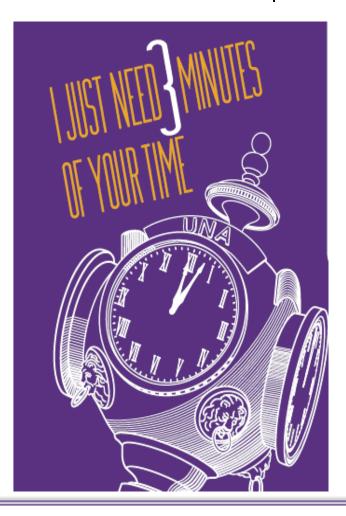*University of North Alabama*

Three Minute Thesis Competition

April 2020

Three Minute Thesis Competition
University of North Alabama

2020 University 3MT Winners

**First place prize $500
Larissa Huissen
Faculty Mentor Dr. Eric Becraft,
Biology**

Larissa is a junior at the University of North Alabama studying Biology and Chemistry. At UNA, she is a member of the Honors College and LaGrange Society. She grew up in Kenosha, Wisconsin where she attended high school at Indian Trail High School and Academy. After graduation, Larissa plans to continue her education applying for a D.M.D/Ph.D. program to pursue a career in dental academics and research.

Cone Wor3: Return of the Reductase

Single cell genomics and metagenomics were used to identify candidate phylum WOR3 in samples taken from a geothermal pool in California. Results for the ecology, diversity, and evolution of WOR3 were reported contributing to the immense genealogy of life and the understanding of microbiology's contribution to Earth's geological structures.
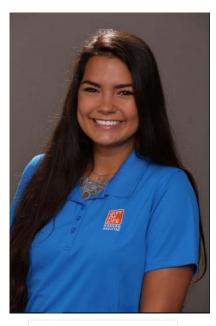
University of
NORTH ALABAMA
BIOLOGY

College of
ARTS and SCIENCES
University *of* NORTH ALABAMA

HONORS COLLEGE
University *of* NORTH ALABAMA

Second place prize $300
AnnaGrace Heinkel

Faculty Mentor Dr. Mel Blake, Physics

AnnaGrace was born and raised in Birmingham, Alabama. She is now a senior at UNA, majoring in Psychology and Biology with a minor in Chemistry. Following graduation, AnnaGrace plans to attend medical school. She began her research as a physics honors project with Dr. Mel Blake. Through her research AnnaGrace has learned how to apply basic physics principles to scientific questions, and hopes to further the available resources in astronomical research.

"A Beautiful Day in the Neighborhood: Developing Software for Determination of Star Cluster Membership of Neighboring Stars" Using public databases as well as published research, we have developed and verified a software that allows us to determine the probability that stars surrounding a specific star cluster are a member of that cluster. This software can be used on other star clusters, and in aiding other research.

University of NORTH ALABAMA
PHYSICS and EARTH SCIENCE

Second place prize $300
Whittney Schwarz
Faculty Mentor Dr. James Jerkins
Computer Science and Information Systems

Whittney is a senior at the University of North Alabama. Although Whittney changed her first major from education to computer science after taking her first CS course, she still has a passion for teaching. This is why the CSMakers research study caught her interest. The study made it possible to combine both of her passions into one. After graduating college, Whittney would like to continue working with elementary or high school students in after-school programs to expose more students to computer science.

Her work this semester on the CSMakers project has included teaching hands-on computer science activities to grade school children. Her research examines if the activities led to an increase in their interest in computer science, focusing on underrepresented students in particular.

University of NORTH ALABAMA
COMPUTER SCIENCE and INFORMATION SYSTEMS

College of BUSINESS
University of NORTH ALABAMA

2020 University 3MT Winners

**Third place prize $150
Alexa Dishroon**

**Faculty Mentor Dr. Meghan Merciers
Music**

Alexa Dishroon is a native of Higdon, AL. She is a senior music education major at the University of North Alabama where she participates in many ensembles, including the North Alabama Marching Pride. She is passionate about bringing music to those who would otherwise not have the chance to participate, including teaching music in Haiti and researching inclusive music education practices. She is a member of the SOTA Student Leaders, Phi Kappa Phi, Pi Kappa Lambda, Tau Beta Sigma, UNA Honors College, and serves as president of the National Association for Music Education collegiate chapter at UNA.

"Bridging the Gap: Music Therapy and Music Education" Music therapy is the evidenced-based use of music to achieve therapeutic goals. Music classrooms are often selected as inclusive environments, yet many music educators feel unprepared to accommodate students with disabilities. Principles from music therapy can be applied to music education in order to achieve success for students with disabilities.

University of
NORTH ALABAMA
MUSIC

Fourth place prize $50
Ethan Hood

Faculty Mentor Dr. Cindy Stenger
Mathematics

Ethan is a computer science major at the University of North Alabama. He has always been interested in any kind of information. Using his knowledge about data, 3D modeling, and statistics, he has enjoyed contributing in any way that he can to the larger problem at hand.

"Investigation of the structure of a SARS-CoV-2 spike protein 3D model, and its relationship with ACE2"
This thesis will analyze the structure of the spike protein in SARS-CoV-2, and how it infects host cells with its relationship to ACE2. In association with the Prokop lab, this project will also provide educational resources (through the 3D modeling of the protein) to help show how COVID-19 spreads.

Fifth place

Savannah Pickens

Faculty Mentors Dr. Melissa DeFoor, Dr. Vince Brewton
Anderson College of Nursing and Honors College

Savannah Pickens is a senior student at UNA studying Nursing with a minor in French. She has been a student of the Honors College all four years and is an inducted member in Pi Delta Phi, the French National Honors Society. Born in Nashville, she currently resides in West Tennessee with her husband and dog.

"A Systematic Review of Healthcare Provider Preceptions on Water Birthing"

Water birth is the act of laboring and or giving birth in a body of water, tub, or pool. The purpose of this systematic review is to identify research across the world that addressees provider opinions on water birthing and search for trends.

Bailey Roberson, *Spanish Commerce*
The Economic and Environmental Effects of Tourism in Peru.
Faculty Mentor: Dr. Scott Infanger

Through analyzing and researching the effects of tourism in Cusco and on ainbow Mountain the communities within Peru have e perienced various turmoil and economic distress. The economic and environmental effects of their developing society and industry show to be effected in many ways. Through comparing the results of the northern portion of Peru and the southern region, one may see drastic shifts from one place to another. When considering the future for countries such as this, a state of a weak economy and a fragile system, the uestion at hand is how to develop Peru, for e ample from a state of economic insecurity to economic growth.

Bio:
Bailey Roberson is a senior at the University of North Alabama who is studying Spanish Commerce and Project Management. Through her studies at her University, she has focused on economic sustainability and international relations. For her future, she is going to start as an intern at the United Nations in New York City to assist in the development of many projects alongside an accredited Non Profit known as The PEAC Institute.

University of
NORTH ALABAMA
FOREIGN LANGUAGES

Sara Woodley, Secondary Education/Mathematics
SLC6A1 Mutation Comparison: A357V, D451E, and R566H
Faculty Mentor: Dr. Cindy Stenger

This research goes towards working with other undergraduates and scientists at Jacksonville State University and the Prokop Lab at Michigan State University to create a larger project that focuses on SLC6A1. The project used a crowd sourcing approach to analyze mutations of SLC6A1. SLC6A1 is associated with an autosomal dominant early onset seizure and epileptic encephalopathy associated with intellectual disability. The mutations pursued in this project are missense mutations at position 357 swapping alanine acid with valine acid (A357V), position 451 swapping aspartic acid with glutamic acid, and position 566 swapping arginine acid with histidine acid. Although the mutations do not widely affect the structure of the gene, they seem to be detrimental to the gene and negatively impacts the function of the gene..

Bio:
Sara Woodley is a senior at the University of North Alabama. She is originally from Jasper, Alabama. She is majoring in Secondary Education in Mathematics. Throughout her four years at UNA she has been a member of Zeta Tau Alpha.

Tara Boy, Exercise Science
Effects of a virtual reality pacer on cycling performance
Faculty Mentor: Dr. Lauren Killen

The presence of a deceptively faster pacer motivated untrained cyclists to exercise at higher intensities vs. baseline pacer and no pacer alone. Despite acute and session RPE values reflecting the higher intensity of the deception trial, participants reported feeling more absorbed in comparison to the baseline and no pacer trials.

Bio:
I am a graduate research assistant for the University of North Alabama's Kinesiology department, and I am majoring in Exercise Science. I am from Logan, Utah, however, I attained my bachelor's degree at West Virginia Wesleyan. I love learning about the human body and the miraculous tolerance levels it can withstand while undergoing various stressors. One of my areas of interest is virtual reality and physical activity. Post-graduation I intend to explore my options of being a collegiate professor or working in the health industry.

Jennifer Olszyna, Computer Science
A Comparative Study of Variants in the HDAC8 Gene Linked to Cornelia de Lange Syndrome
Faculty Mentor: Dr. Cindy Stenger

A comparative study of two variants in the HDAC8 gene utilizing YSARA modeling. Using data collected from the variant linked to Cornelia de Lange syndrome as evidence, an argument is made that a second variant in the HDAC8 gene of unknown relevance may also be linked to the syndrome.

Bio:
I am a third-year student at the University of North Alabama, majoring in Computer Science. During my time at UNA, I have had the pleasure of working on many research projects, most notably presenting at the National Conference on Undergraduate Research and the Alabama Academy of Science Conference both held this past year. I was a member of the coding sub team for the UNA Chem-E Car team, in which we won first place at Southern Regionals and third place at Nationals.

Derick Vickery, Physics/Mathematics
A Search for Variable Stars in the Old Open Cluster NGC3680
Faculty Mentor: Dr. Mel Blake

Contact binaries are stars which orbit one another so closely that they share a common envelope. The contact binaries may form through close encounters or through stellar evolution. The youngest such contact binary is TX Cnc in the Praesepe, which is a billion year sold. We have begun a project to search younger clusters to discover more contact binaries to further constrain the timescales that are required to form them. We report on a search for variable stars in the 1.2 billion year old cluster NGC3680.

Bio:
My name is Derick Vickery. I graduated from Winston County High School in 2016, thus I am a Senior at UNA with plans to graduate in the Summer of 2020 with a General Physics degree and a Math minor. I have been a member of the UNA fishing team for all 4 years and have been the treasurer for the past 2. I am also a member of the Society of Physics Students and just recently became the President this year.

Kara Holden, Anderson College of Nursing
Non-pharmacological interventions in reducing pain, fear, and anxiety for venipunctures within the pediatric population
Faculty Mentor: Dr. LaKeva Harris and Dr. Rachel Winston

The purpose of this systematic review is to identify quantitative studies to examine which non-pharmacological intervention is most effective in reducing pain, fear, and anxiety in venipunctures amongst the pediatric population as venipunctures are concluded to be the leading cause of procedure-related pain throughout hospitals and emergency departments, and this procedural pain and anxiety increases the client's emotional distress which in turn further elevates pain sensation.

Bio:
I am a senior Nursing major pursuing a job in the pediatric critical care field. I have clinical experience working in the pediatric intensive care unit and pediatric emergency department at Huntsville Hospital as well as the leukemia/hematology unit at St. Jude Children's Research Hospital. I want to further research findings on evidence-based practice regarding atraumatic care for pediatric patients to lower stress and anxiety levels in the hospital setting in order to provide the most effective care possible to my future patients.

Meet Patel, Biology (Chemistry)

A Missense Swap on SLC6A1 gene from Glutamine to Lysine at amino acid position 209
Faculty Mentor: Dr. Cindy Stenger

This work is part of a larger project with fellow colleagues from the University of North Alabama, Jacksonville State University and the Prokop Lab at Michigan State University. The project used a crowd sourcing approach to analyze mutations of SLC6A1. SLC6A1 encodes GAT-1 and is associated with epileptic encephalopathy. Clinical manifestation of SLC6A1 epileptic encephalopathy is characterized by an autosomal dominant early onset seizure and mild to severe intellectual disability. The variant sought after in this project is a missense mutation at position 209 swapping glutamine with lysine (hereafter Q209K). This is classified as a semi-conservative mutation since the amino acids go from uncharged to positively charged residues. PolyPhen-2, Provean, and SIFT show probably benign, neutral, and tolerated, respectively. The Q209K is a variant of uncertain significance with a low impact score. However, mutation has RMSD of 1.604 thus suggesting it does have an impact on the protein structure.

Bio: I am junior majoring in biology with chemistry minor. My educational aspirations consist of acquiring a bachelor's degree in biology that would assist me in pursuing a medical career as a doctor (MD) and a researcher (Ph.D.). After becoming a certified doctor, I want to specialize in neurology and add my insight to the neuro research field. I am extrovert who loves nature, photography and, of course, helping people.

Mary Warren, Computer Science
SLC6A1 Mutation F256S in Relation to Epilepsy
Faculty Mentor: Dr. Cindy Stenger

This project is part of research on the gene SlC6A1. This gene's variations are related to autosomal dominant early-onset seizure and epileptic encephalopathy. It is also associated with intellectual disability. In particular, this is research on the mutation swap of Phe for Ser, at location 256. Most data banks believe that this particular swap is not dangerous. When plotted data from ClinVar, ProVean, and SIFT showed this variation had a low impact. Amino acids showed high conservation scores, meaning this location is fairly consistent. Finally, when the mutated gene was aligned with a wild type gene the alignment score was high. Overall results pointed to this mutation being benign.

Bio:
I am a Junior in Computer Science at UNA. I am minoring in information Security. This is my second class in in guided research.