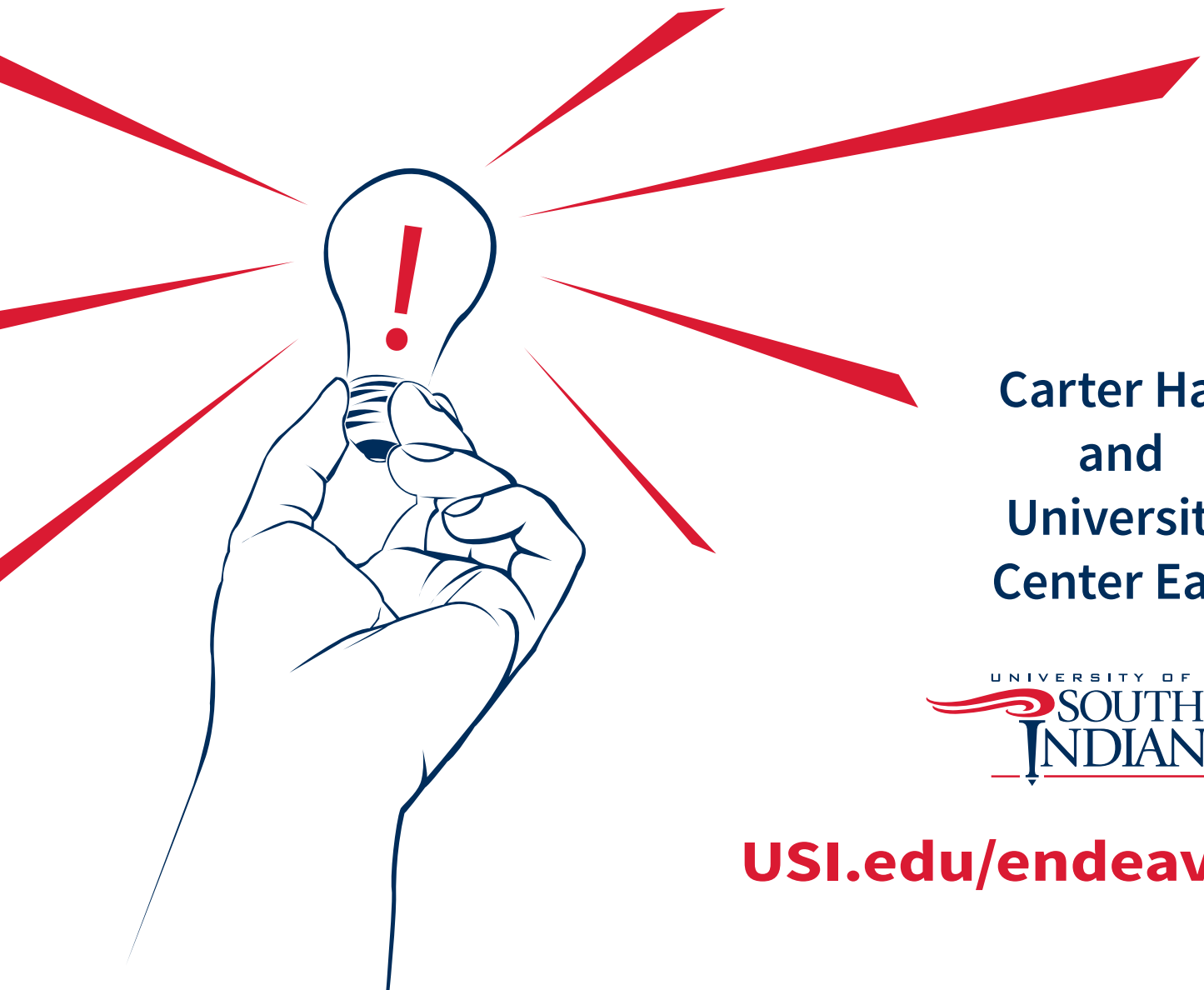
2016

USI

ENDEAVOR!

AWARDS *for*

RESEARCH & CREATIVITY



Carter Hall
and
University
Center East



USI.edu/endeavor

Endeavor Symposium Program

Thursday, April 7, 2016

- 7:30 – 8:30 a.m. **Check-in** for all presenters and sponsors: Pick up your programs and ID badges at registration table (located in 2nd floor UC hallway, next to Conference Services Desk)
- 8:30 – 11:40 a.m. **Oral Presentations**, Rooms UC 2205, and 2206
- 8 a.m. – Noon **Poster Sessions**, *University Center, Carter Hall D* (note: all posters must be removed from Carter Hall D by noon).
- 12:00 – 1:00 p.m. **Endeavor Luncheon** for student participants and mentors, *Carter Hall A-C*. Your badge will serve as your lunch ticket.

Endeavor Research and Creativity Awards Committee

Michael Strezewski	Director of Endeavor Awards for Research and Creativity, Associate Professor of Anthropology, College of Liberal Arts
Jeannie Collins	Associate Professor of Chemistry, Pott College of Science, Engineering, and Education
Rebecca Deeg	Grant Administrator, Office of Planning, Research, and Assessment
Ronald Diersing	Associate Professor of Engineering, Pott College of Science, Engineering, and Education
Lifang Gao	Instructor in Management, Romain College of Business
Rob Millard-Mendez	Associate Professor of Art, College of Liberal Arts
Erin Reynolds	Assistant Professor of Health Services/Administration, College of Nursing and Health Professions
Edmir Wade	Associate Professor of Chemistry, Pott College of Science, Engineering, and Education

Acknowledgements

The Endeavor Committee thanks the following for their support of the Endeavor Research and Creativity Award Program and Endeavor Symposium:

- Dr. Linda Bennett, President, University of Southern Indiana
- Dr. Ronald Rochon, Provost
- Dr. Shelly Blunt, Associate Provost for Academic Affairs
- Michele Duran, Senior Administrative Associate, Office of the Provost
- College of Business
- College of Liberal Arts
- College of Nursing and Health Professions
- Pott College of Science, Engineering, and Education
- USI Honors Program
- USI Office of Special Events

Endeavor Faculty Mentors

- Dr. Antonina Bambina
- Dr. Jeri Burger
- Dr. Jeannie Collins
- Ms. Joy Cook
- Dr. Kim Delaney
- Dr. Cindy DeLoney-Marino
- Dr. Joseph DiPietro
- Dr. Paul K. Doss
- Dr. Kerry Hall
- Ms. Emily Holt
- Dr. Michael Kearns
- Dr. Paul Kuban
- Dr. Eric McCloud
- Ms. Jeanette Maier-Lytle
- Dr. Anton Maria
- Ms. Heather Schmuck
- Ms. Jamie Seitz
- Dr. Jeffrey Seyler
- Dr. Hui Shi
- Dr. Natasha Smith
- Dr. Rebecca Sparks-Thissen
- Dr. Rex Strange
- Dr. Edmir Wade
- Ms. Beth A. Young
- Dr. Stephen Zehr

8-9 a.m. POSTER SESSION

Carter Hall, D

Maria Anderson and Daniel Mann	The Inner Membrane Protein YhiM is Required for Growth of <i>Escherichia coli</i> in Different Environmental Conditions Including Low Cell Number and High Temperature
Mariah Gatewood	Glioblastom Multiforme: Under Pressure
Mariah Gatewood	Make Time for Quality
Regan Grieger	Moyamoya Disease: A Rare Killer
Kevin Howard	Petrography and Geochemistry of Igneous and Metamorphic Core Samples from the Omaha Dome in Southern Illinois
Jessica Litherland	Development of a Student Athlete Nutrition Guide and Cookbook
Tabatha Loppnow and Eric Scheiber	Antibiotic Resistance Profiles of <i>Staphylococcus aureus</i> Isolates Cultured from Common Areas at the University of Southern Indiana Campus
Daniel Mann	Requirement of the Inner Membrane Protein, YhiM, for <i>E. coli</i> Growth in High Temperature and Reduced Salinity Environments
Kyle Mehringer	Synthesis of Ethynyl Substituted Pincer Ligands
Nehal Ninad	Contributions of Wing Condition and Wing Veins to Flexural Stiffness in Three Species of Lycaenid butterflies
Leslie Sargent and Shianne Bowlin	You Want Us To Do What? Adding an Activity-Points Requirement to an Established Honors Program
Heather Willis	A Comparison of Transcultural Nursing Aspects with an Emphasis on Psychiatric Nursing

9-10 a.m. POSTER SESSION

Carter Hall D

Maria Anderson and Daniel Mann	The Inner Membrane Protein YhiM is Required for Growth of <i>Escherichia coli</i> in Different Environmental Conditions Including Low Cell Number and High Temperature
Dmitriy Bachynsky	Analysis of Binding of a Substrate Analog to Enzymes Using NMR
Mariah Gatewood	Glioblastom Multiforme: Under Pressure
Mariah Gatewood	Make Time for Quality
Regan Grieger	Moyamoya Disease: A Rare Killer
Jordan Jones	Friedreich's Ataxia
Jessica Litherland	Development of a Student Athlete Nutrition Guide and Cookbook
Timothy Luczak	Incorporating Music into the Math Classroom
Scott Luke	The Importance of Professional Societies
Daniel Mann	Requirement of the Inner Membrane Protein, YhiM, for <i>E. coli</i> Growth in High Temperature and Reduced Salinity Environments
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Leslie Sargent and Shianne Bowlin	You Want Us To Do What? Adding an Activity-Points Requirement to an Established Honors Program
Heather Willis	A Comparison of Transcultural Nursing Aspects with an Emphasis on Psychiatric Nursing

10-11 a.m. POSTER SESSION

Carter Hall, D

Jordan Jones	Friedreich's Ataxia
Tabatha Loppnow and Eric Scheiber	Antibiotic Resistance Profiles of <i>Staphylococcus aureus</i> Isolates Cultured from Common Areas at the University of Southern Indiana Campus
Scott Luke	The Importance of Professional Societies
Timothy Luczak	Incorporating Music into the Math Classroom
Sid Nathan and Tiffany Ko	Further Studies in Methods of Extraction for Herbal Remedies
Vivian Truong and Marie Luff	Lamprey Mitochondrial Genome Sequencing

11 a.m. - noon POSTER SESSION

Carter Hall, D

Dmitriy Bachynsky	Analysis of Binding of a Substrate Analog to Enzymes Using NMR
Kevin Howard	Petrography and Geochemistry of Igneous and Metamorphic Core Samples from the Omaha Dome in Southern Illinois
Sid Nathan and Tiffany Ko	Further Studies in Methods of Extraction for Herbal Remedies
Vivian Truong and Marie Luff	Lamprey Mitochondrial Genome Sequencing

Oral Presentations

Session I, UC 2205

- 8:30 – 8:55 **Gerlyn Murrell** – World Systems Theory versus Post-Colonialist Theory Explanations of Cross-National Inequality: A Study of Six Nations from Three World Regions
- 9:00 – 9:20 **Alex Hoffman** – NCHC Student Toolkit
- 9:20 – 9:50 **Jace Bittner** – Implementing an Interactive 3D Model Approach to Virtual Tour Design: A Case Study of the Business and Engineering Center
- 9:50 – 10:20 **BREAK**
- 10:20 – 10:40 **Dennis Begeman** – Detecting Stable Isotopic Change of Groundwater in the Inglefield Sandstone Aquifer, and Precipitation in Southwestern Indiana
- 10:40 – 11:00 **Leanna Myers** – Exploring the Link Between Type II Diabetes and Cognitive Decline
- 11:00 – 11:20 **Crystal Thompson** – "The Color of Me" Personal Fiction
- 11:20 – 11:40 **Luis Macias, Alicia Bowling, Jacob Titzer, and Kelley Lott** – Heavener International Case Competition

Session II, UC 2206

- 8:30 – 8:55 **Cynthia Edlin, Emily Naas, and Mickala Snyder** – Taking a Bite Out of Crime – The Science of Forensic Dentistry
- 9:00 – 9:25 **Courtney Potter** – The Role and Importance of Dental Hygiene in Foreign Medical Missions
- 9:25 – 9:55 **Katelyn Majors, Alicia Ramsay, and Molly Zobel** – It Happens Just Like “VAP”: A Dental Hygiene Perspective on Ventilator Associated Pneumonia
- 9:55 – 10:20 **BREAK**
- 10:20 – 10:40 **Rachel Athipozhy and Jackson Traylor** – Solar Splash
- 10:40 – 11:00 **Victoria Smitley and Jessee Swain** – ASCE-Concrete Canoe 2016 Calypso
- 11:00 – 11:20 **Christopher Huber, Alexander Flick, Isaac Morris, and Anna Steurer** – American Society of Mechanical Engineers Human Powered Vehicle

Oral and Poster Presentation Abstracts

The Inner Membrane Protein YhiM is Required for Growth of *Escherichia coli* in Different Environmental Conditions Including Low Cell Number and High Temperature

Maria Anderson and Daniel Mann

Faculty Mentor: **Dr. Rebecca Sparks-Thissen**

The bacterium *Escherichia coli* (*E. coli*) must be able to grow in a large number of different environmental conditions. One gene, YhiM, has been shown to be regulated in response to a variety of environmental conditions, including high temperature, acidic conditions and low oxygen. The YhiM gene produces an inner membrane protein that we have shown to be necessary for survival in acidic conditions but the contribution of YhiM to survival in other conditions is unknown. Our experiments focused on the role of YhiM in high temperature. We first tested whether YhiM deficient (Δ YhiM) cells could grow normally at 37°C by monitoring optical density and viable cell counts. We found that Δ YhiM cells had a 1.5 hour longer lag phase than wild-type *E. coli* but had a similar growth rate during log phase. They also stopped growing at a lower cell density and died more quickly in long term cultures. We then tested whether these effects were exacerbated at 41°C. Δ YhiM cells grew more slowly at 41°C than wild type. We also grew the wild type and Δ YhiM cells at room temperature, 21°C, and found that growth was similar among all three cultures and in some cases the Δ YhiM cells even outgrew the wild-type. This suggests that YhiM is necessary for *E. coli* growth at high temperatures.

Solar Splash

Rachel Athipozhy and Jackson Traylor

Faculty Mentor: **Dr. Paul Kuban**

The Solar Splash is an intercollegiate solar-electric boat competition dedicated to showing the feasibility of solar energy. In actuality, the competition is only one small part of a very intricate system that must be executed fully to be able to compete. This is the first year of competition for the University of Southern Indiana and for the team members who have made a commitment to volunteer their time and work to build an electric boat that will represent their university and their engineering ability. Designed to stimulate the students engineering thought process, the event holds three separate types of boat races that exemplify the vessels speed, maneuverability, and endurance. But race day is just the end product of a process that begins months before. Our journey began in the fall semester of 2014 when faculty in the engineering department presented an opportunity for students to participate in a national competition. At our first meeting it was obvious we had accepted a responsibility to represent our school and our future professions. This will include demonstrating our ability to not only engineer a functional vessel, but also prove we can effectively manage a project from beginning to end, recognizing problems and providing viable solutions. Starting with a donated hull and little else, the USI

Solar Splash team plans to design and build the power and propulsion system for the new USI competition boat. Along with this task, the team will need to prepare a budget, and attempt to communicate our process and progress through reports and summaries so others may follow in our path and improve upon it in future years to come. This year we are excited to share our success of last year's solar splash competition as well as some of our ideas for this year's team as we will be competing again in June.

Analysis of Binding of a Substrate Analog to Enzymes Using NMR

Dmitriy Bachynsky

Faculty Mentor: **Dr. Jeannie Collins**

Enzyme inhibitors are used to interact with a targeted enzyme to turn it off. They can reduce or completely inhibit the activity of an enzyme either reversibly or permanently. We are studying AMP inhibition of several enzymes that oxidize NADH. Alcohol dehydrogenase, aldehyde dehydrogenase, α -glyceraldehyde dehydrogenase, β -hydroxybutyrate dehydrogenase, formate dehydrogenase, L-lactic dehydrogenase, and sorbitol dehydrogenase will be among the enzymes that will be used. When considering the inhibition of analogue inhibitors, it can be related to its geometry, enzyme-transition state and enzyme inhibitor transactions. Enzymes normally operate within femtoseconds. However in the presence of an inhibitor, the reactions are slower and substrate conversion can be monitored using NMR. We theorize that each enzyme will be inhibited differently by AMP, and will allow us to see the spectra differences when bound to NAD⁺.

Detecting Stable Isotopic Change of Groundwater in the Inglefield Sandstone Aquifer, and Precipitation in Southwestern Indiana

Dennis Begeman

Faculty Mentor: **Dr. Paul K. Doss**

Recent and long-term changes to water levels within the Inglefield Sandstone aquifer of Southwestern Indiana prompted an investigation of the stable isotopic ratios of $^{18}\text{O}/^{16}\text{O}$ found in groundwater and precipitation of the Evansville, Indiana area. Stable isotopic data from the same system in 2004 – 2006 permits identification of decadal isotopic differences and similarities. The University of Southern Indiana Groundwater Monitoring Lab houses a deep-shallow piezometer nest within the Pennsylvanian Inglefield Sandstone, screened at 33.5 m and 15 m respectively. Both the shallow and deep groundwater were sampled monthly for stable isotope analysis, along with event-based precipitation sampling. Analyses show that in nearly every month, deep groundwater has a more enriched $\delta^{18}\text{O}$ signature than shallow groundwater, and all samples fall in the $\delta^{18}\text{O}$ range -6.17 to -6.90 ‰. In 2004-2006 samples, deep groundwater was also more enriched than shallow groundwater, but all groundwater samples now are more depleted than the 2004-2006 samples. Over the last 10 years this depletion is as much as 0.98 ‰ in shallow groundwater in April and as little as 0.35 ‰ in July. Although data are limited, stable isotopic signatures of late-winter and early spring precipitation show depletion

from 2004-2006 to 2015-2016 with $\delta^{18}\text{O}$ being more depleted by as much as 2.8‰ in March. The local meteoric water line in 2006 was $\delta\text{D} = 6.4\delta^{18}\text{O} + 6.8$, and in 2015 is $\delta\text{D} = 7.9\delta^{18}\text{O} + 11.3$. The depletion in local groundwater $\delta^{18}\text{O}$ signatures may result from long term changes in seasonal precipitation patterns, and changes in groundwater recharge that are driven in part by a recent shift locally, from domestic groundwater use to a public surface water supply system. This recent local shift in water supply also corresponds with increasing water levels within shallow portion of the Inglefield sandstone aquifer.

Implementing an Interactive 3D Model Approach to Virtual Tour Design: A Case Study of the Business and Engineering Center

Jace Bittner

Faculty Mentor: **Dr. Hui Shi**

An interactive 3D virtual tour of USI's Business and Engineering Center is important because it will generate interest in Business and Engineering majors, while assisting potential students in making an informed decision about attending USI. Prospective students who are unable to visit USI can take an online virtual walk around the building, which may give them the incentive they need to seriously consider attending USI. More buildings could be added to the 3D virtual tour in order to welcome students of all disciplines, ideally encompassing the entire campus. Compared to a standard online tour using only pictures and videos, an interactive 3D virtual tour provides prospective students with a viewpoint only outmatched by a physical tour of USI.

I have worked on the virtual tour for over a year with three students and a professor. Now three students, including myself, are working on the 3D Virtual Tour for our senior project. Using the equipment funded by USI's Endeavor Award, I was able to take high quality photos that are used to make the building look as realistic as possible. The powerful camera, days of photo manipulation, and extreme attention to detail are necessary to make the photos usable in the 3D Virtual Tour. In addition, I used other equipment funded by USI's Endeavor Award, such as trackpads and mice, to test the virtual tour on a variety of hardware setups that prospective students will be using. Currently, more interactive content is being added to the 3D Virtual Tour by the team members, including a tour guide, doors that open and close, and a survey system for users.

Developing an interactive 3D Virtual Tour of USI's Business and Engineering Center is beneficial to USI, USI's prospective students, and the students working on the project. I have learned how to use numerous 3D modelling programs, how to use scripting (a programming technique), and how to work with others on a software team.

Taking a Bite Out of Crime – The Science of Forensic Dentistry

Cynthia Edlin, Emily Naas, and Mickala Snyder

Faculty Mentor: **Ms. Emily Holt**

Forensic dentistry, also known as forensic odontology, is a branch of forensics that involves the collecting, handling, and examining of dental remains to assist the legal system with crime-related identification of deceased individuals, abuse cases, and victims of mass casualties such as natural disasters and terrorist attacks. Forensic odontology is utilized as an alternative identification method when visual identification, fingerprint, or traditional DNA analysis are not available. The purpose of this research is to increase dental hygienists' awareness regarding this forensic field. A broad understanding of this specialty is vital since dental hygienists play a major role in maintaining accurate dental charting and exposing high quality radiographs, which are essential for proper identification of a deceased individual's dental remains. Dental hygienists have an ethical and legal responsibility to keep legible, accurate, and current records of each patient. A patient's dental record could contain that one piece of evidence that assists in solving a crime or brings closure to a family when their loved one is finally positively identified. The areas of forensic odontology that will be explored include historical context and importance, common methods of analysis, training and education requirements if dental hygienists desire to expand their career, and how dental hygienists can become involved.

Glioblastom Multiforme: Under Pressure

Mariah Gatewood

Faculty Mentor: **Ms. Joy Cook**

Every year, the Indiana Society of Radiologic Technologists (ISRT) holds a conference. This conference offers opportunities for networking, earning continued education credits, and participation in academic competitions. I submitted a literary review over glioblastoma multiforme, titled Glioblastoma Multiforme: Under Pressure, to the 2015 ISRT Scientific Essay Competition. Glioblastoma multiforme is a malignant tumor of the brain or spinal cord. It is rare, but most commonly diagnosed in males over the age of 65. There is a vast array of symptoms associated with glioblastomas. This tumor is known for its rapid growth and high recurrence rate. This disease can be diagnosed with the assistance of imaging sciences and a biopsy. The most common route of treatment involves sessions of chemotherapy, radiation therapy and surgical resection. Despite all efforts, there is still no known cause or cure for glioblastoma multiforme.

Make Time for Quality

Mariah Gatewood

Faculty Mentor: **Ms. Heather Schmuck**

Computed Radiography (CR) is used in many imaging facilities. Other current research has already concluded that processing in CR should be done within 24 hours of last erasure in order to preserve the quality for the images produced. We chose to conduct a similar experiment to monitor the changes in quality between images with different time lapses from exposure to imaging processing. These data are important for ensuring the best quality imaging. Our results coincided with our hypothesis that the quality of the image would decay between the moment of exposure until processing. The results also showed a greater rate of decay within the first 24 hours after the exposure. Our conclusion is that an image receptor should be processed immediately after an exposure is made to preserve the image quality.

Moyamoya Disease: A Rare Killer

Regan Grieger

Faculty Mentor: **Ms. Joy Cook**

The Indiana Society of Radiologic Technologists (ISRT) holds an annual conference in which there is a Scientific Essay Competition. For this competition, I submitted a literature review titled Moyamoya Disease: A Rare Killer. Moyamoya disease is an infrequent condition that affects the bilateral internal carotid arteries. These arteries become stenotic and result in the formation of collateral vessels to better supply oxygenated blood to the brain. The gold standard for diagnosing moyamoya is cerebral angiography and it is often treated through various revascularization techniques. This presentation serves to further discuss moyamoya disease itself, along with associated symptoms, pathologies, useful diagnostic imaging, treatments, and prognoses.

NCHC Student Toolkit

Alex Hoffman

Faculty Mentor: **Dr. Antonina Bambina**

During this presentation, the Student Affairs Committee will express the benefits of becoming a member of National Collegiate Honors Council (NCHC). The student board of director nominees will be introduced and express why they are good nominees for the Board of Directors. Also, the Student Affairs Committee will use this time as their committee meeting to review the past year and the future of the board, detailing the process of members rotating off and back on. It will also show the potential

members the inner workings of the NCHC and how their involvement can benefit the future of honors across the nation.

Petrography and Geochemistry of Igneous and Metamorphic Core Samples from the Omaha Dome in Southern Illinois

Kevin Howard

Faculty Mentor: **Dr. Anton Maria and Dr. Joseph DiPietro**

Ultramafic igneous intrusions have been reported in parts of Illinois, Missouri, Kentucky, and Tennessee. These rocks and their relation to the New Madrid Seismic Zone remain poorly understood due to their exotic nature and susceptibility to weathering. Here we focus on a portion of drill core from the Omaha Dome in southern Illinois (37° 51' 37.08" N, 88° 20' 9.42" W), extending from 2596 to 2615 feet below the surface, and exposing 15 feet of igneous rock with 4 feet of metamorphosed calc-silicate rock below. The contact zone extends from 2608 to 2611 feet and is distinguished from the dark gray igneous rock above by a distinct mottling with dark ultramafic clots mixed into a pale carbonate-rich matrix. The igneous rock contains partially serpentinized olivine phenocrysts, magnetite, apatite, and large (> 0.4 mm) crystals of perovskite and apparent melilite pseudomorphs, within oikocrysts of phlogopite and interstitial clinopyroxene. Groundmass carbonate increases in abundance toward the basal contact. Below the contact, the calc-silicate rock is marked by horizontal bands of beige and green, as well as abundant clots of granular garnet surrounded by clinopyroxene. The heterogeneous groundmass is dominated by prismatic wollastonite. Whole-rock analysis by XRF and ICPMS indicates that the igneous rock contains 33-38 wt.% SiO₂, 6-8% Al₂O₃, 16-19% MgO, 12-14% FeO_t, 15% CaO, and 0.5% P₂O₅. High concentrations of K₂O (2.6%) and TiO₂ (4.9%), and very low Na₂O (0.4%) are notable. Mg# ranges between 70-72. Trace element patterns exhibit enrichment of LREE, strong REE fractionation, and relative depletions of K, Sr, Zr, and Hf. These geochemical characteristics are consistent with a near-primary melt from a metasomatized peridotite source containing phlogopite-rich veins, and are very similar to those of ultramafic dikes sampled farther to the south in Illinois (the rock in this study is slightly more primitive, less altered, and set apart by its well-developed cumulate texture).

American Society of Mechanical Engineers Human Powered Vehicle

Christopher Huber, Alexander Flick, Isaac Morris, and Anna Steurer

Faculty Mentor: **Dr. Natasha Smith**

The American Society of Mechanical Engineers (ASME) Human Powered Vehicle (HPV) Competition is designed to challenge students to come up with a design for sustainable transportation. This competition also allows students to apply the engineering principles from their classes to real world situations. Teams travel from colleges across the United States to participate in this annual, national engineering competition. The completion tests the vehicle's design, safety, endurance, and speed. Previous classes built and improved the current vehicle frame and fairing in 2013 and 2014. However,

despite a respectable showing in competition, the HPV was difficult to drive and lacked some valuable safety features. This year, the USI ASME chapter is adding a vehicle stabilization feature to make the vehicle start up smoother and to maintain rider stability while in motion. In addition, the team has designed a lightweight DC power generator and storage system to power required road safety items on the vehicle, such as headlights and brake lights. Finally, the DC Power system will operate an additional safety feature to check blind spots. These added features are expected to improve rider safety and increase the ease of operation.

Friedreich's Ataxia

Jordan Jones

Faculty Mentor: **Ms. Joy Cook**

Friedreich's Ataxia (FA) is a neurodegenerative genetic disorder that occurs in roughly 1 of 50,000 persons. Individuals with FA experience difficulty-walking, loss of voluntary control, and muscle weakness. The primary cause of FA is the lack of frataxin that is made to help synthesize iron in the blood for energy. FA targets the areas of the posterior portion of the brain, the cerebellum, and the spinal cord. Magnetic resonance imaging (MRI) is the imaging modality preferred in diagnosing FA. Currently, there is no known cure for FA, but research is underway.

Development of a Student Athlete Nutrition Guide and Cookbook

Jessica Litherland

Faculty Mentor: **Ms. Beth A. Young**

The purpose of this project was to develop and distribute a sports nutrition guide and cookbook entitled Eagles Eating Strong, which will aid in making healthy food choices to maximize an athletes' performance. Eagles Eating Strong will be distributed to all University of Southern Indiana (USI) athletes, local high school coaches, and to our USI Food and Nutrition alumni who work with athletes in the community. Eagles Eating Strong will be used as a community outreach and educational tool. Both an electronic and printed version of the nutrition guide have been produced for future USI athletes and coaches, USI alumni, as well as area coaches. Eagles Eating Strong was formulated by first collaborating with the Athletic Department and requesting all of the athletes on the university's campus to contribute their favorite recipes that they prepare for pre or post exercise/competition. Students and staff from the Food and Nutrition Department at USI also contributed recipes that were used in the guide. The recipes were analyzed using the SuperTracker program on the ChooseMyPlate website. Standards were established based on the SCAN (Sports, Cardiovascular and Wellness Nutrition) DPG's materials, to classify the recipes as an appropriate choice for pre, during, or post exercise/competition. If a recipe did not meet the predetermined standards, substitutions were made. The nutrition guide portion of Eagles Eating Strong contains sport specific information for student athletes. Nutrition topics and content found in Eagles Eating Strong include; cooking basics, recipe substitutions, seasonal produce charts, cost effective shopping tips and food safety. Sports nutrition basics were also included.

These topics include; pre-competition nutrition, nutrition during exercise, and post exercise/recovery nutrition. Vegetarian athletes, travel tips, portion sizes and sample meal plans are also found in the guide.

Antibiotic Resistance Profiles of *Staphylococcus aureus* Isolates Cultured from Common Areas at the University of Southern Indiana Campus

Tabatha Loppnow and Eric Scheiber

Faculty Mentor: **Dr. Cindy DeLoney-Marino**

While infection by antibiotic resistant strains of *Staphylococcus aureus*, including Methicillin-Resistant *S. aureus*, in clinical settings is well-known, the transmission of these strains in non-clinical settings has not received the same level of attention, particularly on college campuses. We therefore set out to discover if antibiotic resistant strains of *S. aureus*, including Methicillin-resistant strains, could be detected in common areas at the University of Southern Indiana. Bacterial samples from objects and surfaces were collected from nine buildings on the campus and then tested for the presence of antibiotic resistant *S. aureus*, which could serve as a source of potential transmission to students and faculty. Bacterial colonies of interest were characterized using differential media, a series of antibiotics, and a *S. aureus* specific detection assay. Of the screened isolates, six were identified as *S. aureus*, of which five were determined to be resistant to Penicillin, three were determined to be resistant to Erythromycin, and only one was determined to be resistant to Gentamycin, Kanamycin, and Tetracycline. However, all *S. aureus* isolates were found to be sensitive to Cefoxitin (which is used in place of Methicillin to detect Methicillin-Resistant *S. aureus*). Therefore, while Methicillin-Resistant *S. aureus* was not detected on the University of Southern Indiana campus in this study, five of six strains of the bacterium isolated were determined to have resistance to at least one of the antibiotics tested. Through this study, we have identified potential sources of transmission of antibiotic resistant strains of *S. aureus* that could cause difficult-to-treat infections.

Incorporating Music into the Math Classroom

Timothy Luczak

Faculty Mentor: **Dr. Antonina Bambina**

Mathematics can be a strenuous subject for students of all age groups to learn and apply. It is not the liveliest curriculum, but incorporating music into a lesson could make the class more engaging for the students and teachers. Research suggests that there is a strong correlation between mathematics and music; an example of this would be the use of the Fibonacci Sequence in several classical and contemporary songs, as well as the connections made by Pythagoras in the 6th century who found ratios among music intervals. The traditional way of teaching a mathematics class, through lectures and workbook problems, has led to a phenomenon called mathematics anxiety. The introduction of music into the classroom has been shown to reduce this anxiety as well as increase motivation and engagement in the course. As an example, an educator could find a song and have students search for

the correlation between the mathematical concept discussed in class and the song. When students are able to apply math in an engaging way, they are able to make sense of the subject matter.

The Importance of Professional Societies

Scott Luke

Faculty Mentor: **Ms. Heather Schmuck**

The work of professional societies helps to define and set standards for their professional fields and to promote high standards of quality through awards and other forms of recognition. The pursuit of professional societies is educational and informational while offering support for people and programs. These societies encompass the voice of interdisciplinary outlook and intentions of its members. During attendance of the Indiana Society of Radiologic Technologist (ISRT) conference I competed in the quiz bowl. The quiz bowl was a great way to highlight my experience through the program at the University of Southern Indiana and represent our program through the spirit of competition. I was able to assess my knowledge against other peers and evaluate my own skills and competency. The competition as a whole was an exciting affair. My teammates and I walked away from the competition with first place honors as champions of the quiz bowl. I also had the opportunity to attend many informational presentations on different aspects of the radiologic and imaging sciences by practitioners and experts in the field. The ISRT conference was an outstanding opportunity for me as a student to be introduced to the professional etiquettes of being a part of a professional society. By attending the ISRT conference I was able to observe professional activities conducted by a professional society such as the voting and implementation of bylaws and the inauguration of new officers. I learned from my experience at the ISRT conference that professional societies are not extracurricular clubs, instead, they are a dedicated group of people devoted to the continuation and advancement of a profession. By attending a professional society's conference I learned that such organizations are vital for the unification of professionals that practice that profession and that unity strengthens the profession's voice and value.

Heavener International Case Competition

Luis Macias, Alicia Bowling, Jacob Titzer, and Kelley Lott

Faculty Mentor: **Ms. Jamie Seitz and Ms. Jeanette Maier-Lytle**

In preparation for the University of Florida Heavener Case Study Competition, we began practicing 5 months before the competition was scheduled to occur. The team was comprised of a senior marketing major, Alicia Bowling, a junior marketing student, Jacob Titzer, a senior accounting and computer information systems major, Luis Macias, and a junior accounting major, Kelley Lott. The Heavener Case Competition was located in Gainesville, Florida in the University of Florida and was comprised of twenty teams from four continents and ten countries from around the globe. There were two live cases that were distributed in the week of the competition, Exactech and Crom. Exactech was a public local prosthetics manufacturer in Gainesville, and Crom was a local private large tank manufacturer. The Exactech case was distributed on Monday, February 15th and gave students 24 hours to complete the

case. After the 24 hours of analysis teams presented during their allotted times, cases were judged by Exactech executives and alumni of the case competition. Fifteen minutes of protected time for presentation was given following a 15 minute section of question and answer. Once all contestants presented a dinner was held to hold the winners of the first round of the competition. Points were awarded to competitors based on analysis, feasibility, presentation, and overall look of the presentation. Based on ranking points were awarded and accumulated to the next case. The second case over the company Crom was distributed to competitors on Thursday February 18th which gave competitors 30 hours to analyze the case and present on Saturday. After the analysis phase a presentation was developed to Crom executives and alumni, judging criteria were the same as the Exactech case and presentation times and timing were the same as the previous case. The University of Southern Indiana was one of four United States schools competing in a competition of twenty. As globalization becomes more evident in our lives, case studies on the international level will become even more commonplace.

It Happens Just Like “VAP”: A Dental Hygiene Perspective on Ventilator Associated Pneumonia

Katelyn Majors, Alicia Ramsay, and Molly Zobel

Faculty Mentor: **Ms. Emily Holt**

The organisms responsible for causing Ventilator Associated Pneumonia (VAP) frequently originate from dental plaque. Individuals who have been intubated in intensive care units are more likely to develop VAP due to the length of time with intubation and lack of preparation of the oral cavity before intubating. Critical care nurses working with intubated individuals on a daily basis should be educated on how to care for the mouth to prevent VAP. Dental hygienists are knowledgeable of how to provide daily oral care. VAP can be prevented with daily oral care. Critical care nurses may not have the knowledge of how to care for the mouth or may not have the time required to do so. Dental professionals should become active in educating critical care nurses on the importance of providing daily oral care, the method to provide it, and oversee the delivery of care to ensure competency. Preventive measures, rather than corrective measures, are preferred when working with a population who is at a high risk for developing VAP. The newest form of treatment for VAP includes inhaled antibiotics. While new treatments seem very promising, preventive measures reduce the cost of inpatient care

Requirement of the Inner Membrane Protein, YhiM, for *E. coli* Growth in High Temperature and Reduced Salinity Environments

Daniel Mann

Faculty Mentor: **Dr. Rebecca Sparks-Thissen**

E. coli is a bacterium that is able to survive and reproduce in different environments. It contains a gene which codes for an inner membrane protein, YhiM. Several experiments have shown that YhiM is regulated in response to a number of cellular stresses. We hypothesized that YhiM might also have a

direct effect on the growth of this organism in certain conditions, like high temperature and reduced salinity. We tested the ability of YhiM mutants to grow in high temperature and low salt conditions using optical density and viable cell counts. When the wild-type organism, possessing the YhiM protein, and the mutant, lacking the YhiM protein, were put in conditions of 37°C with NaCl in the media both organisms grew, but the mutants possessed a hour and a half longer lag phase. We then tested whether our mutants could grow at 37°C without NaCl. The mutants had a longer lag phase, about half hour longer than when the NaCl was present. We next tested whether YhiM was necessary for growth at high temperature. When the wild type and mutants were placed in growing conditions of 41°C the mutants grew slower than the wild-type with a longer lag phase and during exponential growth. When the wild-type and mutants were placed in conditions of 41°C and lacking salts in the media, the wild-type was able to grow, but no growth of the mutant bacteria was detected. The conditions of high temperature and no salinity provides for minimal, if any, growth for the YhiM lacking mutants. The data indicates that the YhiM is necessary for the survival and growth in additional conditions of cellular stress. In particular, data indicates that YhiM plays a role in mediating growth and survival in high temperature and low salt conditions.

Synthesis of Ethynyl Substituted Pincer Ligands

Kyle Mehringer

Faculty Mentor: **Dr. Jeffrey Seyler**

The study of Iridium pincer catalysts has proven useful in changing alkanes to alkenes by removing dihydrogen (H₂). This process has been seen as potential use in on-board vehicles as an alternative fuel source. Changing the ligands that are attached to these iridium pincer complexes can highly impact the effectiveness of the catalyst. Computational calculations have shown different potential problems that occur with various ligand combinations. By changing the ligands we believe that a higher efficiency can be achieved. We have attempted to synthesize a trimethylsilyl ethynyl (TMSE) phosphine ligand and its coordination to iridium. The concept was that the ethynyl spacer would eliminate phosphine C-H bond reactions within a catalyst as observed in tert-butyl substituted pincers. After unsuccessful trials to synthesis the trimethylsilyl ethynyl ligand our attention has turned to whether we ever synthesized the TMSE phosphine. We are currently attempting the synthesis of phosphine derivatives to see if TMSE will form a stable bond with phosphorous or if the problem lies elsewhere.

World Systems Theory versus Post-Colonialist Theory Explanations of Cross-National Inequality: A Study of Six Nations from Three World Regions

Gerlyn Murrell

Faculty Mentor: **Dr. Stephen Zehr**

World systems theory argues there is a global economic structure to inequality and places nations into core, semi-periphery, or periphery economic sectors. However, empirical studies find much variability in the economies and life chances of residents within the periphery and semi-periphery sectors. I look at

two countries from each of the Asian, African, and South American regions. I hypothesize that there will be variability in economic development between nations within each region and that it will be correlated with several life chances. Economic and life chances data from the Human Development Index (HDI) 2014, CIA World Fact Book, and World Bank will be analyzed for Thailand, Vietnam, Namibia, Kenya, Panama, and Nicaragua. The variability between nations will be explained in terms of specific post-colonial developments.

Exploring the Link Between Type II Diabetes and Cognitive Decline

Leanna Myers

Faculty Mentor: **Ms. Emily Holt**

Recent studies have shown that individuals who develop Type II Diabetes Mellitus are at an increased risk for developing Alzheimer's disease. This hypothesis of Type III Diabetes was developed with the research from Brown University in 2005, and subsequent research is still being done today. There is a distinct correlation between these two diseases; as the number of Type II Diabetes patients continues to rise, the number of individuals with Alzheimer's disease also increases. Uncontrolled Diabetes causes unstable blood glucose levels, which leads to oxidative stress. The increased oxidative damage will compromise endothelial lining of the cerebral blood vessels triggering the brain to undergo changes that will eventually lead to symptoms of Alzheimer's disease. Damage to the brain will inevitably cause even more harm to the insulin-producing beta islet cells of the pancreas. This continuum shows that these two conditions are intertwined on all levels. While research is still considered inconclusive at this time, there is no doubt that the practice of dental hygiene will continue to be affected by the comorbidity of these two diseases. Addressing this problem can benefit the profession of dental hygiene by focusing attention on various dental considerations and interventions including: battling gingival inflammation, controlling xerostomia, and incorporating glucose testing into routine dental appointments. By making dental professionals aware of this correlation and suggesting intervention strategies to implement, they can identify at-risk patients and assist them with improving their oral and systemic health.

Further Studies in Methods of Extraction for Herbal Remedies

Sid Nathan and Tiffany Ko

Faculty Mentor: **Dr. Edmir Wade**

Research has recently been performed at the University of Southern Indiana involving comparison of herbal remedies that possess medicinal qualities. Future research would involve extraction and isolation of organic compounds from plants in southern Indiana, Ghana, and Central America for pharmaceutical use. Being able to perform successful extractions with these plants is vital when limited supply of plants imported are available. For this experimentation a variation of sweet basil, *Ocimum basilicum* var. *thrysiflora*, (also known as Thai Basil) was used. Thai Basil was chosen as it is not native to the area. Being able to work with more non-native plants will help simulate future research with a limited supply of imported plants. Research with *O. basilicum* var. *thrysiflora* is not yet complete but we anticipate

these methods will produce a more broad variety of organic compounds. These techniques could then be utilized with known medicinal herbs from local, national, and international locations.

Contributions of Wing Condition and Wing Veins to Flexural Stiffness in Three Species of Lycaenid butterflies

Nehal Ninad

Faculty Mentor: **Dr. Eric McCloud**

Wing flexural stiffness plays an important role in our understanding of insect flight and other behaviors. Wing condition during testing is especially important to the generalizability of the findings. Structural damage will play a significant role in altering the flexural stiffness; the degree of alteration can be expected to vary for damage to wing veins or interveinal regions. In addition, variation in the “freshness” of the wings and their veins can also be expected also play a role because moisture in the wing is lost over time as dissected wings and veins become dry and more brittle. Testing wings and their veins immediately after dissection may be a good way to measure flexural stiffness that approximates living specimens but it is not clear whether drying affects wings or wing veins differently in different wing regions. Further, the contribution of wing veins to wing flexural stiffness may vary. We tested wings and dissected veins from three species of the Lycaenid butterflies. The flexural stiffness increases over time; dry wings can be almost 50% stiffer than fresh wings at certain locations along the length of the wings and a similar pattern with drying occurs in wing veins. In addition, the contribution of the fresh veins to the flexural stiffness of the whole wing is not same as the contribution of dry veins to the flexural stiffness of the dry wings.

The Role and Importance of Dental Hygiene in Foreign Medical Missions

Courtney Potter

Faculty Mentor: **Ms. Emily Holt**

Missionaries around the world have been providing for the medical needs of their communities as a way to serve and present concrete examples of the faith they are sharing. It is important for interested health professionals to know the potential roles of their profession in these missions and what they can do to become missionaries. This project explores the current and potential involvement of dental hygienists in medical missions. An email survey was sent to twenty-one medical missionaries and organizations of diverse backgrounds and positions in numerous countries. Of these, fifteen responses from eleven different missions were returned. These represented twelve different countries and also included American representatives answering generally on the behalf of their international missions. The questionnaire consisted of sixteen questions designed to evaluate how dental hygiene is currently practiced within these missions as well as the perceived need for hygienists in these areas and ways for them to get involved. The responses indicate a wide variety of opportunities to fill current positions or create new paths in the world of foreign medical missions. Nearly all of these missionaries state that the primary purpose of their mission is some form of evangelism or church planting. In most cases, the

purpose of medical professionals as seen by the respondents is either primarily to treat the locals or to create opportunities to share the Gospel through meeting physical needs first. This presentation will examine the responses to the questionnaire and offer ideas for joining medical missions as a dental hygienist based on insights from the respondents.

You Want Us To Do What? Adding an Activity-Points Requirement to an Established Honors Program

Leslie Sargent and Shianne Bowlin

Faculty Mentor: **Dr. Antonina Bambina**

The University of Southern Indiana has a vibrant Honors Program that has grown steadily since 2008. Inevitably, the program experienced some growing pains with regard to Honors activities that foster community and provide service to the program. The number of students who said they would participate in events and those who did were often different resulting in planning and budgeting problems. In addition, finding enough volunteers to help with Honors recruitment events was difficult, unless you relied on the usual suspects over and over again. After gathering information at National Collegiate Honors Council conferences for years, the director decided it was time to seriously consider implementing an activity-points requirement. This presentation will detail the process starting with debates within the Honors Student and Faculty Councils, and ending with the results of a student survey at the end of the first year of the requirement. Some of the things that will be discussed are: how the activity-points requirement was implemented and monitored; struggles that arose and modifications made to address them; positive results; negative consequences; and student feedback after the first year.

ASCE-Concrete Canoe 2016 Calypso

Victoria Smitley and Jessee Swain

Faculty Mentor: **Dr. Kerry Hall**

The University of Southern Indiana (USI) student chapter of the American Society of Civil Engineers (ASCE) is competing in a regional canoe competition. The competition is in Chicago, Illinois and is hosted by Illinois Technical Institute. Throughout the past semester a hull design, the shape of the canoe, and mix design, the material used to make the canoe, have been researched, tested, and finalized to create our canoe, Calypso. In this competition the results are based on canoe races between other universities, as well as presenting our finding from the hull design, mix design, and structural analysis of the canoe. This will be the final demonstration of how the research and analysis developed throughout the semester were combined in canoe design.

"The Color of Me" Personal Fiction

Crystal Thompson

Faculty Mentor: **Dr. Michael Kearns**

I submitted a personal work of fiction as a member of the international English honor society, Sigma Tau Delta. My paper was chosen for presentation among only a handful from the thousands of submissions. The purpose of the conference is to gather, inform, and present written works and students in a fun and entertaining manner. The convention offered an opportunity to present my work publicly and to be among a panel of other writers whose pieces were of the same theme as my own. My piece, a short story titled "The Color of Me" addresses racial and educational tracking and its disadvantages. It comments directly on the institutionalized racism of this country and discusses the implications of such built-in racist systems.

Lamprey Mitochondrial Genome Sequencing

Vivian Truong and Marie Luff

Faculty Mentor: **Dr. Kim Delaney and Dr. Rex Strange**

Vertebrate mitochondrial genomes are around 16,000 base pairs in size and can provide valuable insight into phylogenetic relationships among similar species. Here, we are in the process of sequencing the mitochondrial genomes of the Chestnut lamprey (*Ichthyomyzon castaneus*) and the Southern Brook lamprey (*Ichthyomyzon gagei*). The lamprey mitochondrial genome has 13 protein coding genes, 22 tRNA genes, 2 rRNA genes, and two non-coding regions. The Sea lamprey (*Petromyzon marinus*) mitochondrial genome has previously been fully sequenced and was used here as a template. We have already sequenced the genes for Cyt B, ND2, ND3, ND5, 12S, 16S, and CO1. Our next goal is to focus on sequencing the remaining protein coding regions.

A Comparison of Transcultural Nursing Aspects with an Emphasis on Psychiatric Nursing

Heather Willis

Faculty Mentor: **Dr. Jeri Burger**

The prevalence of mental illness stigma in the United States is demonstrated by two key factors. The first factor is the high rate of suicide, which was reported as the 10th leading cause of death in the United States by the CDC in 2013. The second factor can be described as an underdeveloped system to care for patients with mental illness and subsequent reintegration into everyday life. Because stigma is indirectly related to patient outcomes, we created our study in order to better understand stigma and

perhaps then reduce its prevalence. Our study wished to see if another first world country in Europe was able to provide better mental healthcare than the United States. To do this, we interviewed five healthcare professionals in the United States and five more in Germany. For each participant, we used the same interview guide to ensure consistency in the interview process. We asked about things such as how mental health was promoted in the local area, caring for people with mental illness, and how the general public looked at a person with a mental illness. After collecting the data from all participants and recording it via audio recording device, the data were then transcribed and subsequently coded. Coding the data brought out themes shared between the two countries and themes that were not. Those themes that were in common included patients feeling embarrassed about having a mental illness and anxiety over the diagnosis. It was found that Germany's method of treatment was very diagnosis specific and rooted deeply in a theoretical basis concerning stigma. In contrast, the United States took a more team oriented approach by integrating multiple interdisciplinary persons more frequently. Reports from the United States also indicated that nurses felt as though patients had a great sense of relief following treatment. This theme did not seem evident in Germany and participants from this country seemed to think that mental illness was less easily treated.

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