JCCC STEM

Poster Symposium

April 27, 2023

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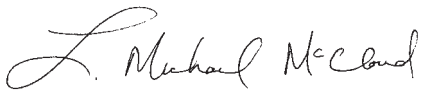
Welcome to the STEM Poster Symposium hosted by Johnson County Community College (JCCC)! We are proud that your interest in STEM has brought you to our campus to share your work, and thankful that we are able to provide a venue to support your personal and academic growth as you plan your future and set off in search of the experiences that will shape your life.

Since 1969, JCCC has been building a tradition of academic excellence, with a strong faculty and staff who are committed to creating an environment for students, scholars, and community members at-large to engage in meaningful learning experiences. This year's STEM Symposium is another chapter in that storied legacy, and we are so pleased to have you here as a part of our continued drive for academic excellence! We at JCCC are proud of the work that you will display on our campus, and we thank you for sharing that work with us through the Symposium.



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JCCC STEM Poster Symposium
April 27, 2023

PROGRAM

9 a.m.	Opening Remarks for Session 1 by Dr. L. Michael McCloud, Executive Vice President of Academic Affairs, Chief Academic Officer
9–10:15 a.m.	**Session 1**
10:30 a.m.	Opening Remarks for Session 2 by Dr. Andy Bowne, President, JCCC and Chris Davis, Vice-President, PGAV Architects
10:30–11:45 a.m.	**Session 2**
Noon	Opening Remarks for Session 3 by Dr. Mary Wisgirda, Dean of Mathematics and Sciences, JCCC, and Dr. Stuart Day, Dean of the School of Professional Studies, KU Edwards Campus
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Abstracts

Aamir, Mahrukh. Mutations and Proteins: Using Models to Create Reliable Information.
This project will generate reliable data about enzyme and gene functions to allow us to improve existing artificial intelligence models. FoldIt is a modeling software used to predict the impact of mutations using its database. Bacteria E. coli are used to produce Beta-glucosidase B (BglB) proteins as they provide a sound model system because they are populations we understand and can control in the lab, and also provide a template for enzyme mutations. During this process, mutagenesis and sequencing was a success, as the mutation that occurred was on N293, and it mutated to N293M on all three samples done. Using the Kunkel Mutagenesis approach, plasmid pET29b+ -BglB will be used in introducing mutations into protein-coding sequences. After the mutation occurs in the plasmid, annealing, and polymerization are done to create a hybrid plasmid. When the hybrid plasmid is introduced into bacterial cells, the cells break down the original DNA strand and build a new double-stranded mutated version of the plasmid. This plasmid will be used to produce a mutant protein. We will have enzyme activity and stability data from labs to learn the impact of the mutation on enzyme function.

Abernathy, Corinne. Snow White and the 7 Candidates.
This project involves attempting to find bacteria that have antibiotic properties. Antibiotic resistance has risen, so by collecting candidates from soil an attempt to find a specimen with antibiotic properties is made. Using soil from Overland Park, it was first diluted enough to get individual specimens. The soil was then tested against the ESKAPE pathogen relatives. The Overland Park soil resulted in several candidates however one in particular stuck out, Happy. Happy exhibited positive antibiotic properties in all of the ESKAPE pathogen relatives. After staining, Happy is a gram positive non spore forming bacillus.

AbuAli, Aws. NASA Dynamical Systems.
The Dynamic Systems Test Branch is responsible for engineering design and operation of high fidelity robotic facilities supporting NASA's missions. The dynamical core is the part of the code that computes the large-scale motion of air and heat through the atmosphere based on the fundamental fluid dynamical equations adapted to Mars and the Moon missions.

Agundez, Bianca. JCCC Student Initiative to Help Growing Antibiotic Crisis.
There is a growing global antibiotic crisis that needs to be answered and everyone is at risk. Antibiotic resistance and synthetic approaches in producing antibiotics have not been able to keep up with the multi-drug resistant "ESCAPE" pathogens that have caused almost 3 million illnesses and 35,000 confirmed deaths each year (CDC, 2019). At JCCC Life Sciences, students and faculty have joined in the collective efforts with organizations such as Small World Initiative to answer the call to this global public health challenge. Through this hands-on program at JCCC and SWI, I have isolated and tested bacteria from soil samples in hopes of finding a potential antibiotic that can save the lives of millions. The discovery of my bacteria, Candidate #4 "Cheer Bear," has shown promising characteristics toward new antibiotic discovery that may one day save lives. CDC. Antibiotic Resistance Threats in the United States, 2019. Atlanta, GA: U.S. Department of Health and Human Services, CDC; 2019.

Allen, Shelby. Outdoor Doghouse Solutions.
Outdoor doghouses were originally designed to provide a comfortable place for dogs to rest when temporarily outdoors. Now that there is a reasonably-sized market for outdoor doghouses, customers and consumers face several potential issues when it comes to the doghouse design, including issues with transport, assembly, size, ventilation, safety, and cost. The purpose of this outdoor doghouse design is to solve as many of these issues as possible. For transport purposes, the tools and building materials are packaged for sale in a box that is small enough to fit in the backseat of an average, standard-sized sedan. For the customer's benefit, the design is relatively easy to assemble. When assembled, the doghouse is well ventilated and large enough for an average-sized dog. All building materials, including hardware and paint, is weatherproof to provide maximum protection from moisture and temperature as well as non-toxic and eco-friendly for the safety of our earth and for the safety of the consumer.

Alvarado, Olivea. Antibiotics in Soil.
Over the semester I have been testing candidates for antibiotic resistance. I obtained a soil sample, then serially diluted the sample and placed the dilutions on agar plates so that candidates could grow. I then took the candidates that show inhibition to the other bacteria on the plate and made a master plate. I finally tested these candidates against E.S.K.A.P.E relatives. Screening against these relatives will give us an idea if the candidate will show inhibition against serious pathogens that we cannot safely test against in this class. I think this research is important because antibiotic resistance will always be an issue and we need to try to be one step ahead. As a class we are all searching for a new antibiotic, if even one of us can find a good candidate more research could be done and we could have a new antibiotic on our hands. A few of my candidates have shown inhibition towards E.S.K.A.P.E relatives, but I have chosen my candidate LA9 to move forward with. LA9 show inhibition against Enterococcus faecium, Staphylococcus aureus, and Escherichia coli.

Amakye, Samuel. Antibiotic Properties of Nairobi.
The emergence of antibiotic-resistant microorganisms is a pressing health concern. Soil microorganisms have gained popularity among biologists as a potential source for investigating their antibiotic properties, given the soil's ability to provide a suitable environment for diverse bacteria and its easy availability. This research paper focuses on investigating the antibiotic properties of an unidentified microorganism against selected safe relatives of ESKAPE pathogens. The unidentified microorganism was obtained from a soil sample collected from KU Edwards and was subjected to serial dilution and challenged with other microorganisms from the same soil sample against safe ESKAPE relatives. The unknown bacteria was chosen due to its ability to inhibit the growth of other microbes. The selected microorganism was then subjected to simple stain, gram stain, acid-fast stain, and spore stain. Finally, the sample was processed for sequencing and identification.

Anderson, Jakob. Properties of Candidate 10 in the Formation of Antibiotics.
The increase in antibiotic resistance has proven to be an increasingly alarming issue that has spread across the world. New antibiotics are being discovered and researched, which are needed to combat antibiotic resistance. Previously, microbes would secrete antibiotics that would prevent pathogens from destroying the bacteria. Through continued use of these antibiotics, the viruses and pathogens have begun to resist the antibiotics after constant exposure. In this study, I used several methods in identifying the bacteria that would grow in the soil of my own backyard. These methods include gram, acid-fast, and spore staining, serial dilutions, streak plating for isolation, Polymerase Chain Reaction, and gel electrophoresis. Through these procedures, one candidate was found that has been able to resist several different pathogens. This candidate has been found to be a gram positive, bacillus shaped microbe.

Aql, Marwah. The Affects of Mutation D279R in the Beta-Glucosidase B Protein.
The lack of interest in the ability to efficiently create never-before-seen mutations in proteins for novel therapeutics, and industrial and agricultural applications has sent an alarming risk for uncertainty for when these mutations occur. Luckily, JCCC has partnered with Design 2 Data (D2D), which goal is to facilitate "academic crowd-sourcing" to rapidly address protein design questions that would normally take isolated labs decades to answer. Through this partnership, the protein called beta-glucosidase B is used as well as a chosen mutation D279R. This was done by mutation an enzyme in BglB's to predict the impact of stability through a software called FoldIt, which predicted better enzyme function due to its decent stability. Further testing of the mutant enzyme will be done to predict the impact of the mutation on enzyme activity and stability.

Asif, Maham. The Search for Antibiotics.
The discovery of new antibiotics is critical in treating existing and new diseases. Antibiotic resistance may develop over time and new drugs need to be formulated with various antibiotics to combat these diseases. I had the opportunity to collect and analyze a soil sample from under a tree un my front yard. I chose to collect soil from this specific area because I believed that a unique candidate may arise from the sample. I was able to discover a candidate that inhibits Enterococcus faceium and Klebsiella pneumoniae.

Aso, Kurumi. Discovery of 'Matthew,' The Possible Hero in the 'Post' Antibiotic Era.
Since the discovery of penicillin by Alexander Fleming in 1928, more and more antibiotics had been discovered and developed. Antibiotics have been the cure of almost all the bacterial infections and disease. Scientists and researchers would collect samples from various locations, grow the microbes, and carefully examine them. Those successfully discovered microbes had played a huge role as antibiotics. However, recently we are in what it's called the "post antibiotic era." Like a child learning and adapting to their environment as they grow, researchers discovered that microbes also are capable of adapting to their surrounding environment. Therefore, the more pathogenic bacteria are exposed to antibiotics, the less effective the antibiotics will become to the pathogenic bacteria. Because of that, this research was done to contribute to discovering a candidate that can be a possible new antibiotic. From the 12 candidates I have collected from the soil sample of mine, I found the best possible candidate throughout the careful examination, which is named Matthew. He has inhibited Acinetobacter baylyi, Pseudomonas putida, Escherichia coli, Enterococcus faecalis, Staphylococcus epidermidis, Bacillus subtilis, and Mycobacterium smegmatis.

Baeta, Priscilla. Collapsible Doghouse.
The Collapsible Doghouse is a project that requires the creation of a doghouse design that can be collapsible for transportation, fitting into most trunks or small SUVs. To successfully accomplish a good design for our proposed doghouse, the following variables were carefully taken into consideration: the ideal dimensions of a house for the average dog size, the average trunk dimensions of small SUVs, the ideal insulation, the choice of materials, the position of the door, placement of ventilation, elevation from the floor, the collapsible mechanism, and design simplicity.

Banks, Kate. Am I a Pseudomonas?
Since its discovery in 1894, the genus Pseudomonas has been defined in very ambiguous terms, which allowed almost 1000 species to be included in the early 20th century. Currently, the only way to determine if a bacteria belongs to this genus is through the use of DNA. By using 15 bacterial candidates, this research hopes to discover a better definition of this genus that uses metabolic tests rather than depending on DNA. This would be especially useful to JCCC students trying to determine the genus of an unknown bacteria when PCR is unsuccessful. While this research is not complete, some defining characteristics that have been discovered include: aerobic, Gram negative, non-lactose fermenting, indole negative, motile, and resistant to multiple antibiotics.

Basnet, Lakshita. Potential Candidate for a New Antibiotic Against Resistant Pathogens.
Antibiotic resistant pathogens are a growing concern, increasing the risk to human health despite the new discoveries of antibiotics. Micro-organisms found in soil can help in producing such antibiotics. Here, I screened a soil sample from my garden to isolate microbes that can potentially be used in making antibiotics against resistant pathogens. From my screening, I found one candidate that inhibited Staphylococcus epidermidis which is a safe relative of one of the ESKAPE pathogen.

Bechard, Kori. Creating Antibiotic Producing Candidates from Soil.
Many microorganisms like bacteria and viruses develop resistance to antibiotics; which are produced to kill them. When a microbe has tested and proved sustainable against each and every antibiotic, what's next? In my Microbiology lab course I have been testing candidates for antibiotic producing properties. I have taken a soil sample from my backyard and have isolated colonies of microbes to test against different tester strains of bacteria. I have serially diluted my soil to spread to Agar plates to incubate and grow. From there I carefully selected eight promising candidates to further incubate on a master plate. I then selected four candidates from those eight to be tested against prominent bacterial tester strains. One specific candidate inhibited the growth of the following strains: Enterococcus Faecalis, Acinetobacter baylyi, Enterobacter aerogenes, Escherichia Coli, and Pseudomonas putida. I have continued growing this candidate weekly on streak plates to maintain a pure culture. Most recently I advanced to a PCR test of my bacteria to amplify the RNA genes of that candidate. I have kept a record collection of my data along with the materials and methods that I've used along the process to be submitted to Tiny Earth, which will conclude with my overall results of my analysis.

Bechard, Luke. Exploring β-glucosidase B.
In an effort to understand more about genetic mutations, I have decided to research the effect of mutation V147T on the enzyme β-glucosidase B (BglB). For this project, we will be collaborating with the organization, Design to Data (D2D). D2D is accepting data on mutations to enzyme BglB. The data submitted by students are used to advance their mutation prediction algorithms, which aid in accurately anticipating the effects of a mutation. For my research, I tested my mutation beforehand in a simulation software and recorded the results to form a general idea of my mutation and compare the simulation to my lab-made mutant. To make my mutant, I used many scientific processes, such as the annealing process to combine my mutated DNA into the plasmid of an E. coli bacterial cell. This change in the gene is called a mutagenesis mutation, which means that the E. coli accepts and integrates my mutated DNA strand and will produce my mutant protein. Then, through protein purification, we can analyze the effects caused by my mutation. Once synthesized, I can accurately compare my lab data to the computer-generated simulation. Discrepancies such as enzyme production and stability will be key factors in analyzing the effects of the mutation. These differences will be noted, and my physical lab data will be reported to the D2D database. As my mutation, V147T, has not yet been recorded in D2D's database, this research will be beneficial in increasing the algorithm's accuracy in predicting the effects of a mutation.

Beggs, Corvin. Modeling RLC Circuits as Dynamical Systems.
RLC circuits are circuits that contain resistors, inductors, and capacitors, which can exhibit dynamic behavior when subjected to varying electrical signals. These circuits can be modeled as dynamical systems, which describe how the circuit variables evolve over time. By analyzing the dynamics of RLC circuits, engineers can design circuits that exhibit desired behavior, such as oscillations or filters, for a wide range of applications in electronics and signal processing.

Booker, Rosenie. Searching for New Antibiotics in the Soil.
In the past century, scientists discovered that bacteria and fungi produce a secondary metabolite called antibiotics that we can get from the soil. Most antibiotics originate from the ground, where thousands of microorganisms live. Antibiotics help control the bacteria, but the overuse of these antibiotics can be less effective because bacteria can adapt and overcome the drugs. This research aims to discover a new antibiotic that does not exist. Our society is facing a problem due to the rising cases of drug resistance. Healthcare facilities have a problem with ESKAPE pathogens that can cause life-threatening infections. Therefore, it is crucial to research a new soil sample to find inhibition for a potential candidate for the antibiotic. In January, I collected soil from our front yard to do a serial dilution to estimate the concentration of the microbes and the number of colonies. Then I isolated the colonies until I found a suitable candidate that showed inhibition for a potential antibiotic candidate. Then I screened against the ESKAPE relatives to find candidates that showed inhibitions until I narrowed them down and found a viable candidate for my streak plate to see a pure sample. The microorganism I chose had continuously shown consistent inhibition from the Safe relevant RS6. Still, the RS6 candidate was not showing inhibition from the safe relevant Acenibacter bylyi. The pure sample is still in the process of incubation and will conduct further studies. All the data collected for this research could lead to finding a potential antibiotic candidate.

Bowman, Amaris; Andersen, Stephanie; Bella, Ester. Analysis of Soil Samples from Native Tallgrass and Lawn Areas at JCCC.
Soil samples were collected from the native tallgrass area on the JCCC campus that is designated as the "Prairie Restoration" area and from the nearby lawn. These samples were tested for total organic carbon using the Walkley-Black method of analysis with an acid digestion followed by a titration. Additional tests were also performed. A comparison of the test results for both locations will be discussed.

Bradley, Kinuko. A Search for a New Antibiotic Against ESKAPE Pathogens.
In this study, soil samples from two locations were diluted and cultured in a lab setting to identify candidate microorganisms that are effective against the tester strain of ESKAPE pathogen's safe relatives. After screenings against such pathogens, two microorganisms were isolated as candidates. Polymerase Chain Reaction and gel electrophoresis were performed to identify the 16s rRNA gene, followed by DNA sequencing at a separate facility.

Burgei, Ruth. Antibiotics in the Soil Environment.
There are many types of microorganisms around us, such as bacteria and fungi, that are essential to complex organisms such as human beings and animals and are vital for survival because these microscopic organisms play an essential role in the ecosystem. However, bacteria have "bad" or disease-causing properties and good properties through antibiotics, which is an antimicrobial substance that is active against bacteria and is commonly found in microorganisms. To carry out my experiment, I collected one gram of soil from the Johnson county community college area around the Regnier center, and after following the protocols of dilution and serial dilution I created a master plate with ten potential candidates that were derived from the candidates that I chose from the agar plates. After screening the candidates using the safe relatives, that is, ESKAPE Pathogens, most of my candidates could not inhibit any antibiotic growth. Thankfully a classmate saved the day and let me use one of her samples, namely "W.M 5," derived from the wetlands meadow in Lawrence, Kansas, that inhibited antibiotic growth when screened against Staphylococcus epidermis. A WM5 was streak plated and underwent polymerase chain reaction (PCR) to isolate the millions of copies of DNA that will be used to copy a specific sequence of DNA outside of the living cell.

Cathers, David. New Resistance to Antibiotics.
There is a crisis today in healthcare and it is the crisis of human resistance to antibiotics. The research for new forms of antibiotics is falling behind the demand, while new strains of bacterial and viral pathogens are haunting our healthcare professionals and hospitals. As bacterial and viral pathogens invade our cells and infect larger numbers of people, the chance for mutation increases. These mutant pathogens are finding new ways to evade and resist current antibiotics. Addressing this threat requires aggressive action. The Tiny Earth Network (TEN) has stepped in and joined with colleges throughout the United States to encourage students and professors to help uncover new microbial species in soil. For my part in this case, I have excavated soil from an area in Bonner Springs, KS, and used various methods in an attempt to identify the bacteria present. In an effort to identify the bacteria in my sample, I have performed revealing biochemical assays, streak plating to separate single colonies, and several staining procedures to determine cell morphology, and colony morphology using serial dilution. I have currently focused my research on a Gram-negative, spore-free, and acid-fast bacteria. I have also employed PCR sequencing.

Caughron, Sara. The Isolation and Testing of an Antibiotic Produced by a Pseudomonas Bacteria.
"Mona" is the name of a Pseudomonas bacteria collected by a JCCC microbiology student that has previously been shown to inhibit tester strains of S. epi and E. coli when grown competitively. A chemistry student from a previous semester found compounds in extracts of this bacteria inhibited a tester strain of S. epi when grown in broth with the extract. The goal of this project was to isolate and confirm the isolation of the antibiotic produced by this bacteria and work towards separation of the compounds.

Chelanga, Fridah. M221L Mutagenesis.
The research aims to generate reliable data about genes and enzyme function to improve AI models. Modeling software (fold it) is used to predict the impact of mutation in Bgl B enzyme by intentionally modifying the structure of the protein by changing one amino acid residue. The mutation made is methionine to Leucine (M221L). Bacteria E.coli is used to produce Bgl B mutant protein. Bacterial cells have a plasmid used as a vector and trick their cells into making proteins from other organisms. Their cells can read genes from different organisms producing proteins coded by these genes since genetic code and DNA structures are identical across the living world. I introduced the Kunkel product plasmid into a strained E.coli bacteria and added antibiotic-resistant kanamycin to separate the bacterial plasmid from my plasmid. The goal is to use E.coli bacteria to replicate the Kunkel product plasmid. After growing bacterial cells in liquid culture, I extracted the plasmid DNA for downstream sequencing to verify that the Kunkel mutagenesis process succeeded, transforming the strained E.coli for protein production. For successful sequencing, I did a DNA concentration Assay (A260) to determine the concentration of the DNA. In the sequencing results, out of three cultures, two had mutations.

Cifuentes, Paula. The Discovery of Luke, the Bacteria.
Our world is constantly evolving, so we must keep up with it in every aspect, specifically when it comes to health. A couple of years ago, we got hit by a virus we had never encountered. It is up to scientists and medical workers to evolve as well in order to protect our country and others from grave suffering. A problem the medical world faces is fighting against antibiotic-resistant bacteria. That means that when a person is sick, no medicine can help them improve because the bacteria is more powerful than any existing medication. That is why we students have taken it upon ourselves to help scientists continually search for antibiotic-resistant bacteria to fight against unstoppable microbes. Scientists make antibiotics with fermented bacteria, which is what we students have sought out through the collection of soil. Interestingly enough, soil contains many microbes that contain inhibiting properties towards other microbes because it is a highly competitive environment. I acquired twelve candidates from a soil sample I collected from Berkley Riverfront–and two from a soil sample my lab partner and I shared. I chose each of my candidates by how they inhibited other bacterial colonies (created space between themselves and others). My only promising candidates (meaning they fought against ESKAPE pathogens' safe relatives) were Luke, which fought against Enterococcus faecalis and Staphylococcus epidermidis, and Cameron and Olivia, who both inhibited against Enterococcus faecalis.

Clark, Ashley. The Search for Antibiotics.
There is currently a diminishing supply of effective antibiotics, which is a threat to global health as many infectious diseases can only be treated with antibiotics. Many of the antibiotics today were discovered by looking at the microorganisms in the soil. In this project we want to identify a microbe that has inhibitory properties and see what other organisms are related to it. To do this we used serial dilution to separate the microbes from the soil, challenged candidates produced from the sample for inhibitory properties, performed numerous staining procedures to help try to identify the microbe under a microscope, and performed PCR to try to identify how the candidate relates to known microbes. So far, we have found that the candidate is not spore forming, acid fast, and is bacillus shaped. The candidate has also been found to produce antibiotic properties against Staphylococcus epidermidis, Escherichia coli, Acinetobacter baylyi, Pseudomonas putida, and Enterobacter aerogenes.

Clark, Bonnie. PET Plastic Biodegradation: Impacts of Mutating the Bacterial Enzyme Is-PETase .
We live in a sea of plastics. Plastics are an integral part of our lives from the #5-plastic toothbrush covered with toothpaste from a #2-plastic tube with which we brush our teeth in the morning until we lay down at night on our #7-foam-filled pillows under our recycled #1-fleece blankets. However, increased use of plastics has not come with an increased ability to reuse or remove these plastics from the environment. It is estimated that only 25% of #1 PET plastic water and soda bottles are actually recycled. Even with recycling, many plastics have a limited number of reuses before they are discarded. In 2016, researchers discovered Ideonella sakaiensis in soil near a plastic bottle recycling plant. This bacterium degrades polyethylene terephthalate (PET). Under lab conditions, the enzyme Is-PETase is able to almost completely degrade PET film over 42 days at 30° C. Scientists around the world are now working with Is-PETase, making genetic modifications to increase the ability of this enzyme to degrade PET. In this study, I used the computer program FoldIt to model the impact of changing two amino acids near the catalytic site of the enzyme. Commercially purchased plasmids were mutated using site-directed mutagenesis in parallel and transformed into Escherichia coli cells for growth. Is-PETase was purified and used in a bulk absorbance assay to assess the impact of amino acid substitutions at positions 208, 279 and 208/279 on the enzyme's ability to degrade PET pellets. Kinetic activity was compared against the wild-type Is-PETase.

Clark, Bonnie. Prairie Pasture Pathogen: A Promising Candidate in the Search for Novel Antibiotics.
The rise of super pathogens is frequently reported in the news. Antibiotics that once helped overcome diseases in the 20th century have fallen as bacteria have evolved and gained antibacterial resistance. One quarter of the world's population has tuberculosis, leading to the death of 1.3 million people in 2020. From 2010 to 2019 the incidence of extensively-drug-resistant TB increased by 23%. Similarly, WHO reports that 2020 was the first time that last-resort antibiotics no longer cured bloodstream infections. At the same time, pharmaceutical companies, driven to increase shareholder profit, have not continued to spend money on research for new antibiotics. Microbiology classes at JCCC have joined other classes across the globe to fill this gap by giving students the opportunity to address this real-world problem. For my research, I collected soil from an upland prairie pasture. Bacteria were cultured and assessed for their ability to inhibit other colonies. The prairie pasture site produced 15 colonies inhibiting other bacteria. Candidates were tested against 7 harmless relatives of multi-drug resistant bacteria. Candidate PP1 inhibited the growth of 4 of these bacteria. Tester plates were also prepared to assess the ability of PP1 to inhibit Mycobacterium smegmatis, a harmless relative of M. tuberculosis. Candidate PP1 will be further characterized using stains to identify cell morphology, along with various biochemical tests, to allow the bacteria to be identified to its Bergey Bacterial Group. Prairie Pasture #1 will be sent out for DNA sequencing as well to help identify this promising bacterium.

Corby, Sophia. Antibiotics Grown from Soil.
The purpose of this experiment is to dilute microbes through serial dilution and isolate some microbes for future study purposes. The bigger picture is finding candidates that produce novel antibiotics from soil bacteria. During this experiment we were able to get a countable plate at (10-5). 4 pure cultures were produced through this serial dilution experiment. Microorganisms are ubiquitous to the earth and by studying a small amount of microbes we could find new antibiotics.

Daniels, Audrey. Roads and Wildlife: Black Hills and Badlands.
Previous studies have suggested a relationship between wildlife populations and the presence of roads. This study aims to examine how this relationship presents itself in the Black Hills and Badlands regions of South Dakota. Protecting the wildlife populations in these areas is crucial for local tourism through the Black Hills National Forest and Badlands National Park, as well as for the conservation of unique species and habitats.

David, Isaac. Differential Equations of a Population Growth Model.
This project will be a summary of a population growth inside an observed environment, using differential equations to predict future outcomes for how certain populations vary inside a controlled environment. There are certain basic differential equations that are used to model population growth with specific variables and values set to the conditions that the population or environment could entail. This specific project will give a observation of a population, turning our main focus to a certain species of mammals and how they adapt based on their growth due to their reproduction in the respective environment, and their decline due to various causes such as other animal species, hunters, or harsh weather conditions, predicting the outcome to create an overall balanced environment.

Davidson, Carysa. An Antibiotic Produced by a Bacteria.
"Peeves" is the working name given to a novel bacteria collected by a JCCC microbiology student that has previously been shown to inhibit tester strains of bacteria when grown competitively. A chemistry student from a previous semester found compounds in extracts of this bacteria inhibited a tester strain of S. epi when grown in broth with the extract. The goal of this project was to isolate and confirm the isolation of the antibiotic produced by this bacteria and work towards separation of the compounds.

Doolin, Kiana. Isolation and Testing of the Antibiotic Compounds Produced by a Burkholderia Bacteria.
In the search for a novel antibiotic, we studied the antibacterial compounds produced by "Burk," a strain of a Burkholderia bacteria previously isolated by a JCCC microbiology student. This bacteria was previously found to inhibit a tester strain of S. epi when grown competitively. A chemistry student from a previous semester found compounds in extracts of this bacteria inhibited a tester strain of S. epi when grown in broth with the extract. In this research we worked to isolate and test the antimicrobial compounds produced by this bacteria.

Dowling, Crandall. A Use of Differential Equations in Population Modeling.
Differential Equations has many applications, one of them being modeling the growth and decay of various populations. By varying parameters we can predict weather the species will die off, stay consistent, or grow infinitely.

Driskill, Molly. MAD-C: A New Antibiotic Discovery.
Antibiotics have become a vital piece in the medical world for fighting off diseases and infection; which is why it has become an extensive threat when we see resistance to our antibiotics today. Antibiotic resistance is when microbes evolve and gain the capacity to survive the antibiotics that were intended to eliminate them. Unfortunately, this problem is growing rapidly so the discovery of new sources to diminish this matter is crucial. Soil is an excellent resource for finding non-pathogenic bacterial organisms that produce antibiotics. In an effort to help, I gathered and examined a soil sample from a property in Paola, KS hoping to find any new antibiotic producing bacteria. From this sample, I cultured 10 different candidate species that I tested against the safe relatives of the known ESKAPE pathogens, for which only two of my candidates were able to inhibit. These tests lead me to a very promising organism, which I call MAD-C. MAD-C has the ability to strongly inhibit both safe relative strains, Staphylococcus epidermidis and Escherichia coli. This data can suggest inhibition for these strains' related ESKAPE pathogens, which can help determine if it has the possibility of being a new antibiotic. MAD-C will undergo PCR, Gel Electrophoresis, and DNA sequencing to reveal its true identity. Once we know what MAD-C is, its identity and beneficial properties will be shared at the Symposium.

Eidson, Allie. Candidate University.
Semester project started with diluting soil from a residential location in Blue Springs, Missouri. After testing any potential candidates from this soil against the ESKAPE pathogens, it was unsuccessful. The process restarted using soil from a residential location in Overland Park, Kansas hoping to find successful candidates that displayed antibiotic properties. The soil was then diluted in an attempt to grow individual colonies. With this dilution deeming successful, challenge plates were then created to test several potential candidates against the same ESKAPE pathogens used for the first dilution. More than one candidate was developed, but the one chosen is called "Sully". Sully showed signs of antibiotic characteristics and showed the strongest resistance to many of the ESKAPE pathogens including Enterobacter faecalis and Staphylococcus epidermidis. Sully is a gram negative, non-spore forming, acid fast bacillus bacteria.

Epperheimer, Elizabeth. From Soil to the Lab: A Hunt for Antibiotic Producing Microbes.
The need for discovery of new antibiotics due to bacterial resistance has become imperative. Soil has been proven to be a great source for antibiotic producing microorganisms. In my study, from collection of a soil sample, I have discovered a candidate with potential antibiotic producing capabilities. Coltrane, the candidate, has been isolated thru standard serial dilution technique. Further testing and research have been done to identify my bacteria. This includes challenges against safe relatives of ESKAPE pathogens as well as Bacillus subtilis and Mycobacterium smegmatis, differential staining, and a PCR test. Thus far, Coltrane has proven to be a capsule forming, Gram-negative species.

Ferguson, Kyah Sharylle. Testing Soil.
The focus of this research is to test a soil sample against ESKAPE pathogens safe relatives to see if any of them create a zone of inhibition. Throughout this research there will be multiple different procedures. Collecting soil, diluting the soil, creating a master plate with each sample, testing each colony from the sample against each ESKAPE pathogen safe relative, identifying a positive candidate, creating a streak plate with that candidate, staining to see whether the candidate is gram negative or gram positive.

Frank, Allisyn. Discovering New Antibiotics.
Throughout the course of this project I have isolated a single colony of bacteria from a soil sample taken near a creek bed in Baldwin City Kansas. When this sample of soil was serially diluted I found 12 bacteria candidates that all had some form of antibiotic properties by inhibiting the growth of the other bacterial colonies near them on the agar plate. Out of my 12 candidates, I chose four to test against the safe relatives of the ESKAPE pathogens. Candidate number four showed inhibition of four of those different pathogenic relatives, which was more inhibition than the other four candidates I tested. Candidate number four is now going through further testing. It forms round, cream colored shiny colonies. I have been making streak plates to keep a pure culture, and in class we just recently put our bacteria samples through PCR testing so we can hopefully identify them soon.

Friebele, Emily. The Fight Against Antibiotic Resistance.
Antibiotic resistance is when bacteria develop the ability to defeat the drugs designed to kill them. Worldwide, antibiotic resistance is a threat to public health and is a priority across the globe. However, collaborative efforts towards this problem will help slow the development and spread of antibiotic resistance and protect people. This class has partnered with the Tiny Earth Network in hopes to be successful with two main objectives: to use data from thousands of researchers to investigate environmental samples for new antibiotic-producing strains of bacteria, and to provide students with a chance to conduct authentic research. For my project, I collected a sample of dirt at the edge of a pond. After collecting my dirt, I went through a series of processes to dilute my sample and culture the bacteria. After going through more testing and processes with my bacteria, I finally found a candidate that seemed promising. This candidate was off-white/tan in color and had a mostly round border. I tested this candidate against the 7 safe relatives of the ESKAPE pathogens, which are a major threat to clinical settings. By testing my candidate against these safe relatives, it can help me to determine if my candidate is secreting anything that could have an inhibitory effect on some of the world's most notorious antibiotic-resistant pathogens. My candidate had shown moderate inhibition against Staphylococcus epidermidis, which is the safe relative of the ESKAPE pathogen Staphylococcus aureus, which can cause bloodstream infections, pneumonia, and bone and joint infections.

Fritz, Rebecca. Search for Soil Microbes to Produce New Antibiotics.
Recent studies have discovered a continuing issue in healthcare is antibiotic resistance due to overuse and also misuse of antibiotics. This research project is trying to develop new ways to treat antibiotic resistance through discovery of new antibiotics produced by microbes found in the soil. In this study, soil samples were collected from the general area of Johnson County residential areas. The soil samples were isolated and then a series of serial dilutions were performed on the samples. 10 candidates from the soil samples were screened against the ESKAPE safe relatives. From these, candidate BF6 was the only candidate that showed zone of inhibition. These findings can be used to help further research finding new antibiotics to treat certain bacteria that are resistant to the current antibiotics we have today.

Gabbert, Alexis. Identifying the Mystery Bacteria.
Antibiotic resistance is a large and growing issue today. Previously effective antibiotics are now losing their effectiveness against some of the most dangerous pathogens. Subsequently, a search for new antibiotics is ongoing. For this research project I was able to retrieve a sample of soil from my backyard in order to culture and isolate the bacteria present for identification. Despite a great fight against contaminating mold during this process, I was able to single out my most promising candidate for further testing. While this candidate has shown inhibiting qualities, it was not able to out compete with the major ESKAPE relatives. Further testing is still underway to identify this gram positive rod shaped bacteria.

Garcia, Anthony. Exploring Dirt Medicine.
Antibiotic resistant strains of pathogens is on the rise, while new antibiotic production has been at a steady decline for years. Most antibiotics come from the natural world around us, and in my project I explore soils found locally for bacteria resistance against ESKAPE pathogens.

Glass, Rylee. Antibiotic Search.
The goal of this project is to see if the bacteria found in a sample from dirt found a backyard has the possibility of producing an antibiotic-like substance that is shown by a halo forming around the bacteria and separating from the ESCAPE pathogen used. Many antibiotics we find today are from soil. To figure this out we use techniques like serial dilution, challenging the bacteria against different pathogens, and creating stains like gram, acid-fast, and spore. We then ran a PCR test to see deeper into the microbe and how its DNA possibly correlates to other known microbes. All of the information is observed and is then taken and recorded in journals. At the end of all of our tests, we hope to identify what we have found in the dirt sample and maybe even discover a new antibiotic if we are lucky!

Goertzen, Holden. Analysis of the 3 Body Problem.
In the past decade we have seen the most advancements in the field of space exploration since the space race of the 1960s. Companies like Space X, Rocket Lab, and NASA have been hard at work creating ways to go further into space while using less resources and saving money. One of the key ways spacecraft move through the vacuum of space is by using the gravitational force of nearby celestial bodies, reducing the amount of fuel needed to move around and in turn reducing weight and cost. The three body problem is a way of mapping trajectories based on initial conditions and the changing position of celestial bodies due to their own motion in space. This poster analyses the basics of the extensive subject known as the three body problem.

Gomez, Blake. The Peak Runoff as Determined by TR-55 and the Rational Method.
The watershed delineated in this project includes JCCC's campus as an area and low point is provided as a baseline. The peak runoff must be calculated by first surveying total and specific land areas for runoff-coefficients, & Manning's n; subsequently, TR-55 will be used (Technical Release 55) - as applicable to small watersheds – to compute the necessary Time of Concentration (Tc) with 3 types of flow: Sheet flow, Shallow Concentrated flow, and Channelized flow. Multiple iterations will be tested against each other using both TR-55 and Kerby-Kirpich. With the necessary variables obtained, the Rational method is used to quantify the Peak runoff of the Watershed in cubic feet per second. The Project was created using industry standard software Bluebeam and calculations were performed with Excel; land topography and area was determined with manual surveying, AIMS and planimetric data; Supplementary 3D topography was created with LiDAR/Photogrammetry, Contour mapping and modeling software.

Gonzalez, Janelli. A Determination to Find Antibiotics in Kansas Soil.
Microorganisms are microscopic living things that are all around us. Some of these microbes make us sick but they also serve as a reservoir for microorganisms that produce antibiotics. Over the last decades there has been a resurgence in antibiotic resistance challenging the healthcare field. Due to this issue growing in this field, scientists and researchers are having trouble finding new and effective antibiotics to replace the antibiotics that are no longer efficient, making us face an internationally global health issue. Antibiotic resistance is when the antibiotic resistance does not kill the species of bacteria that is designated to kill. Back in January I collected soil from my backyard where I took a gram of soil and have done research and studies ever since. I have performed protocols of dilutions and serial dilutions with this gram of soil, where I then created a master plate and transferred 13 potential candidates onto the media. I tested the 12 of my candidates that survived against 6 ESKAPES relatives pathogens. Where I found that TAE07A inhibited E. faecalis and A. baylyi. Recently I have streaked plated my final candidate TAE07A to move forward on with where I will perform some bacterial staining techniques, and have it go through a Polymerase Chain Reaction (PCR) to have multiple copies of DNA sequence for later DNA sequencing.

Goode, Michael. Antibiotic-Producing Soil Microbes.
Antibiotics are a valuable resource for our medical teams in the fight against bacterial infections. However, with the recurrent use of our antibiotics, bacteria are mutating and becoming resistant to our known antibiotics. Without antibiotics, we would have little in the means of treating bacterial infections. In this research project, we are attempting to find new antibiotic-producing bacteria in soil sampled from our community. The soil sample from my experiment came from a creek that runs along a walking path behind my house. From this sample, I was able to observe 13 rings of inhibition and in turn, 13 potential candidates for antibiotic-producing bacteria. My sample appeared to have many antibiotic-producing bacteria but upon further testing, only one of my antibiotic-producing candidates inhibited the growth of a single safe relative species. This candidate has been given the name MG-05 and it appears to inhibit Staphylococcus epidermidis.

Goodman, Gillyan. Fight Against Antibiotic Resistance.
Due to the over/misuse of common antibiotics, bacteria have been changing and developing resistance to many antibiotics. This makes these resistant bacteria very dangerous for humans who are infected by them. Currently, the most concerning antibiotic resistant strains of bacteria are known collectively as E.S.K.A.P.E pathogens. Many people are trying to find new and effective antibiotics that can inhibit the growth of these pathogens. A group called the Tiny Earth Project uses research that students collect to find a new effective bacterial species which inhibit the growth of one or more E.S.K.A.P.E relatives. The research I conducted in the lab started by collecting a personal soil sample from a location of my choosing. I chose a spot near the walking path by my backyard due to the plant life and convenience of the location. This sample was then diluted and plated to find any bacterial colonies that showed signs of inhibition. Of these colonies that I collected none of the candidates I had from my own soil proved to have effective zones of inhibition against E.S.K.A.P.E. relatives. This suggests that my soil sample was not a rich source of antibiotic producing bacteria. I ended up choosing a candidate that I isolated from the communal lab soil dilution, and I used this candidate for further testing.

Hassan, Mahmood. Tiny Earth Student Sourcing Antibiotic Discovery.
This project involves discovery of bacterium from a soil sample obtained from Sandstone Creek Apartments in search for a potential antibiotic organism candidate. This organism was isolated from the soil sample by performing soil dilution and further isolated via the creation of streak plates. It was then tested against the safe relatives of antibiotic pathogens and it was determined that candidate 2 exhibited inhibition from all safe relatives except E. aergoenes therefore it was chosen to be isolated for further testing.

Hernandez Sanchez, Jennifer. Candidate JH012: In Search of Antibiotics.
In efforts of finding more antibiotics for the crisis we are in, our microbiology laboratory department class is all conducting experiments in finding new antibiotics. As of today, we have the luxury to cure many patients with bacterial infections through the use of antibiotics. However, in many situations, antibiotics are being over-prescribed and or misused, yet we don't have many types of antibiotics to treat every infection effectively. Therefore, many patients are becoming antibiotic resistant meaning the effective antibiotics are now not operating correctly and effectively due to misuse and overuse of the antibiotics. So in the efforts of my research, I have one potential candidate that is still being researched. I will conclude my research this upcoming April 2023 and will have my research open to the public for further research.

Hoang, Anna. Isolation and Testing of the Antibiotic Compounds Produced by a Pseudomonas Bacteria.
In the search for a successful antibiotic, we studied the antibacterial compounds produced by "Mona," a strain of a Pseudomonas bacteria previously isolated by a JCCC microbiology student. This bacteria was previously found to inhibit tester strains of both S. epi and E. coli when grown competitively. A chemistry student from a previous semester found compounds in extracts of this bacteria inhibited a tester strain of S. epi when grown in broth with the extract. In this research we worked to isolate and test the antimicrobial compounds produced by this bacteria.

Hoffman, Brylee. Testing Soil Samples.
My project will be going over how I used different techniques in the lab like staining, and chemical testing to identify the bacteria I found in my soil samples.

Holloway, Isabella. Analytical Data of Antibiotic Producing Bacteria.
Common infectious diseases and the decrease of effective antibiotics has contributed to an advance in finding new antibiotic producing bacteria that is from soil. Previous research that has been done is no longer sufficient to treat the mutated pathogens that have become resistant to antibiotics today. Antibiotics that we use today were from soils discovered from different areas. I have conducted extensive scientific investigation undergoing the screening of plates against safe relative pathogens, various staining techniques, use of polymerase chain reaction programs, gel electrophoresis, DNA sequencing, and many more analytical methods. My candidate Morgan #5 is a convex, smooth, round bacteria that inhibits growth to some but not all opposing bacteria. M5 is spore and gram-negative bacteria that inhibits Bacillus subtilis, Mycobacterium smegmatis, Pseudomonas putida, and Staphylococcus epidermis. M5 is likely to be a strong competitor against antibiotic resistant pathogens but could be stronger.

Howard, Aarnisha. From L to W.
In this research project I was attempting to add a genetically modified cloning vector to an E.coli Cell. Nucleotide sequence was changed by 1 letter using an oligo and it was added to the cell. The goal was to see different proteins be made due to the change in the nucleotide sequence producing different amino acids.

Hur, Jeesoo. Antibiotic Screening from Soil Bacteria.
In this experiment, the soil sample collected from the environment was used for screening for antibiotic. Bacteria from serial dilutions of the sample were selected as candidates. The twelve candidates had been observed for antibiotic screening.

Inthavong, Paula. The 2022 Guide to Electronic Prescribing for Recently FDA Approved Drugs.
Physicians need to be periodically updated on issues with the recently approved drugs. My poster project will: Demonstrate on how to send an accurate, error free and understandable electronic prescription directly to the preferred pharmacy. Differentiate some different allergies, drug interactions and other issues that can affect the patient when taking recent 2022 FDA approved drugs. Distinguish the key components on an E-prescription. Monitor and track controlled substance prescriptions. Develop efficient customized workflow for e-prescribing. This project was completed in JCCC HCIS 277 Training and Instructional Design.

Jimenez-Garcia, Alyssa; Kreeger, CJ; Ortega, Angelina; Rima, Anthony; Schnoor, David; Weingart, Josh. The Next Flint Could Be Here.
This semester, this section of HON 250 has explored the interconnection between water chemistry, infrastructure and environmental justice through the lens of what happened with the Flint, MI water crisis. Students have conducted individual water chemistry projects, where they have investigated water quality on the JCCC campus using readily available water test strips, which contain 16 different water analysis experiments. Students will present a compiled poster highlighting each of their questions and their results of their explorations. Results and analysis will include why people should care about the quality of their water and what to do if someone suspects their water is compromised.

Jones, Alizah. Collapsible Doghouse.
Design a lightweight, collapsible doghouse (lays flat when not assembled) which can be easily set up and secured and can be transported in a normal small SUV-type vehicle.

Jones, Cassidi. Apples, Bananas, and Cantaloupe.
Certain antibiotics have been derived from soil samples from the simplest places. With appropriate experimenting, microbiologists have been able to discover new antibiotics. In my experiment, I extracted a soil sample from my front yard in hopes to find the presence of an antibiotic. There are several steps in this specific kind of experiment but identifying a potential candidate is the first crucial step. Identification involved observing colonies that displayed inhibition on challenge plates. In this case, challenge plates were a test between my candidates from serial dilution plates versus the six safe pathogenic relatives. Through trial and error, my only candidate, named Bananas, has shown inhibition with almost every safe relative. These positive results got me through my first big step, next is identifying what kind of species Bananas belongs to.

Jones, Kevin. Dynamical System of Weather and Climate Prediction.
My project will be over the application of dynamical systems to predict weather and climate. By using the current state of our atmosphere and differential equations, meteorologists are able to predict specific things about our climate such as wind speed, temperature, and rain. These are just a few of things that are interesting about the application of differential equations. To be able to form a dynamical system concerning weather is something that is very fascinating.

Juan, Lani. Analyzing a Possible Antibiotic Producing Bacteria in Johnson County Soil.
The discovery of antibiotics has been a big benefit in fighting off and preventing bacterial infections. However, the prolonged use and misuse of antibiotic medications in the healthcare system has resulted in antibiotic-resistant bacteria. The number of antibiotic resistant bacterial infections has continued to rise, becoming a global problem, and leading to more expensive medical treatment, extended stay in the hospital, and increase in the risk of death. In this study, the protocols and tests performed in finding and screening possible antibiotic producing bacteria found in Johnson County soil will be discussed. Soil serial dilution to TSA plates was performed on an initial soil sample. A master plate from the colonies that showed a zone of inhibition against other bacteria was isolated. In addition, the candidate antibiotic bacteria were placed in a plate with safe relative ESKAPE pathogens. Subsequently, the candidate antibiotic bacteria were able to inhibit the ESKAPE relative pathogens by showing a zone of inhibition and it was then stained with dyes. Differential stains were performed and the results showed that the candidate antibiotic bacteria is gram negative, non- acid fast and spore former. The polymerase chain reaction (PCR) test and gel electrophoresis were also performed on the candidate bacteria and will be prepared for DNA sequencing.

Keegan, Amy. Transitioning School Based Behavioral Health Services Paper Referrals and Medical Records into an Automated System That Integrates Directly into FQHC's Electronic Medical Records.
Integrating outreach satellite clinics such as school-based services' paper registration to electronic registration has many benefits. The most important benefit is there is no need to exchange forms between the school locations, the Federally Qualified Health Clinic (FQHC) and the student's home. The consent and registration forms can be completed and signed online by the parents or guardians which lessens the chances of the paperwork not being completed, lost, illegible or not being completed in entirety. Also, the up-to-date medical information can be accessible by treatment teams at the FQHC and the satellite location. This project will review the mechanics of transitioning from paper records in a computer application that can be customized to integrate into the FQHC electronic medical records so the patient's records will be together, organized, and accessible.

Kelley, Ryan. Determination of Peak Runoff Using the Rational Method.
This presentation is designed to calculate the storm water runoff of a 40 acre watershed on the campus of Johnson County Community College. By using valuable resources such as topographic maps, the rational method equation, runoff coefficient tables, rainfall intensity tables, photographic examples, and various spreadsheets, this project displays calculations for 3 different flow paths determining the peak discharge for a 50 year storm event on this watershed. It was designed to be user friendly and displays an easy to follow flow chart showcasing how these calculations are performed and the resources used to determine the total runoff expected from a 50 year storm event.

Khan, Junaid. Potential Antibiotic-Producing Bacteria Found in Kansas Soil.
Since the mid 20th century, when antibiotics started to be used widely, numerous novel antibiotics have been discovered. However, concerns about the future of global health have been raised by the outbreak of bacterial diseases that are resistant to antibiotics and a fall in the production of antibiotics. I isolated the bacterial colonies that were growing in a soil sample from Olathe, Kansas, using the soil dilution technique. A possible candidate was chosen after 12 colonies were examined for indications of inhibition. It will be necessary to conduct more research into the sustainability of the colonies amassed in sufficient quantities to create viable medications.

Kibet, Ian. Discovery of Antibiotics from the Soil.
Antibiotics play a crucial role in the medical field. However, antibiotic resistance has been a major challenge as microbes evolve making the antibiotic incapable of fighting bacterial infection.

In spite of that, cultured bacteria from the soil have been found to have antibiotics which kill bacteria which are termed as resistant. I collected my soil sample from my backyard and used the serial dilution method to grow my bacteria. I then observed the bacteria which exhibit some resistance and aseptically transferred them to a master plate. I went ahead to test the bacteria on safe ESKAPE relatives. ESKAPE is an acronym for six highly virulent pathogens that have developed resistance against antibiotics. I then selected two potential candidates which presented distinct antibiotic characteristics. I went ahead to perform some staining as well as a Polymerase Chain of reactions to get the identity and structure of the bacteria. This data helped me see how soil microbes can play an important role in fighting antibiotic resistance and this will help fight antibiotic resistance bacterial infections.

Klusman, Ellie. Microorganism Identification from Soil.
This experiment involved taking a sample of soil and running multiple tests to try and identify the microorganisms that were inhibiting the growth of other microorganisms. I ran a serial dilution of my soil and collected colonies that seemed to inhibit the growth of others. From there I challenged the microorganisms against different ESKAPE relatives and chose the colony that inhibited the growth of the ESKAPE relatives. I named it EK4 and it inhibited the growth of Escherichia coli(4mm ring of inhibition), Staphylococcus epidermidis(3mm), Enterococcus faecalis(6mm), and Bacillus subtilis(6mm) and after doing a streak plate I was able to identify its morphology as medium size, pale yellow, round, smooth and convex. After that, I ran a gram, spore, and acid-fast stain on EK9 and looked at all stains under an oil immersion lens. EK4 was non-acid-fast, gram-negative, and spore-negative.

Kudrna, Carrington. Discovery of Bacteria: Squirrel Flight.
In this course, we learn about antibiotic discovery. Each student gathers a sample of soil and aseptically isolates a specific colony of microbial bacteria from the soil to do research throughout the semester. During the semester we do a series of dilutions, isolations, staining, observing, and testing to be able to draw a series of characteristics of our microbe and share if we believe it is a good candidate for the antibiotic. So far in my project, I have been able to find a candidate I believe is bacillus, spore-forming, and resilient, and am excited to keep researching to share my further findings.

Kyser, Garrett. Screening for Antimicrobial Producing Microbes.
The rise of antibiotic-resistant superbugs is presenting an overwhelming challenge in the medical science industry. Our goal for this project is to contribute information to the development of new antibiotics to fight these superbugs. Our class has taken soil samples from locations of our choosing. I chose soil near the veterinary clinic I work for in Kearny, MO. My class is screening for microbes that produce antimicrobials. We isolated the microbes from the soil by a soil dilution series, diluting to a factor of 10^-6 or 1:1,000,000. Once we have found candidates by searching for their zone of inhibition we challenge them against the ESKAPE pathogen's relatives to see if they inhibit their growth. My candidate is a gram negative bacillus species measuring 2µm long that on an agarose plate was observed as orange, smooth, and having defined borders between the colony. After obtaining the observable data, the DNA is extracted from live cell samples of the candidate afterward; a PCR procedure is followed to replicate the DNA, which is then sent off for sequencing to identify the microbe further. Conclusively, if our projects are successful, these experiments will give insight into developing new antimicrobials.

Lammers, Jack. Tiny Earth Project.
Antibiotics come from bacteria that naturally inhibit the growth of other bacteria. The need for making new antibiotics is higher than ever because pathogens are constantly adapting to their environment. These adaptations and mutations allow pathogens to resist current antibiotics and cause more disease. With many new and different pathogens arising, researchers need to find, isolate, and produce new antibiotic treatments. An easy and fast way to find new bacteria is through soil composition. Soil is very bacteria-rich, and a spoonful can contain billions of bacteria. The soil screened for this research project was dug up on January 30th, 2023, at 38.98 degrees N and -94.755 degrees E. This location was right in front of a flower bed, and the soil had a loamy clay texture with a pH of 7. My soil sample was serially diluted to pick out potential candidates. I found 12 potential candidates and screened them against the six ESKAPE pathogens. Potential candidate six, "Black Panther," showed the strongest inhibition of Enterococcus faecalis and Escherichia coli.

Lara, Bethzayda. The Power of Inhibition.
The presence of inhibition takes place at a microscopic level. It all starts when microorganisms that thrive in the soil produce and secrete antibiotics. Antibiotic production is important because it leads to inhibition and exhibits the potential of a microorganism to kill or inhibit the growth of another organism. The secretion of antibiotics produced by microorganisms can help humans discover new antibiotics as well as help patients fight infections that have developed immunity to a specific antibiotic. Using aseptic technique microorganisms were isolated from my garden bed to obtain soil sample candidates. I was able to isolate 15 potential candidates all with the same convex and circular morphology. Ultimately, candidate number fourteen, Jackrabbit, was the only candidate to show clear signs of inhibition against four "safe relatives" of ESKAPE pathogens: Enterococcus faecalis, Escherichia coli, Pseudomonas putida, Acinetobacter baylyi.

Le, My Phuong. Antibiotic-Producing Candidate from Soil Sample.
As microbes rapidly evolve and develop proteins, the chance of them defeating and becoming resistant to antibiotics increases. The phenomena of antibiotic resistance are globally warning and seen as a health threat to the mass population. Researchers have had a hard time encountering and coping with antibiotic resistance. We can only slow down the inextricable situation while science progresses and technology advances. One method is to look for potential pathogen-fighting microorganisms and use them in more research and antibiotics development. I am honored to contribute to the journey of antibiotic hunting by collecting candidates fighting off ESKAPE relatives from soil samples. Six extremely virulent organisms being resistant to antibiotics are known as ESKAPE. This study concludes that the potential candidate might have antibiotic resistance traits against pathogens because it produced inhibition zones when interacting with ESKAPE safe relatives. My microbiology lab course involves many laboratory procedures, including serial dilution, plate streaking, plate screening and gram staining. Despite having six candidates on my master plate in the end, I have adopted one of my classmate's candidates that has demonstrated the ability to inhibit at least one clinically significant microbe.

Le, My Phuong. Attention to Oligonucleotide-Directed Mutagenesis.
Science academics have long considered genes and mutation to be essential subjects. A mutation is a change in the DNA sequence affecting a gene's physical structure and function. Genetic diseases are closely related to protein mutation. Hence, to maintain well-balanced human health, and normal body function, it is essential to comprehend the significance of mutation and handle the change in DNA sequence. The development of technology has made it possible for us to undertake studies and learn about the role of enzymes in human life. In this study, I perform laboratory experiments to modify an amino acid and compare the results to initial data collected from Fold It software. The selected amino acid changes from asparagine N293 to methionine M and anticipates to experience a decline in stability. Beta-glucosidase B would be employed as an enzyme model in this investigation. Upon completing the project, I am contributing to the information-gathering process that will improve artificial intelligence and advance science.

Lehrman, Jacob. Orderly Chaos and Its Applications.
This poster aims to explain what mathematical models of chaos look like and how they can be used.
This poster will focus on two relatively famous models of chaos and their applications.

Logbeck, Jennifer. The Search for Antibiotics in the Soil Beneath Us.
Antibiotic resistance has hit an all-time high, creating near crisis-level needs for new antibiotics for the treatment of broad-spectrum-resistant pathogens, to aid the medical community at large. This need has spurred the research community to spread beyond the pharmaceutical Research and Development departments to the classrooms of colleges nationwide. In my effort to contribute to this research, I was able to find 10 suitable candidates from my soil sample and narrow it down to one very promising candidate that was broad-spectrum producing in antibiotic inhibition of ESKAPE relative pathogens.

Initial serial dilution of the soil sample was done and plating to achieve a countable plate was key to candidate selection. Candidate selection was done through careful consideration of colony morphology including unique variables such as size, elevation, margin, and coloration. Eventually, the field was narrowed to the aforementioned 10 candidates, of which 2, Edge and Mick Foley tested well against 5 of the ESKAPE relative pathogens: against E. faecalis, S. epidermidis, E. coli, A. baylyi, and P. putida; each proving inhibition against 3 of the same relatives and 1 unique relative pathogen. In the end, only one candidate was allowed to move forward, Edge, and this candidate demonstrated antibiotic inhibition against E. faecalis, S. epidermidis, E. coli, and A. baylyi. This research is ongoing and has a very encouraging outlook for the identification and genetic sequencing of a possible new broad-spectrum antibiotic.

Long, Cameron. The Search for an Antibiotic Produced by a Bacteria.
"Goldilocks" is the name of a bacteria collected by a JCCC microbiology student that has previously been shown to inhibit tester strains of bacteria when grown competitively. A chemistry student from a previous semester found compounds in extracts of this bacteria inhibited a tester strain of S. epi when grown in broth with the extract. In this research we worked to isolate and test the antimicrobial compounds produced by this bacteria.

Love, Bree. Isolation and Testing of the Antibiotic Compounds Produced by a Bacteria named "Betty".
"Betty" is the name of a bacteria collected by a JCCC microbiology student that has previously been shown to inhibit tester strains of bacteria when grown competitively. A chemistry student from a previous semester found extracts of this bacteria inhibited tester strains of both E. coli and S. epi when grown in broth with the extract. In this research we worked to isolate and test the antimicrobial compounds produced by this bacteria.

Lovell, Luke. Use of Dynamical Systems in Automobile Development.
Automobiles have a massive impact on the world whether they are used for the transportation of goods and services, motorsports, or general use. Car manufacturers continue to improve every model, but how do they do this? Dynamic systems allow scientists and engineers to analyze models describing various aspects of car design such as efficiency, safety, and performance, which manufacturers look to optimize for every vehicle. By optimizing these features improvements are continuing to be made as new models of cars are developed. Presented here are examples of how dynamic systems are utilized in automobile development.

Maggard, Josephine. Potential Antibiotic Search in Your Backyard.
Antibiotic resistance continues to make a growing number of infections harder to treat. Drug resistance in bacteria and mortality rates related to these complications are rising every year, and little is being done to stop it. In our economic system, researching treatments for this issue is unprofitable, and therefore uncommon. The projected risks of this situation are staggering, so students such as myself are taking on the task of researching possible antibiotic candidates found in soil. In this Microbiology lab class, I tested a soil sample that I collected against six safer relatives of bacterial strains that pose large threats in clinical settings. These dangerous pathogens are referred to as ESKAPE Pathogens, including Enterococcus faecium, Staphylococcus aureus, Klebsiella pneumonia, Acinobacter baumannii, Pseudomonas aeruginosa, and various Enterobacter species. The safe relative species that were chosen to use to screen for potential antibiotic candidates in this lab were Enterococcus faecalis, Staphylococcus epidermidis, Escheria coli, Acinetobacter baylyi, Pseudomonas putida, and Enterobacter aerogenes. I tested 10 potential candidates that I found in my soil sample that showed possible inhibition of other bacteria against these tester trains. Only one of my potential antibiotic candidates showed inhibition of a tester strain, so I continued testing and researching with another student's candidate that they chose not to proceed with. This candidate showed inhibition of the ESKAPE safe relative Enterococcus faecalis. This candidate will be put through more testing to determine whether or not it could become the next antibiotic drug that saves lives in this developing crisis.

Massaro, Owen. Antibiotics Present in Overland Park Soil.
In the last half-century, antibiotic-resistant bacteria has been shown to transfer between different organisms, with methods of transfer such as livestock intestines to meat consumers, or from inadequate water purification methods (Woolhouse et al., 2015). The accumulating crisis of antibiotic adaptability/ resistance in bacteria is a constant concern that requires vigilance from the scientific community (Ventola, 2015), and recent research has shown that with intensifying livestock production, this results in increased manure exposure, specifically dairy, which has been found to increase the distribution of antibiotic resistant organisms in the environment (Wepking et al., 2017). In the JCCC microbiology course, under instruction of Angela Consani, we have sourced microbial colonies from serial soil dilution, as soil has historically been the primary source of medical antibiotics. During the course of our research thus far, these collected microbial samples were screened for inhibition growth when exposed to various ESKAPE pathogen safe relatives via challenge plates. In regards to the microbial candidate that I am researching, it was sourced from loam soil in Overland Park, KS, and it has shown growth inhibition against the ESKAPE pathogen safe relative Enterobacter faecalis. I am currently undergoing the identification stage of my research, as well as exposing samples to newly acquired ESKAPE pathogen safe relatives.

McLaughlin, Morgan. 'Dr. Bailey'.
This experiment that I conducted is the process of soil collection and serial dilution for microbiological analysis. My sample of peaty soil was taken from Kansas City, Missouri on 1/31/2023 in cold, sunny, clear conditions from approximately 5 cm in depth, outside temperature at -3.89 degrees Celsius. I conducted a serial dilution to try to find a potential candidate. I used 1 gram of soil, some sterile water, and TSA agar plates for dilution. After incubation of 4 days, two of the plates were countable and could have had potential candidates but I did not do further experimentation with them due to having no rings of inhibition and most of the countable colonies and candidates appeared to have very similar morphology. The candidate I did pull, I named "Dr. Bailey", a Grey's Anatomy character. This candidate showed a strong ring of inhibition against Staphylococcus epidermis, and is the candidate I chose to study for the remainder of the semester.

Mcwilliams, Melanie; Armstrong-Lopez, Kennedy; Carder, Sarah. Storing Carbon in the Soil: Total Organic Carbon Analysis.
Soil samples were collected from two places on campus: the Prairie Restoration area and the lawn next to that area. We collected samples at two different depths from both areas. These samples were analyzed using the Walkley-Black titration method of total organic carbon analysis. This method involves a soil sample digestion followed by an oxidation-reduction titration. These results will be discussed.

Mendizabal, Max. Collapsible Dog House.
A dog house designed to be easy to assemble and disassemble quickly. The dog house is to be affordable while still being durable. Your dog will be comfortable and safe!

Milks, Sarah. Antibiotic Resistance from a Soil Sample.
Antibiotic resistance is a growing problem in the United States and worldwide. Antibiotics have been deemed unprofitable by big pharmaceutical companies, therefore they have stopped their search to find new antibiotics. That's where my project comes in. I collected a soil sample from my family's garden in hopes to find candidates that could potentially inhibit safe relatives to common bacteria. I had two solid candidates that inhibited all of the bacteria, SM1 and SM8. There was only one of my candidates, SM8, that was a pure culture. That being said, it was the only candidate that on its own inhibited all the bacteria. It is unknown if it could be a potential new antibiotic, but it will undergo further investigation to conclude.

Miller, Holly. EK1 Candidate.
One of the many ways microbiologists attempt to find new antibiotics is by using bacteria found in soil. This is an excellent resource because of the abundance and diversity of bacteria colonies that reside in it. Soil microbes have yielded the majority of the antibiotics we use to treat infection today. (Manyi-Loh, 2018) Many of these organisms found is soil have the ability to construct antibiotic composites. I took a soil sample and performed a serial dilution to obtain a countable number of bacteria to determine if any would be candidates for resistance to pathogen relatives. Out of my thousands of bacteria collected, four initially appeared to be potential candidates for antibiotic production. After further testing, one clear candidate stuck out to me. This candidate, named EK1, was able to inhibit the growth of multiple pathogen relatives such as Mycobacterium smegmatis and Escherichia coli. This indicates that my bacteria EK1 has the potential for antibiotic production.

Moeller, Marek. From Second Favorite Child to Treating Antibiotic Resistant Pathogens: The Search for Soil Microbes to Produce Novel Antibiotics.
Antibiotic resistant bacteria have been on the rise, causing many of the current antibiotics to be ineffective in treating antibiotic resistant infections. Antibiotics can be produced from some strains of bacteria, and the students at Johnson County Community College have partnered with the Tiny Earth Network to find new strains of bacteria that could potentially produce new antibiotics. Microbes from the soil have been isolated and tested against safe relatives of the ESKAPE pathogens, bacterial species that cause most of the antibiotic resistant infections. One of the isolated microbes, Second Favorite Child, was able to inhibit the growth of most of the safe relatives and could potentially be used to produce a new antibiotic.

Molina, Anna Marie. Rachel.
An antimicrobial substance that kills or inhibits the growth and replication of bacteria, is known as an antibiotic. Antibiotics are produced in nature by soil bacteria and fungi, giving the microbes an advantage by killing off its competition. Overuse or misuse of antibiotics leads to antibiotic resistance, which poses a huge threat to our health today. There are currently 6 bacterial species identified, referred to as ESKAPE pathogens putting us at risk of infection due to their multi-drug resistant nature. As antibiotic resistance continues to be on the rise, the hunt for a new antibiotic producing microorganism is as crucial as ever. Through screening soil samples in the microbiology laboratory we hoped to find potential candidates that are antibiotic producing. Soil from South Lake Park had the potential to support a varied and dynamic community of microorganisms. Several promising candidates were available to choose from, but one stood out in particular. Candidate #10 named Rachel, displayed large zones of inhibition when tested against all 6 safe relatives, and produced a pure culture in a streak plate, earning its way to the top. Extended incubation time for screening results is needed for Bacillus subtilis, and Mycobacterium smegmatis to grow and possibly inhibit. Will Rachel have her cover blown, and a new antibiotic producer be unleashed? Without new antibiotic discoveries, antibiotic resistance with increasing death rates will continue to be an issue encountered.

Montgomery, Madi. Antibody Ariel.
The world is testing different antibodies that are found to someday help the fight against superbugs. In a JCCC Microbiology Laboratory class taught by Professor Angela Consani we would begin this process simply with a ziplock bag of soil. This soil sample was taken from Overland Park, KS, and was serial diluted to start testing. When put on a 50% Tryptic Soy Agar plate, if they showed any zone of inhibition, they could now be considered a candidate. I started with 10 but one candidate named Mulan had to be discontinued because she was contaminating the plate, growing mold. With the remaining candidates, I tested them against the ESKAPE pathogens, looking and measuring the zone of inhibition again. With further testing I chose to continue my project with candidate Ariel. I then was able to gram and spore stain the sample to be viewed under the microscope. Learning new techniques allowed me to figure out that the sample is a very small, non-spore forming organism. She will now go through the PCR process to hopefully find her genetic makeup.

Morrison, Madison. Koko the Big Yellow Bacteria.
Antibiotic resistance is becoming an ongoing issue in biotechnology and will quickly become one for almost everyone in the world. This is why I am using extensive reach to pull a bacteria from soil to see if it inhibits a known pathogen relative. We know that almost all antibiotics have come from soils all around the world. Finding a new Bacteria that shows inhibition and will become a new antibiotic is possible. I have used techniques such as serial dilution, master plates, and many challenge plates, to try and find a bacteria that is resistant to 8 known pathogen relatives. Koko showed inhibition on the last day possible. It inhibited Enterococcus faecalis, Staphylococcus epidermidis, Acinetobacter baylyi, Escherichia coli, and Mycobacterium smegmatis. It is yellowish, flat, smooth, entire, and irregular as a whole. Koko had to undergo stains such as a gram, spore, and acid-fast, and came negative to all but was shown to be gram positive. I am hopeful she will conquer the rest of testing and prove to be the next antibiotic that will change people's lives.

Morsy, Nadeen. Antibiotic Resisting Bacteria Derived from Loam Soil Sample.
The purpose behind this project is to isolate a bacteria that consists of antibiotic resistant characteristics, which is originally derived from a soil sample. This soil sample was achieved from my front yard at a temperature of 33 degrees Fahrenheit. The type of soil the bacteria is derived from is loam, having a pH of 6.5. Taking 1 gram of that soil sample, a serial dilution was performed to dilute the soil sample to help identify antibiotic producing candidates. Additional screening was done on several bacterial residents that showed to have antibiotic resistant characteristics to help further isolate those candidates and choose which one best represents antibiotic resistance. After several trials of transferring candidates by making master plates to help represent the best candidates and further isolate them, 3 candidates were then used for further screening against safe relatives of ESKAPE pathogens. In conclusion, one candidate was the most effective against almost all safe relatives, including Enterococcus faecalis, Pseudomonas putida, Enterobacter aerogenes, Escherichia coli, and finally Acinetobacter baylyi. The only safe relative it wasn't effective against was Staphylococcus epidermidis. The other 2 candidates weren't as effective against these safe relatives, so the candidate that was most effective against them was chosen to continue to use for further testing. This candidate is a round colony that has a convex elevation with a smooth margin, and has an orange color. Two trials of making streak plates have been made to help isolate colonies of this bacteria candidate. Further testing in the future will be made to help identify this bacterial candidate.

Muehlberger, Courtney. Looking For an Antibiotic Produced by a Bacteria named 'Betty.'
In the search for a successful new antibiotic, we studied the antibacterial compounds produced by "Betty," a strain of bacteria previously isolated by a JCCC microbiology student. A chemistry student from a previous semester found extracts of this bacteria inhibited tester strains of both E. coli and S. epi when grown in broth with the extract. The goal of this project was to isolate and confirm the isolation of the antibiotic produced by this bacteria and work towards separation of the compounds.

Mullings, Camille. Sand CAM Soil Tackles Antibiotic Resistance.
Antibiotics Resistance has been giving scientists a run for their money for many centuries. As the expression states, it has been difficult to obtain antibiotics as bacteria tend to learn quickly on how to become resistant. In the quest to find microbes grown in soil, a sand soil sample was collected on a cold bleak day around a private community pond in Lenexa. The researcher hopes that sand is the overlooked soil as it tends to not have an environment to create as many bacteria in comparison to other soils. A master plate was then created with the sample collected, and a series of screenings against the safe relatives of the ESKAPE pathogens was done as well as a streak plate. The Sand Soil CAM had nine colonies and the researcher selected Soil Sand CAM 5 colony which morphology is flat, smooth entirely, white and round and inhibited the Enterobacter aerogenes. The researcher performed the staining techniques to visualize Sand Soil CAM and further identify the microorganism. These findings may be useful in the future when seeking alternative antibiotics and in the battle against antibiotic resistance.

Nebergall, Steven. Applications of Dynamical Systems to Development in Aerospace.
Dynamical Systems can be used to model a variety of phenomena in the world, and systems that we use in it. Through development using these models of dynamical systems, we can optimize and improve technology through engineering to control and use these chaotic natural systems to work with us. We see this in aerospace engineering and aviation when modeling the movement in the atmosphere, and we can accurately control unstable environments like these.

Negash, Betelhem. Antibiotic Research.
The rapid growth of antibiotic resistant infection is a threat for human health. These bacterial infections caused by antibiotic resistant microbes highly demands an invention of resistible drugs that could reduce the infection itself and reduce the spread of the infection. In the long run, it is difficult to predict a clear mechanism for coexistence of both drug-sensitive and resistant strains intermediately because of the eco-evolutionary dynamics. Additionally, this antibiotic development field received less attention and less funds than other drug producing companies. In this research, I have taken a part of the antibiotic discovering community. This community works on discovering and doing studies on microbes, primarily form a soil source. The soil used for this research was collected from the backyard of senior living area found in Overland Park, Kansas. However, the soil collected did not produce any potential inhibitory chemical producing microbes. Hence, the soil collection was not successful in showing in any candidate that inhibited any of the six ESKAPE safe relatives pathogens. For this reason, the research of this paper proceeds to use a donated microbe that is discovered by a colleague of mine. This candidate microbe named 'Can #5" showed inhibition Acinetobacter baylyi and Staphylococcus aureus.

Nevius, Jenna. Searching for New Antibiotics.
The purpose and goal of the research done this semester was to learn how to use microbiology lab techniques in a very useful way by looking for possible soil microbes to be used as antibiotics. Antibiotic resistance has become a very alarming issue so it is very beneficial to look for possible candidates while learning about microbiology. Many of the skills learned in this lab may very much be used again later in life depending on career choice. The techniques learned in the class are as follows. Aseptic technique to transfer microbes without contamination. Examples of this is transferring microbes to plates with occultation loop, swab sampling, and air sampling with MAS 100. Serial dilution to gather information on the soil used and to find possible candidates. Then a master plate and antibiotic screening plate were used to test the ability of candidates to inhibit the growth of other microbes. Once one candidate was chosen to work with, more information was gathered on it by gram staining, acid fast stain, spore stain, and PCR. Gathering information on the candidate by all of these tests helps to identify the microbe to see if it is possible a new microbe to use for antibiotics or if it is one already discovered.

Obertop, Abigail. Antibiotic Potential of Soil Microbes.
Antibiotic resistance is an ongoing problem in which bacteria are capable of withstanding antibiotics intended to kill or inhibit their growth. The earth's soil, a widely available resource, is inhabited by billions of microorganisms. Among these microorganisms are bacteria. Bacterial colonies from the soil can be cultured to observe whether certain colonies will emit chemicals to inhibit the growth of other bacteria. Colonies that present strong zones of inhibition are potential candidates for the creation of antibiotics. A bacterial colony, named "A," was produced from a silty soil sample in Shawnee, Kansas. In a serial dilution of the soil sample, colony "A" created a strong zone of inhibition against other colonies. When tested against safe relatives of pathogenic species, "A" inhibited Enterococcus faecalis, Staphylococcus epidermidis, Acinetobacter baylyi, and Escherichia coli. The tests that were performed indicated that this particular colony could be a strong antibiotic candidate.

Pacheco, Gean. Our Backyard Soil, A Possible Antibiotic Against Many Pathogens.
Pathogens are a problem we have faced for thousands of years, and around the world, they cause the death of 7 million people each year. Antibiotics are chemicals that help fight against pathogens, unfortunately, more and more pathogens develop resistance to certain antibiotics, which makes antibiotics ineffective. Interestingly, the soil in our backyard may help us find an effective antibiotic, since we can find hundreds of bacteria in a spoon of soil. For our experiment, the first step was to get backyard soil, then we did a serial dilution, with the purpose of reducing the concentration progressively. Then, we had to transfer 0.1ml of each serial dilution into a petri dish and wait for 24 hours for the bacteria to grow. The next step was to choose 9 different colonies among all the Petri dishes and preferably choose colonies that were isolated, in order to create a master plate. The goal of the master plate was that each colony would grow in its respective grid, and not contaminate the other colonies. The next step was to create antibiotic screenings, in which we must first transfer each ESKAPE pathogen to a new Petri dishes, and then transfer the colonies from the master plate to these new Petri dishes, to see if any of them show resistance against these safe pathogens. Successfully, one of the nine colonies was found to have possible antibiotic characteristics.

Patel, Amita. Beta-glucosidase Mutation.
Cell research tells us how the cell works to keep the body healthy and what diseases cause if they do not work correctly. Cell biological studies show cells' structure, growth, reproduction, and death. The Main idea of the research on Beta-glucosidase (BglB) mutation is how we can generate reliable data about genes and enzyme functions to improve the AI model. Computational tools to predict enzyme stability and catalytic efficiency are a growing method in protein engineering. To improve the predictive accuracy of enzyme modeling software, many data are needed to train the algorithms. The enzyme variants were modeled with FoldIT software, built using Kunkel Mutagenesis methods in Escherichia coli, and the purified proteins were tested for kinetic activity. Adding these mutations to the Design2Data (D2D) Course-based Undergraduate Research Experience database contributes to an improved understanding of the structure-function relationship of ß-glucosidase B. It expands the potential for improving the accuracy of computational modeling tools for protein design. BglB is a suitable model enzyme and easy to mutate. I have researched the BglB mutation A236C. My mutagenesis is successful. After successful mutagenesis, I used BL21 E coli bacteria to make my mutation protein. I will be purifying my mutant enzyme using immobilized metal affinity chromatography. This process isolates the BglB enzyme from all the other cell debris. After the purified enzyme, I will check the stability of my mutant enzyme and at what temperature the enzyme can work or cannot function correctly.

Patel, Manasvi. Differential Equation.
Differential Equation means one or more derivatives of a function in the equation.

Patel, Manasvi. Dog House.
Doghouse is the shelter for all kind of dogs where they can live and spend most of their time. It also keeps them safe from weather. There are so many types of dog house like wooden dog house, metal, plastic, Barrel dog house and many more. There are so many kinds of dogs too with different breeds and sizes. The steps to build and design a great doghouse are design a plan for a dog house, Design the base, Design the walls, Create the roof framing, design the entrance, design the interior and paint the dog house. The doghouse that I'm planning to design is a wooden doghouse with one window and one door. It will have wheels on it too so the dog owners can move it wherever they want. My doghouse will be weather friendly and big enough that all kind of dog can fit in there. The main purpose of my doghouse is to make my dog feel comfortable and happy.

Peer, Raven. Designing a Doghouse.
I was given the task to design a doghouse for a shelter. The requirements for the doghouse are as follows: lightweight, collapsible (lays flat when not assembled); can be easily set up and secured and can be transported in a normal small SUV-type vehicle. It will be built in the nearby area, so Kansas City climate should be expected. With the aforementioned info above, I began preparing ALL POSSIBLE ways to make this doghouse as budget given, specification of materials, modifications (vents, bedding, insulation, etc.), and the size of the house or the dog.

Perkins, Kaylee. The Discovery of Lawrence, Kansas Soil.
In this experiment, a sample of soil was taken and many different tests were completed. The goal of this experiment was to see which microorganisms that this microorganism were inhibiting the growth of. The first that I performed was a serial dilution to get a countable plate. I then challenged my bacteria against different ESKAPE relatives. I think chose the plate that had the largest ring of inhibition against these ESKAPE relatives and named it EK9. This is the microorganism that I have been studying the entire semester. I made a streak plate and I found that that morphology of EK9 was round, entire, opaque, small, and white. I then took a colony from the streak plate and performed an acid-fast stain, a spore stain, and a gram stain. After viewing all of these stains under the oil immersion lense on the microscope, I found that EK9 was non-acid fast, gram-negative, and spore negative. I then made a Polymerase Chain Reaction and I am awaiting those results.

Peters, Grace. Antibiotics and the Isolation of Bacteria from Soil.
Antibiotic resistance is a global concern due to the ability of bacteria to develop resistance to antibiotics, making them ineffective. Soil has been known to contain many different kinds of bacteria, including those that produce antibiotics. To address the antibiotic shortage concern, a soil sample was collected from Louisburg, Kansas. This location was chosen due to its close proximity to farmland, of which the soil is known to contain an abundance of different types of bacteria. From this soil sample, 14 potential candidates were discovered. Two of these candidates inhibited the same four of the six ESKAPE pathogens, namely Enterococcus faecalis, Staphylococcus epidermidis, Escherichia coli, and Enterobacter aerogenes. Of these two final candidates, the one with the clearest zone of inhibition was selected for further testing.

Pimentel, Han. Subjectivity Is Scientific: The History of Field Journaling in Western Science.
Science in the West is primarily driven by quantitative data and is valued for its perceived objectivity. However, I hypothesize that this emphasis severely limits advancement within science, and particularly within natural sciences which have historically relied on qualitative methods of investigation. During my initial research, I concluded that a return to field journaling would positively impact scientific research through increased connectivity between human inhabitants and their respective ecological communities. Additionally, field journaling has the potential to promote interpersonal relationships and inclusivity within scientific communities by including people of cultural backgrounds that traditionally value qualitative observation. Unfortunately, research indicates that the subjectivity of field journaling is often met with opposition. In my research, I further investigate the negative attitudes towards subjectivity in Western science through a postmodernist lens. I examine how the history behind the reign of hard data provides evidence of significant subjectivity behind the current perceived "objectivity". Through the lens of cultural materialism, I investigate how sociocultural factors, such as race, class and gender, historically influenced Western culture's philosophy of science in an attempt to decenter values imposed onto Western science by hegemonic forces. I then determine the role of the Western philosophy of science in the diminishment of field journaling as a legitimate methodology within natural sciences. I conclude by envisioning theoretical benefits of a reintroduction of field journaling into professional and academic settings. My research outlines an alternative approach to science that emphasizes a union with humanities in order to progress. My conclusion supports a return to qualitative methods such as field journaling to promote the advancement of science that is not otherwise possible.

Pitts, Kylie. Potential New Antibiotic.
Antibiotic Resistance is on the rise. Scientists around the globe are searching for new antibiotics that have yet to be discovered. It is extremely important that this research has many participants in order to get as much data as possible. I have taken a soil sample from Greenbrier Apartments to do further testing on. In my research, I have found a few potential candidates that created zones of inhibition against our ESKAPE relatives. I have decided to move forward with one of my candidates named "KRP 3", which may have the potential to be the next lifesaving antibiotic.

Pleitez, Rosa. Soil Dilution to Identify Antibiotic Producing Candidate.
This project involves the discussion of a bacteria of a sandy soil sample in Kansas City, Ks. This organism shows effectiveness against these 3 ESKAPE pathogens Escheria coli, Enterococcus faecalis and Acinetobacter baylyi, but not against these 3 ESKAPE pathogens Enterobacter aerogenes, Staphylococcus epidermis and Pseudomonas putida. This organism shows itself to be a good candidate due to the sampling performed with isolation, ESKAPE pathogen testing and streak plating.

Plunkett, Jordan. Boston Terrier B Bacterial Discovery.
This research was conducted to isolate a soil sample from Paola, Kansas in hopes to find a microbe that is antibiotic producing. Today there is a need for more antibiotics in the medical world. As antibiotic resistance continues to grow, we need other safe alternatives to help patients. A small sample of soil was taken from a flower bed in Paola, Kansas. A serial dilution was performed, and 16 interesting candidates were selected. Of the 16 original candidates, ultimately one was chosen. Boston Terrier B was selected for its performance after several challenges against the 6 ESKAPE pathogen safe relatives. Further research will continue in order to know more about Boston Terrier B and ultimately know whether or not it is antibiotic producing.

Poelling, Melissa. Microbes in My Neighborhood, The Hunt for New Antibiotics in Soil.
The purpose of this research is to identify potential new antibiotics from soil samples. Antibiotic resistant microbes are a community health risk. Microbes are becoming resistant to antibiotics faster than we can develop new drugs to treat them with. In partnership with Tiny Earth Network, we are crowdsourcing potential new antibiotics with this research on soil samples. To this end, a soil sample was collected from my front yard and potential candidates were isolated for subsequent microbial screening. Initially 12 candidates were chosen and screened against 8 pathogens, E. coli, A.baylyi, P. putida, S. epidermidis, E. faecallis, E. aerogenes, M. smegmatis, and B. subtilis. While several candidates showed promise against one or two organisms a single candidate showed promise against 7 of the 8 pathogens. This microbe shows exceptional zones of inhibition against the screened pathogens. This microbe is identified as 5B, further research will be done to determine just how helpful this microbe can be in the pursuit of novel antibiotics. Join me as we discover what this microbe has to show us.

Prapassorn, Nicholas. Soil Bacteria: A Source of Antibiotics Against Pathogens.
The emergence of antibiotic resistance has been a significant issue in healthcare settings, with many drugs or prescriptions no longer being effective against strains of bacteria that have gained resistance against them. This project's purpose was to find bacterial candidates that are present in soil that could produce antibiotics against pathogens. This was done by performing serial dilutions on a sample of soil from Olathe and finding zones of growth inhibition around bacterial colonies. Candidates were transferred to a master plate and then tested against various safe relatives of ESKAPE pathogens. One of the candidates showed a zone of inhibition against the safe relative Enterococcus faecalis. It was chosen as the candidate for this project with the purpose of identifying it.

Ramirez-Hernandez, Andrea. Backyard Soil Collection Holds Potential to Inhibit an ESKAPE Pathogen.
In this project, you will find how bacteria can be used to inhibit the growth of other bacteria. The research done in this project is crucial because all of the necessary steps used to create a promising microbe were closely followed and tracked into a lab notebook. It's also important to note that with research special techniques like serial dilution, screening, and staining were demonstrated. The purpose of finding a bacteria collected from soil in my backyard and conducting numerous experiments is to find a promising microbe that produces a chemical that might be used for an antibiotic. The bacteria grown in the lab will be used to determine which relative of ESKAPE pathogens it can inhibit. The bacteria that I found through my research was shown to be effective against Staphylococcus epidermidis. This safe bacterium is a relative of the ESKAPE pathogen Staphylococcus aureus. In conclusion, my bacteria that I found could be used to possibly treat skin infections, or an antibiotic resistant infection called MRSA.

Ramsey, Clark. Dark Matter vs. MoND: Is Most Matter in the Universe Invisible or Do the Laws of Gravity Need to Be Modified?
Evidence has been accumulating for decades that there is not enough matter to explain the motions observed by astronomers for the rotations of spiral galaxies, the movement of galaxies within galaxy clusters, the movement of the Andromeda galaxy toward the Milky Way galaxy, or the large scale structure of the universe. Current estimates are that ~80% of the matter in the universe is invisible to us. Astronomers have developed a theory, ΛCDM, that most of the gravitating mass is composed of a "Dark Matter" that interacts only gravitationally with ordinary matter. Despite decades of research however the nature of this Dark Matter is still unknown, and recent results from the James Webb Space Telescope appear to be in conflict with the predictions of ΛCDM. An alternative view has developed that perhaps it is not that there is missing matter but that our understanding of gravity as developed by Newton and Einstein is in need of revision. The leading alternative theory of gravity is known as "MoND." We present here a review of Dark Matter vs. MoND cosmology, finding that neither theory is adequate to completely explain astronomical and cosmological observations.

Reyes-Bolanos, Roshele. Antibiotics and the Resistance of Antibodies.
Antibiotics are medical compounds that have selective toxicity. Soil microbes have yielded most of the antibodies we use to treat infections today. So the search for new species of antibiotic-producing bacteria continues to be one of the most promising avenues for finding the next generation of antibodies. We went through the methods of aseptic technique and applied them in the isolation of pure cultures of bacteria, Also performed various staining techniques and chemical tests to identify these bacteria. The response of bacteria to changes in environmental conditions will also be examined.

Ricks, Delainey. Identifying Bacterial Antibodies from Soil.
Antibiotic resistant bacteria is a recurring issue that we come across every single day. With that in mind, this research consists of a clay soil sample obtained from my backyard, in Blue Springs Missouri, and experimenting with it further in order to observe and identify potential bacterial candidates that are antibiotic resistant. The steps taken to note such resistance consists of taking a soil dilution from the original soil sample, transferring all potential candidates to a master plate, creating a new master plate of the notable candidates that appear to have no excessive growth, with some resistance to antibodies present, screening chosen candidates against antibiotic properties, as well as creating a streak plate of the best candidates against what are known as the ESKAPE relatives. The ESKAPE relatives that my best candidate shows effectiveness against consist of Enterobacter aerogenes, Staphylococcus epidermidis, and Acinetobacter baylyi. The ESKAPE pathogens that the candidate shows no effectiveness against consist of Escherichia coli, Enterococcus faecalis, and Pseudomonas putida. After completing these steps, one final candidate was chosen for further experiments in order to test its isolated colonies, which was the best candidate effective against most of the ESKAPE relatives mentioned above.

Roberts, Chloe. Antibiotic Producing Bacteria.
The purpose of this experiment was to isolate antibiotic producing bacteria from a soil sample. This soil sample was a loam sample collected from a residential lawn in Kansas City Missouri. After diluting the soil sample, the candidates were spread onto eight 50% TSA agar plates and incubated for a week. The plates with higher dilution exhibited countable colonies and was used for further testing. Plate 10-5 dilution was selected for use having 178 countable colonies, from those 178, 12 antibiotic producing candidates exhibited clear zones of inhibition. These candidates were collected and transferred to a master plate and labeled 1-12 and incubated for a week. A new master plate was configured once again, narrowing down the 12 candidates into five that showed clear zones of inhibition. These five candidates were then transferred to the new master plate and labeled using their original number from original master plate and incubated for a week. These candidates were numbers 4, 5, 8, 9, and 12.

It was observed that candidate 4 had irregular texture, and erose margin. Candidate 5 did not exhibit growth. Candidate 9 grew into a large colony, light beige in color with a matte appearance and irregular margin. Candidate 12 was glossy in appearance, light yellow in color, with an irregular margin. These candidates were then tested for resistance against ESKAPE pathogens Enterococcus faecium, Staphylococcus aureus, Acinetobacter baumannii, Enterobacter, Pseudomonas aeruginosa, and Klebsiella pneumoniae. Candidate 4 showed antibiotic resistance against all ESKAPE pathogens.

Rogers, KathleenMae. Antibiotic Properties of Paen.
Soil taken from Little Blue Place Park was diluted to identify any bacterium with antibiotic qualities. Out of the four possible candidates only one was able to inhibit any SAFE pathogens – relatives of more dangerous bacteria, ESKAPE pathogens. Candidate named "Paen" is able to inhibit SAFE pathogens Klebsiella aerogenes and Staphylococcus epidermidis.

Rowse, Jordan. The Use of Dynamical Systems in Predator-Prey Interactions.
Within any environment, different groups of species interact with one another in varying ways. Predator-prey interactions, called Predation, is one way two types of species can interact within an ecosystem. Dynamical systems can be utilized to understand how these species evolve with time. The goal of this presentation is to explore how differential equations are used to create a dynamical model of predator-prey situations which can then be used to predict long-term behaviors and changes in predator and prey populations.

Rubey de Guerrero, Stacy; States, Laura; Aguilar, Marla. A Comparison of Soil Samples: Native Tallgrass and Lawn Areas on the JCCC Campus.
Soil samples were collected from two areas with different grasses in a similar part of campus. One area that was sampled was planted with native tallgrass (Prairie Restoration area) 30+ years ago and the other area is maintained as a lawn. These samples were tested for total organic carbon using the Walkley-Black method of analysis with an acid digestion followed by a titration. A discussion of the results will be included along with additional tests conducted on these samples.

Ruppelius, Conrad. Applications of Dynamical Systems for Autonomous Robotics.
Dynamical systems play an integral role in the design of robotic autonomy. Behavioral traits in robotics can be represented by objects within the solution space of a differential equation. These traits can be generated by a dynamical system. By manipulating the differential equation and its solution space, a variety of tasks can be produced.

Santamaria, Andres. Exploring the Potential of Soil Bacteria as a Source of Antibiotics Against ESKAPE Pathogens.
The emergence of antibiotic-resistant ESKAPE pathogens has led to a pressing need for new antimicrobial agents. One potential source of such agents is soil bacteria, which are known to produce a variety of secondary metabolites, including antibiotics. In this study, a soil sample was analyzed to determine if the bacteria present were able to produce antibiotics with activity against ESKAPE pathogens. The results showed that two strains from the soil sample were able to inhibit the growth of some pathogens, suggesting that soil bacteria may be a valuable source of novel antibiotics for the treatment of drug-resistant infections.

Santamaria, Andres. Isolation and Testing of the Antibiotic Compounds Produced by a Bacteria Named 'Goldilocks.'
In the search for a new antibiotic, we studied the antibacterial compounds produced by "Goldilocks," a strain of bacteria previously isolated by a JCCC microbiology student. A chemistry student from a previous semester found compounds in extracts of this bacteria inhibited a tester strain of S. epi when grown in broth with the extract. In this project we worked to confirm the antibacterial activity of the extracts from this bacteria and worked towards the isolation of the antibiotic compounds produced.

Schneider, Lauren. Antibiotic Producing Bacteria.
Candidate 9 is an antibiotic producing bacillus found in a soil sample from Constance Park, near the Kansas River, in Lawrence, Kansas on February 3, 2023. It has shown resistance to relatives of the ESKAPE pathogens: Enterococcus faecalis, Escherichia coli, Acinetobacter baylyi, Pseudomonas putida, and Enterobacter aerogenes. Candidate 9 is beta hemolytic, and gram-negative.

Schnoor, David. A Genetic Mutation of Beta-Glucosidase B.
This project aimed at gathering data on genetic mutations as a contribution to the collaborative research study which originated at UC Davis, Design2Data (D2D). Through the use of a protein-modeling software program, FoldIt Standalone, predictions were made about the efficacy of a selected mutation to a DNA sequence responsible for the production of the enzyme Beta-Glucosidase B (Bgl B). The mutation was successfully carried out in the laboratory by means of Kunkel mutagenesis. The DNA was then activated with the help of BL21 E. coli cells, resulting in the successful production of the mutated Bgl B enzyme. Through analysis of the mutated enzyme, we will be able to provide real world data which will be used to improve the accuracy of protein-modeling algorithms for programs such as FoldIt Standalone. This data, along with that collected by other members of the D2D community, will give insight into the functionality of Bgl B while providing a better understanding of modern, technological approaches to genetic engineering.

Schunk, Sam. Soil Project.
The purpose of the experiment was to calculate the number of cultivable microbes per gram from a collected soil sample and then run screening against safe relative bacteria. Serial dilution is a fairly simple method that allows microorganisms to grow into countable colonies by diluting the solution. This entire experiment used a single gram of soil that I diluted into a bacterial broth, which I then spread onto an agar plate and incubated to see what would grow. I then was able to collect isolated colonies and transfer them to a separate "master" plate. Finally, I screened all the bacteria I was able to collect against safe relatives to see if my bacteria would inhibit them.

Sellami, Breana. Soil Microbes and Antibiotic Screening.
Due to the natural development of antibiotic resistance, the search for new antibiotics is vital. Soil provides a highly competitive environment which promotes adaptations of soil dwelling bacteria. These adaptations lead to antibiotic producing bacteria. By serially diluting a soil sample, we can grow its bacteria in different, quantifiable, amounts. These cultures are used when looking for candidates for antibiotic screening. After finding a good candidate, it is tested for inhibition against common antibiotic resistant pathogens.

Sellens, Tinuviel; Strayer, Lauren ; Selgelid, Emily. Does Native Tallgrass Store More Carbon in the Soil?
The Earth's soils store more than three times the amount of carbon in the atmosphere. Native grasses are known to have root systems that extend far deeper than those of shorter grasses used in suburban lawns. For this project, soil samples were collected on the JCCC campus from both the Prairie Restoration area and the lawn area nearby. An analysis of these soils for total organic carbon was performed using an acid digestion followed by a titration method. The results of these tests will be shared and discussed.

Seston, Victoria. Soil Bacteria Producing Possible Novel Antibiotics to Fight Antibiotic Resistance.
Throughout our healthcare, the problem of bacteria becoming resistant to even our strongest antibiotics has become a front-line topic. Previous misuse or overprescription of common antibiotics has created super bacteria nearly immune to our current treatments. Soil samples have long been the source of antibiotic-producing bacteria as they are highly condensed with many types of bacteria trying to survive oftentimes accompanied by the production of antibiotics in self-defense. This research aims to discover a bacterium that produces novel antibiotics against ESKAPE pathogens. The soil sample chosen came from the outskirts of a decaying garden in hopes that the dead plant material provided an optimal environment for bacteria. 13 original candidates were chosen however, four had become overgrown with a known bacteria Bacillus mycoides, thus unable to provide for further testing. Two candidates found within this soil sample were observed to have inhibited the growth of at least two ESKAPE safe relatives. Of these two candidates VS4, which inhibited Staphylococcus epidermidis and Escherichia coli, was chosen for further analysis.

Sholotan, Chisom Edeh. The Candidate Hunt.
The hunt for new antibiotic producing microorganisms is vital for humanity survival. With the growing rate of antibiotic resistance, better and newer antibiotic is relevant to be able to fight ESKAPE pathogens. My research is hopefully going to bring progress in identifying potential candidates/candidate for antibiotic producing microorganisms in the hopes of reducing the rate of antibiotic resistance. The process of selection of potential candidates will depend on the ability of this candidate to inhibit the growth of any of the ESKAPE relatives. To complete this hunt and eventually pick a potential candidate, a series of processes have to be completed, they include: soil collection, serial dilution, candidate selection and isolation, gram stain, and PCR. Candidate CBYS3 showed signs of inhibiting the ESKAPE relative Enterobacter aerogenes. Candidate CBYS3 is currently being sent off for DNA sequencing after the PCR reaction so that the DNA can be studied in other to know how it functions. This project has been very enlightening, and I hope that the product of my research will be able to contribute to the search for new antibiotics.

Silva, Alexa. Soil Experiment.
Throughout the years there has been a rise for antibiotic resistant diseases/infections. In our course we are given the opportunity to work hands-on and practice our scientific skills, research and go through with our experiment whether we get the desired results or not. We worked from obtaining our own soil, diluting it, finding growing microbes and so on. We are learning the process of being able to create a new antibiotic while working around all the obstacles that come with it.

Solis, Janet. Soil Bacteria.
Collecting bacteria from the ground near my place to see what kind of bacteria grows within. Using serial dilution to be able to see how many colonies are in the soil, when I transfer to an agar plate and isolate it in the incubator. Once it's been in the incubator for 48 hours at room temperature, I look to see which colonies are able to look more in depth. Then challenge the colony with the safe relative and incubate them for 48 hours and see if there is a halo around the colony or not. When I have picked the colony that I'm able to look more into, that is my candidate. When I have picked my candidate, I will do a streak plate to isolate the candidate. As soon I get a single colony I'll be able to gram stain, spore, and acid fast staining to look at the candidate under a micro-scoop. Last step using PCR and Gel Electrophoersis to be able to see if the candidate has and DNA and if it does, it gets sent off to get a sequence for the candidate.

Stegner, Calista. Collapsible Dog House.
The aim of this project was to design a lightweight, portable, and collapsible dog house. Though lightweight, the materials used must be durable enough to withstand outdoor elements such as rain, snow, etc. It was also important to identify a material that could be easily and affordably purchased in the area. The scale of the structure must be determined by the distribution of interior area that would best accommodate a dog and compatibility with the chosen material regarding the dimensions in which it is sold. The unassembled house must also be able to lay flat and fit in a small SUV vehicle. Clear instructions on how to assemble and secure the doghouse are required. Comfort of the dog and ease of use by the caretaker must also be taken into consideration.

Stieben, Ashley. What Lives in Our Soil?
This project involves a soil sample from Tonganoxie, Ks that is shown to have antibiotic producing properties. After testing again ESKAPE pathogen relatives, it has shown resistance to E. coli, E. faecalis, S. epidermidis, A. baylyi, and P. putida. It has not been proven to have resistance to E. aerogenes.

Stites, Brian. Isolation of Antibiotic-Producing Bacteria from Soil Sample.
The search for new antibiotic continues at JCCC! In this study, a loam soil sample was taken from Heritage Dog Park (38 degrees, 51', 28" N; 94 degrees, 46', 22" W) to identify and isolate bacterial strains that produce antibiotics against ESKAPE pathogens. After an initial screen on 50% TSA agar plates, the candidate bacteria, SAM3, was selected for further evaluation based on a zones of inhibition for other soil bacteria. A Gram-stain identified SAM3 as a gram-negative bacillus rod, and its pattern of hemolysis on a blood agar plate indicated that it is beta-hemolytic. Based on visual inspection, there is a strong indication that SAM3 is also spore-forming. Its colony morphology is rhizoid with irregular edges, it grows moderately deeply into the agar and it's a light cream color. SAM3 had significant zones of inhibition for E. coli, A. baylyi and P. putida, and had strong zones of inhibition for E. faecalis and S. epidermidis. The 16s rRNA from this microbe has been isolated and sent off to be sequenced as further research is conducted.

Theleman, Arianna. A New Hope for Antibiotics; Discovering Anakin Skywalker.
Antibiotic resistance has become a very big issue in the medical field over the last several years. With the development of resistance to many of our known antibiotics, bacterial infections are getting harder to treat. Over the course of the semester, we took on the challenge of discovering new candidates with the ability to produce growth inhibition to surrounding bacteria and then tried to identify what type of bacteria our candidates were. By doing so we hoped to help create new solutions for the growing problems of antibiotic resistance. Most of the antibiotics used today are products from soil samples that have been taken and researched further. I participated in trying to find a solution by taking a soil sample of my own, and by testing it through serial dilution and challenge plates, I hoped to find a good candidate worth exploring further throughout the semester. I discovered a candidate that I named Anakin Skywalker, who showed promising results of a possible future antibiotic breakthrough.

Toratti, Elise. The Search for the Cure of Antibiotic Resistance.
Antibiotic resistance has been an issue since the 1950's. Antibiotic resistance is a problem because it is making treating bacterial infections more difficult. In order to help try to find a solution to antibiotic resistance, I collected a soil sample to try to see if the bacteria would be able to inhibit one of the six ESKAPE pathogens. My candidate inhibited three out of the six pathogens. It is important to see if my bacteria sample can inhibit ones of these pathogens because it can help determine whether a new antibiotic can be made to help fight these infections.

Tovar, Emily. Rick Defends the Universe Against a Notorious ESKAPE Pathogen Relative.
As the incidence of new pathogens continues to increase in the world, so does the need for antibiotics that fight them off. In hopes of furthering the research done on antibiotics, our class looked for answers in dirt! I collected soil from my own backyard in Olathe, KS. I performed a serial dilution to lower the colony count found in the soil sample and challenge plates to determine candidates showing inhibition against ESKAPE pathogens. From the first, 12 candidates, one was selected, for further testing, due to it's clear zone of inhibition against Staphylococcus epidermidis.

Townes, Shymiek. Identifying Bacteria Found Near Home.
The purpose of this research is to find bacteria that have the unique qualities of inhibiting the growth of bacteria that cause infectious diseases. This is important because we are trying to find bacteria that produce antimicrobial chemicals in order to create new antibiotics. While the bacteria found in my soil has not yet been identified, it has shown promise in that it has inhibited the growth of Enterococcus faecalis, Staphylococcus epidermidis, and Acinetobacter baylyi. While these bacteria themselves are not infections they are closely related bacteria that are.

Tribaldo, Luis. Isolation and Testing of Antibiotic Compounds Produced by a Bacteria.
In the search for new antibiotics, we studied the antibacterial compounds produced by "Peeves," a strain of bacteria previously isolated by a JCCC microbiology student. A chemistry student from a previous semester found compounds in extracts of this bacteria inhibited a tester strain of S. epi when grown in broth with the extract. In this research we worked to isolate and test the antimicrobial compounds produced by this bacteria.

Turner, Katie. Antibiotic Resistance.
Antibiotic resistance is becoming a common problem in clinical environments. Companies are not eager to develop new antibiotics because it is expensive as well as time consuming. Bacterial infections that are able to overtake antibiotics are difficult to treat because the science can be uncertain. Microbes from the soil may be able to counteract this problem. Since the soil contains millions of bacteria, there is a possibility of discovering one that can inhibit pathogens that are resistant to modern day antibiotics. I was able to cultivate a colony from a soil sample collected in Shawnee, Kansas, named KBT E. It is a white, irregular, and lobate colony with mucus like consistency that provided zones of inhibition against pathogens including Staphylococcus epidermidis, Escherichia coli, and Enterococcus faecalis. The effects of KBT E shows promise and it has the potential to fight against harmful bacteria.

Umer, Muhammad. JCCC Study Abroad Trip to Iceland.
My project will focus on the key aspects of my trip to Iceland in summer 2022. I studied geology and sustainability during my time in Iceland and how the Icelandic nation is fighting with the climate change. I gained a lot of insight about multiple projects that the Iceland is working on to produce clean and efficient energy by using natural resources and keeping their environment clean.

Viehweg, Alexius. Finding Bacteria Possible of Being a New Antibiotic.
Antibiotic research has become more scarce than it should be, especially in the hopes of fighting off and killing drug-resistant pathogens. Discovering new antibiotics is necessary in improving modern medicine and eliminating the threat to global health. Johnson County Community College (JCCC) has partnered with Tiny Earth Network (TEN) to crowd-source antibiotics from the soil of students' own backyards and conduct experiments in an effort to find a potential new antibiotic. In this lab, I participated in the multiple step testing processes in which I have discovered two different bacteria from a soil sample. These bacteria have thus far shown promising characteristics of a potential new antibiotic discovery.

Wainaina, Caroline. Antibiotic Resistance Using a Soil Candidate.
For this project students were supposed to conduct an independent project throughout the semester by using a microbial candidate found in a soil sample which may have been collected by any student or themselves from any location. Students were able to conduct multiple tests challenging their candidates against ESKAPE pathogens as well as other bacterial cultures in order to know which type of variants as well as properties/morphologies their candidates consisted of. Students were also able to perform certain stains which would assist the students with being able to observe the colonial structure which would be then seen through the use of a microscope. The purpose of this project is for students to learn how to perform proper lab techniques while also being able to work independently along with other students and with the assistance of their lab professors.

Watts, Hannah. Stranger Things Chapter 6: The Candidate.
Bacteria emergence has been an increasing problem within the medical community. With the growth and spread of new and previous infectious diseases from bacteria, it has been difficult to create sustainable antibiotics for these illnesses. With many new mutations forming with resistance to previous antibiotics, scientists are left to discover new ways to grow and create antibiotics made to fight off newer strains of these diseases. In our lab we used serial dilution to isolate a single bacterium from a soil sample and tested it for antibiotic properties. We isolated 9-13 individual candidates on a master plate and examined their reaction to the ESKAPE pathogens safe relatives. We also smeared and performed a series of stains to identify the properties our candidates had. We then performed a PCR test and a Gel Electrophoresis test for the DNA of our candidate. My candidate, Johnny, is gram-negative, non-spore forming, and not acid-fast.

Wen, David. Dynamic Models for a MSR SMR.
A Molten Salt Reactor (MSR) is a new design of nuclear reactor in which a fuel salt, typically containing thorium is used to power the reactor. This design presents multiple benefits over traditional Light Water Reactor (LWR) designs in terms of safety and fuel efficiency. The downside is the increased corrosion inside of a reactor. A Small Modular Reactor (SMR) is another type of reactor design in which the size of any reactor is scaled down in order to mitigate safety hazards. By combining the two, a reactor that is 30 times more fuel efficient and much safer than traditional ones can be built. Such a reactor can be modeled using Dynamic Systems.

Whitson, Jakob. Front Lawn Soil Sample Leads to Possible Antibiotic.
Microscopic organisms result in serious sickness and death for millions of people every day. To combat the serious consequences of one type of microscopic organism, bacteria; scientists have developed antibiotics. The first known antibiotic, penicillin, was developed in a high concentration form from mold growing on a piece fruit. After this discovery, scientist turned to using an environment rich in microbes, soil. Some bacteria from the soil produce substances that inhibit the growth of other bacteria; these are the bacteria we are looking for. Although there have been many discoveries of new antibiotics from these microbes living in the soil; the past 40 years of research has lead to few new antibiotics. The lack of new antibiotics and resistance to the current known antibiotics has lead to an urgency to find more. To aid the discovery of more antibiotics, Tiny Earth Network has partnered with Johnson County Community College microbiology labs to discover more bacteria producing antibiotics. This partnership led to the discovery of "Krsna 11" from a soil sample collected in the front yard of a church in Kansas City, MO. "Krsna 11" can inhibit two types of bacteria similar to two types of ESKAPE pathogens, Escherichia coli and Staphylococcus epidermidis, meaning it can possibly lead to the production of a new antibiotic. Further testing is needed to establish its viability as an antibiotic.

Wiebke, Audrey. The Fight Against Antibiotic Resistance.
Antibiotic resistance is becoming more prevalent among bacterial pathogens in the world today, causing concerning outbreaks and cases in patients with no options for treatment. As antibiotics are misused and health care workers continue to prescribe antibiotics for unnecessary health issues, resistance to these drugs is increasing significantly. Six pathogens, named ESKAPE pathogens, represent the most common and virulent strains of drug resistant bacteria. They are of utmost priority as new antibiotics are being actively searched out to overcome antibiotic resistant bacteria. My project this semester has attempted to discover an organism that produces antibiotic properties, implementing aseptic techniques learned throughout my research. The research has thus far consisted of performing a serial dilution from a soil sample, challenging the chosen candidate against all six of the ESKAPE pathogens, and gene sequencing. The goal is that by the end of my research I will have found a potential candidate for an antibiotic that can serve to inhibit the growth of one of the ever spreading ESKAPE pathogens, to aid in the fight of deadly antibiotic resistance.

Wittman, Brooke. Investigating the Dynamical Systems Used in Offshore Wind Turbines.
In recent years, renewable energy has become one of the largest studied topics among engineers for its ability to bring our world into a new era of global recovery and self-sufficiency. In order to maximize production, we have turned to the untapped potential of offshore wind turbines that could span surfaces several times more than existing land wind turbines as well as produce up to ten times more energy due to constant winds and larger engine capabilities. In this research, dynamical systems used to model offshore wind turbine responses to common stresses such as wave and wind loads will be investigated thoroughly along with their common parameters that are frequently adjusted. Understanding these responses allows engineers to effectively minimize failure within the wind turbine and optimize performance no matter where it is in the world. Although using dynamical systems does not account for all possible outcomes of wind turbine responses, it does set a foundation for much more intricate programs such as FAST or ADAMS that can model extremely detailed responses used in the engineering world today.

Wood, Lydia. Candidate 4 LW.
Antibiotic resistance is a growing issue in modern medicine. Bacteria are constantly evolving to fight back in a competitive environment, and improper use/prescription of antibiotics can speed this process up. In this course, microbes have been grown and isolated from soil samples and screened against safe relatives of dangerous pathogens. A microbe in my soil sample was successful in inhibiting the growth of Acinetobacter baylyi. Further research will help determine the identity of this microbe and whether it will be useful in combating pathogens.

Wynn, TJ. Antibiotics: The Fight Against Resistance.
Since the discovery of penicillin, antibiotics have been used drastically and systemically for a variety of reasons. Though this discovery has saved numerous lives and added several years onto the population's lifespan, it hasn't come without its drawbacks. Through years of consumption, practices such as overprescribing antibiotics, feeding it to livestock as well as not finishing the complete round of antibiotics given has catalyzed antibiotic resistance. Given that this provides a worldwide issue, the search for new strains of antibiotics is crucial and necessary. Upon the investigation of my own plant soil, I have gone through a few potential candidates against the race of finding a new antibiotic. Correspondingly, I've found and chosen the strongest microorganism that has shown inhibition against the strain Bacillus subtilis.

Xie, Junxian. Mushrooms & Fungi of the Black Hills.
South Dakota is a large state with few people. Its summers are hot, with often-violent weather. Its winters are cold. Most of the state is dry grassland or agriculture, though the Black Hills region is densely forested. With such varied conditions, a wide variety of mushrooms can be expected. They grow abundantly in the ponderosa pine forests of the Black Hills, particularly in shady areas. Mushrooms are types of fungi that have a "plantlike," but they aren't plants because they don't make their own food (plants use photosynthesis to make food). The larger portion of many fungi is underground and can be acres in size. The underground part of the fungus uses enzymes to "digest" other substances that it can use as food. Mushrooms and other fungi often grow in association with plants - perhaps attaching to the side of a tree, or growing out of a dead log as it decays. They are important in helping to "recycle" nutrients and break down dead plant materials. Some fungi are very colorful -often with orange or red coloration. Others are less noticeable, blending into the litter on the forest floor. Depending on what time of year it is, you may see the "flowering" part of the mushroom, as the fungus enters its reproductive phase. Many mushrooms are poisonous, so they should not be touched, as even a small amount of spores can have an effect on humans. Mushrooms generally aren't eaten by other animals since they are mostly water and have little nutritional value as well as being toxic. Most of the mushrooms that humans eat are cultivated rather than wild.

Young, Brooke. Microorganism in Depth.
This project involves a bacteria found in my backyard in Grandview, Missouri. The purpose of my project is to find a microorganism that produces an antibiotic or resemblance of antibiotic properties. After going through a soil dilution to create several series of master plates, I was able to narrow down a few candidates which seemed to show good inhibition for further investigation. From my final master plate I picked a single candidate that I chose to do a gram stain on, as well as a streak plate, and tested against other pathogens. My candidate was negative shown through the gram stain, and from looking through the microscope at this microorganism it was coccus shaped. My streak plate was able to isolate several colonies for further investigation that we are now using to do a PCR screening of. My microorganism held up well against pathogens like E. coli, E. faecalis, and S. epidermis. In class we are still further investigating and testing our pathogens, but this is as far as we have gotten. However it seems as if my microorganism could be one step closer to fighting this ongoing battle of antibiotic resistance.

Zawacki, Evan. Population Models in Dynamical Systems.
This project's goal is to give a better understanding in how we use differential equations in population models; and how Dynamical systems helps in demonstrating how population models may fluctuate and how this. these population Models then give a better understanding in what physically is happening in nature.

Acknowledgments

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Jamie Cunningham, Associate Professor, Biology

Matthew Ducote, Adjunct Associate Professor, Biology

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Melanie Harvey, Professor, Chemistry

Kristy Howell, Adjunct Professor, Honors

Nancy Holcroft Benson, Professor, Biology

Susan Johnson, Professor, Engineering

Rachael Ott, Adjunct Assistant Professor, Biology

J. Douglas Patterson, Professor, Astronomy

Heather Seitz, Professor, Biology

Beverly Tanui, Adjunct Assistant Professor, Biology

THANK YOU

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Acknowledgments

JUDGES

Session 1

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Tamas Kapros
Jim Lane
Kathi Lefert
Heather McCain
Joris Meijs
Lisa Parra
Heather Seitz
Willy Simmons
Hondo Tamez
Douglas Texter
Larry Weaver
Aldyn Wildey

Session 2

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Anne Dotter
Terri Easley-Giraldo
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Gideon Ney
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Beverly Tanui
Kristin Thurlby
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Session 3

Dennis Arjo
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Mark Jakubauskas
Kay King
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Session 4

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Kathryn Nold
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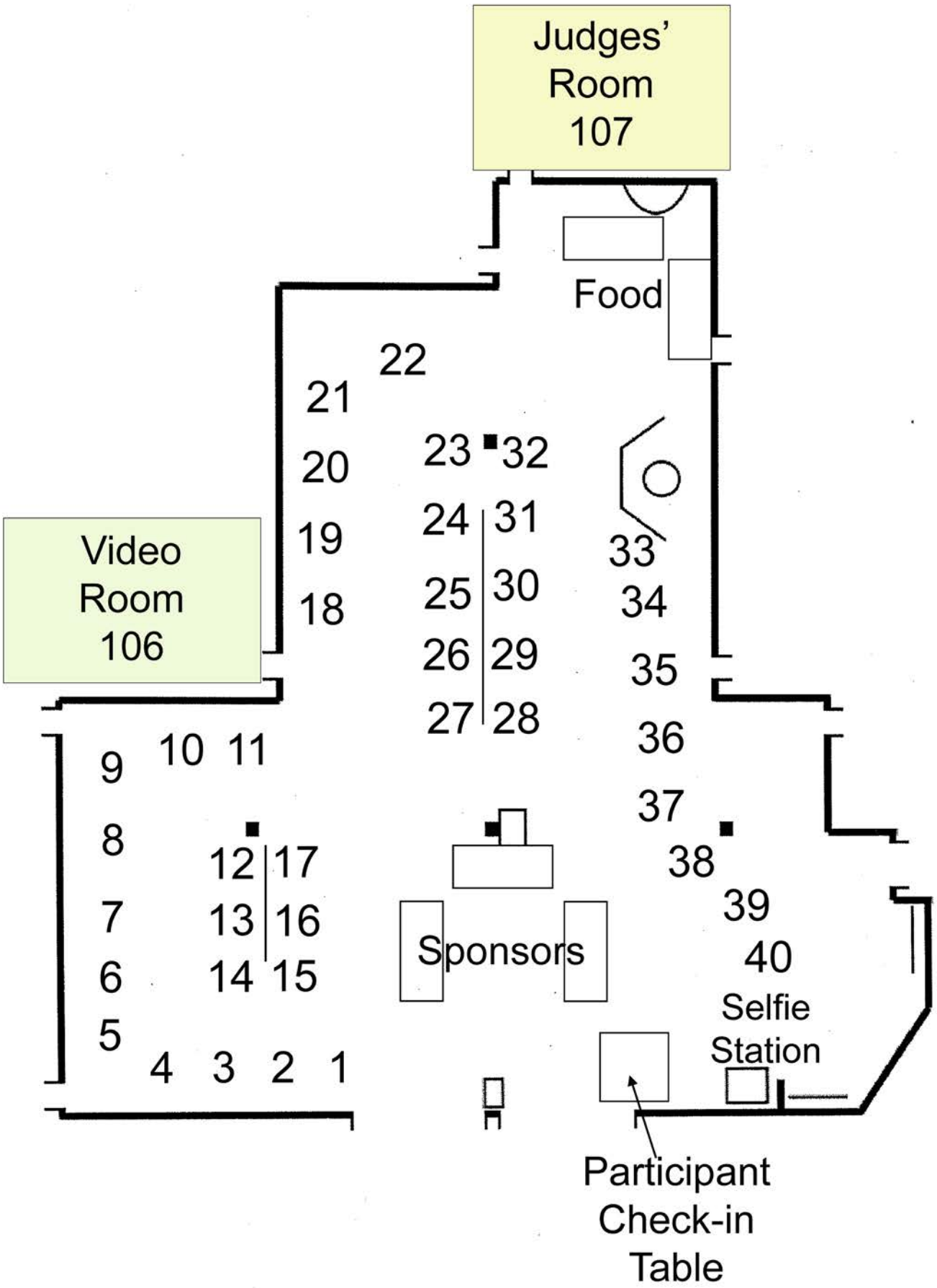
Judges' Room 107
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