

December 2020



We hope you have had a restful Thanksgiving and enjoying this warm first week of December!

Thank you for doing your part in keeping our research community safe and healthy.

Announcements

So far, there have been no known cases of COVID-19 on the ASDRP research campus, but given the unprecedented circumstances in the Bay Area and around the country, and in concordance with similar protocols enacted by our neighboring research laboratories in our complex and area, the Board has enacted a set of preemptive policies in order to keep our research facilities a safe place for scientific research.

Who is permitted to come on site in ASDRP research laboratory buildings?

Has not been outside of the Bay Area in the last 14 days.

Has not come into contact with anyone who has traveled from outside of the Bay Area in the last 14 days.

Does not have an immediate household member who has come into contact with anyone who has traveled from outside of the Bay Area in the last 14 days.

Has filled out the Daily HealthCheck prior to arrival on site.

Has booked out shifts on OpenSimSim for each time block during which you intend to be in an ASDRP research building.

ASDRP LAB POLICY



While we understand that the policies below may pose an inconvenience for many in the ASDRP research community, particularly around holiday plans, the Board is not willing to take any risks when it comes to protecting and safeguarding the safety and health of our faculty, staff, and researchers.

All researchers are expected to be in full compliance with policy updates.

Please be sure you carefully review the ASDRP Lab Policy update emailed to all researchers and ASDRP family members on December 1, 2020. If you need a copy of the message, please email us asdrp.admin@asdrp.org. The updated rules will remain in effect until further notice and went into effect on December 1, 2020. Researchers who are identified as being non-compliant with any of the policy may have laboratory privileges revoked for up to a month. **The policies unilaterally apply to all researchers, research faculty, instrumentation servicemen, facility maintenance staff, laboratory staff, and administrators who work or come on-site without exception.**





ASDRP RESEARCH

Semester begins on February 1, 2021

Spring 2021

Semester begins on February 1, 2021!

If you are a returning researcher, you do not need to submit a new application to the program. However, all returning researchers are responsible for confirming that they will continue and pay the \$900 ASDRP Spring 2021 program fees.

All returning researchers who wish to change research groups or change advisors, you must work directly with the advisor responsible for the project. Remember – contact the advisor directly for approval.

December Publication Spotlight

“Reactivity-guided de novo molecular design and high throughput virtual screening of a targeted library of peptidomimetic compounds reveals charge-based structure-activity relationship of potential covalent inhibitors of the main protease of SARS-CoV-2.”

Sun, Stephanie; Anand, Kavya; Ashok, Ishani; Ashok, Bhavesh; Bajaj, Ayush; Beldona, Varsha; Chattopadhyay, Kushal; Kwan, Audrey; Mageswaran, Karankumar; Surapaneni, Anvi; Surapaneni, Atri; Verma, Pranjal; Chen, Allen; Kolala, Ria; Liang, Andrew; Poosarla, Ayeeshi; Premnath, Krithikaa; Sri Indran, Karthikha; Wu, Jeslyn; Yuvaraj, Aishwarya; Raj, Harsha; Sathish, Tanish; Shah, Aashi; Su, Sarah; Tran, Kara; Njoo, E.S.



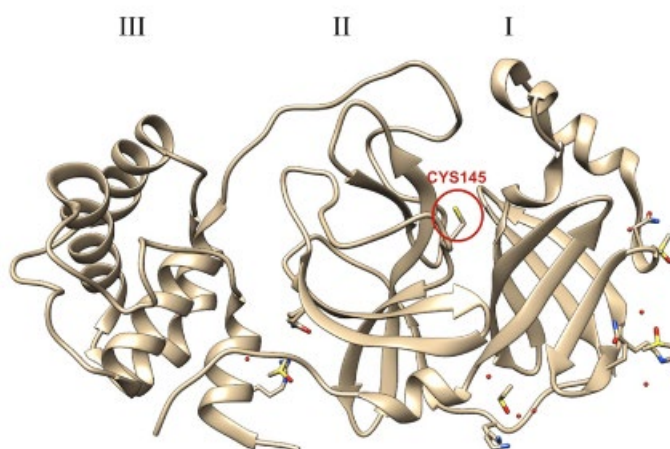
Journal of Student Research

Published on November 20, 2020 - Congratulation!!

Journal of Student Research **2020**, 9(2), 1082. <https://doi.org/10.47611/jsrhs.v9i2.1082>

Abstract: In December of 2019, a novel coronavirus was first identified in Wuhan, China, and has since spread around the world, leaving a largely unsolved biomedical problem in its wake. Upon entry into host cells, the main protease is essential for the replication of viral RNA, which is what allows the virus to replicate inside humans. Inhibition of the main protease has been investigated as a potential strategy for inhibition of the viral replication cycle. Here, we designed a combinatorial library of small molecules and performed high-throughput virtual screening to identify a series of hit compounds that may serve as potential inhibitors of the main protease.

In our design of covalent inhibitors of the coronavirus protease, we modeled a library of 361 peptidomimetic Michael acceptor small molecules, which are designed to engage the nucleophilic cysteine residue in the active site of the protease in an irreversible 1,4-conjugate addition. We then employed a variety of computational tools to determine the binding affinity of our designed compounds when bound to the protease active site, where we determined that cationic side chains are potentially beneficial for inhibition of SARS-CoV-2.



Student [Research](#) Updates

Semi-Permanence in Quantum Entanglement

Contributed by Ananya Balaji

10th Grade, West Windsor-Plainsboro High School North (Grade: 11)

McMahan Research Group

Hi, I'm Ananya and I'm in Dr. McMahan's Quantum Entanglement group. Last month, my group began by gathering information on our research question. To give a small explanation, Quantum Entanglement is when two or more particles can interact with each other such that one's state is connected to another's [1]. There are two types of quantum entanglement: spatial nonlocality [entanglement through space] and temporal nonlocality [entanglement through time]. Our research question is to determine whether

temporal entanglement and spatial entanglement can be combined to form an accurate description of space-time. This could allow us to add more depth to Einstein's Theory of Relativity, and combine any patterns in these two types of entanglement together. A paper I found recently had researchers predict if there was a sudden rebirth and death manifestation that repeated over time, similar to that of a sine curve [2]. In their experiment, they placed two weighted particles in time dependent fields and tracked them over time based on concurrence and a mathematical value called 'Quantum Discord'. This value calculates for the differences between quantum generalizations of two particles. What I found interesting was that there was a difference in asymptomatic behavior on what regions were assigned to have zero concurrence and zero Quantum Discord. In fact,

Quantum Discord estimates the distance between particles on a 2-dimensional (bi-partite) system, whereas the points of zero concurrence is dependent on a density matrix (3-dimensional). This discovery has led me to try to find a similar connection for spatial entanglement.

[1]

https://www.sciencedaily.com/terms/quantum_entanglement.htm

[2] <https://arxiv.org/pdf/2010.03968.pdf>

Study the effect of Eugenol and its analogs on the human opportunistic pathogen, *Alternaria alternata*.

Contributed by Shalini Singh

10th Grade, Presentation High School

Mikhail Research Group

Our group has been working on the effect of eugenol and 11 different analogs on *Alternaria alternata*.

Alternaria alternata is an opportunistic human pathogen that largely affects immunocompromised patients and causes infections such as asthma, and onychomycosis. Despite the continual progress in the medical industry, the invasive fungal infection still remains a major problem. The emergence of resistant strains induces therapeutic failure. Therefore, scientists are looking for natural alternatives to the synthetic drugs. Eugenol is an essential oil extracted from aromatic plant, clove and is known for its antimicrobial activities. Its analogs are derivatives synthesized from eugenol. Therefore, certain analogs have different properties and varying levels of antimicrobial activity based on the composition.

This past month, our group has been screening those analogs. We used the disc-diffusion method to determine the most effective analogs that causes an inhibitory effect on the fungus. For our first test, all analogs were able to stop the fungal growth at 1000 ppm concentration. Thus, we are testing now their effectiveness at lower concentrations to determine the most effective analogs to inhibit the fungal growth. It is important

to note that Eugenol is safe for humans while at a lower concentration.

We will continue working to know the best analogs that can suppress the fungal growth with the least concentration to be a suggestive alternative to the current antifungal drugs.

Our group continues to read literature pertaining to our research and the lab experience has helped us learn more about what scientists encounter on a daily basis.

Using Curcumin as a Potential Treatment for Parkinson's Disease

Contributed by Sunanditha Vempati

10th Grade, Irvington High School

Truong Research Group

Parkinson's Disease is a neurodegenerative disorder that affects movement and curcumin is a potential neuroprotective agent. We have been researching more about the alpha-synuclein role in Parkinson's Disease. The aggregation of alpha-synuclein inhibits the release of dopaminergic neurons and an insufficient amount of dopamine is linked to Parkinson's Disease. Curcumin is a key compound found in turmeric spice and is mainly used in Asian cuisine. In our research, we have found that curcumin exhibits antioxidant, anti-inflammatory, anti-apoptosis properties, and was shown to improve neurological function in animal models. But, curcumin has been proven to have low bioavailability, which is the extent a substance or drug becomes available. We want to assess the effectiveness of curcumin against alpha-synuclein aggregation given the findings in vitro studies (Singh et al, 2012).

Over the past couple of weeks, my group has been learning about curcumin analogs. Currently, we are collaborating with Mr.Njoo's group to synthesize and characterize various curcumin analogs, which are compounds that have similar structures to curcumin. In the coming weeks, we will be testing

the bioactive properties on alpha-synuclein expressed in E.coli competent cells. Specifically, we'll be assessing the effects on the mTOR pathway, which regulates cell growth, metabolism, and proliferation.

In the next few weeks, we aim to isolate the plasmid containing alpha-synuclein and transform it into competent cells. Moving forward, we hope to successfully test curcumin as a potential treatment for Parkinsons Disease!

Structure-activity Relationship of a Library of Eugenol Analogs as Potential GABA Receptor Ligands, Antifungals, and Antimicrobial Agents

Contributed by Aashi Shah

10th Grade, Amador Valley High School
Njoo Research Group

Eugenol is a natural product found in the oils of numerous plants and herbs, primarily cloves. It is known for its numerous biological properties. Our group focuses on the synthesis of eugenol analogs in order to improve their biological efficacy. We are currently making a library of analogs by acylating the hydroxyl on eugenol, dihydroeugenol, and isoeugenol and adding various R-groups. The completion of this library would allow us to begin biological testing.

There are numerous biological problems we are faced with. There is no cure for neurodegenerative disorders (like epilepsy and schizophrenia), antibacterial and antifungal resistance is increasing, and diseases like cancer can still be better treated. Through our screens, we hope to determine compounds that may work better against some of these targets, allowing us to better explore possible treatments for all these issues.

We plan to screen our library against a variety of these targets. Through a study on C. Elegans (microscopic roundworms) with epilepsy, we will determine the effectiveness of our analogs on neurodegenerative disorders related to seizures. In addition, our analogs will be screened against Alternaria Alternata, a type of fungus to determine the potent antifungal activity. By screening against

bacteria like E. Coli and S. Epidermidis, we can determine their antibacterial properties and determine if our analogs seem more effective than eugenol, a known antimicrobial.

The completion of this library would allow us to explore the numerous potent biological properties of acylated eugenol analogs.

Using Genetic Algorithms, Artificial Neural Networks and investor sentiment data to predict trends in the stock market.

Contributed by Gautam Nair

10th Grade, Branham High School
McMahan Research Group

Under the guidance of Dr. McMahan, our group set out to predict the movement of healthcare related stocks by using an Artificial Neural Networks and a genetic algorithm. Our group is focused on using historical stock data and investor sentiment as our two primary factors to achieve the goal of predicting the stock market. Sentiment is any form of media a person creates to express opinion or deliver news. After reading articles and research papers, we have decided that investor sentiment is the key driver of the stock market and we can correlate any movement to investor sentiment. Therefore, sentiment data will be the main input to our algorithm during the prediction process.

Historical data is a great way for our group to train and test our algorithm. During the past month, we have collected 20 years of historical data from previous stock crashes and election cycles. We have also created various programs to automate the collections and analysis of this sentiment.

The two algorithms that our group is using are an ANN (Artificial Neural Network) and a Genetic Algorithm. The algorithm that will predict the prices will be the ANN, and we use the Genetic Algorithm for correction and minor adjustments. We are using two algorithms because Artificial Neural Networks often perform overfitting; overfitting is when the algorithm is too focused on the data given and

often struggles with predicting events that are rare or have never happened before. The Genetic Algorithm solves the issue with overfitting and mimics the process of natural selection. In the next couple months, we plan on training our model with our historical data and starting the prediction cycle in early December.

Modeling Alzheimer's Disease in Genetically Modified *Caenorhabditis elegans* strains

Contributed by Sripradha Manikantan
9th Grade, James Logan High School
Truong Research Group

Caenorhabditis elegans (*C.elegans*) have been widely used to study Alzheimer Disease (AD) due to the presence of APP-like gene(*apl-1*), tau homolog (*ptl-1*), and presenilin-like genes (*sel-12* and *hop-1*) that have been found to be responsible for the onset of AD. The *apl-1* in *C.elegans* has been found to affect the insulin signaling pathway. Therefore, controlling the Insulin-like Growth Hormone (ICG-1) could be a potential way to treat AD.

Our current project focuses on the effect of A β aggregation in associative memory formation of *C. elegans*. We have begun synchronizing N2 WT *C. elegans* to understand the techniques in handling *C. elegans*. This would ensure that our sample of worms would grow at relatively the same rate. After synchronization, we plan on assessing their baseline chemotaxis levels by conducting a chemotaxis assay with butanol. When *C. elegans* are deprived of food, the presence of butanol will result in a positive association between food and butanol. In N2 WT *C.elegans*, short term associative memory (STAM) typically lasts for 2 hours while long term associative memory (LTAM) can last up to 24 hours Using this assay, we will assess the effect of A β aggregation on the memory formation of short term and long term memory in transgenic AD *C. elegans*: CL2122 - aggregation of A β in the muscle cells; CL2120 - genetically analogous to CL2122 but does not express A β ; CL2355 -aggregation of A β in the neurons. We hypothesize that A β aggregation in the neurons will

significantly reduce the duration of associative memory and affect motility.

Space-time relation to spatial and temporal Nonlocality

Contributed by Samyutha Ayalasomayajula
9th Grade, Dublin High School
McMahan Research Group

After researching further into quantum entanglement, also known as the phenomenon that two or more systems exist in entangled states, my group has been intrigued by spatial nonlocality and temporal nonlocality. Spatial nonlocality is the entanglement of particles across space, while temporal nonlocality is entanglement through time. To find out if the dawn of space-time emerged from entanglement but more specifically spatial and temporal nonlocality, my group realized it was crucial to first gain background knowledge unto the quantum fields such as temporal and spatial nonlocality. Starting with spatial entanglement, one thing that we looked into was Einstein-Podolsky-Rosen steering.

The Einstein-Podolsky-Rosen steering describes a scenario where the correlation between the measurements of two entangled particles are correlated strongly enough. This leads to the measurement of one region changing the quantum state of the entangled particle in another region. For temporal nonlocality, we learned that it has no time-operator in the standard formulation of quantum theory. In addition, we looked more into disentanglement which is the act of releasing from a tangled condition. We read articles about disentanglement between two entangled detectors and that disentanglement is dependent on the distance which is the space-time coordinate but is independent of the choice of time.

For the future, we plan to narrow down our research as we expand our knowledge on this field and expand our theoretical understanding of this topic through simulations and quantitative

relationships to help us answer our research question.

The power of words

Contributed by Amy Liu

**10th Grade, Basis Independent Silicon Valley
Downing Research Group**

At the beginning, I was attracted to the Voynich research group by its academic complications. The group had already made astonishing discoveries that exceed high school levels. Voynich group found the potential source language of the Voynich manuscript to be Indo-European using data mining and frequency analyses. They found the meaning of a few words in the manuscript and successfully linked those meanings to the illustrations on the manuscript. For example, the decoded word NUTE is very similar to the Latin word nox, noctus and nuit in French which both have a meaning of night. I was very afraid that I couldn't catch up with the steps of the group. When I was in the state of struggling, my group mate pulled me out. They understand that I'm new to the field so they patiently explained to me their finished works, their progress, and future plans.

At this difficult time, communications are hard as we are on different sides of the screen, but my teammates and professor Downing are willing to explain the project to me several times from different perspectives so that I can participate in the research. Now I understand what "convert" means in translating the manuscripts and how to use the code to locate the words in the manuscript. The next step of the group is to check the decoded words in context of a sentence. I'm looking forward to further participate in decoding the unsolved mystery of the Voynich manuscript.

Detecting Fake Reviews Using Machine Learning

Contributed by Aaryan Rustagi

**10th Grade, Irvington High School
Subramaniam Research Group**

In modern day, the world is turning to online versions of everything from shopping to doctors appointments. This includes the world of e-commerce, or online shopping websites like amazon. However, with online shopping comes the need for reviews to help determine the quality of a product. With machine written reviews, it can often be difficult to figure out which reviews are real and which ones are fake. That's why we chose to take up the project of detecting fake reviews using machine learning. Our first step was finding a labeled dataset to use for training data. We found a set with 400 real and 400 fake human written reviews. Our next step was creating a vector matrix for each review so that it could be fed into a model. We hope to finish that and soon start testing on the rest of our dataset. A special thanks to our advisor, Mr. Subramaniam for providing guidance throughout the project.

- Aaryan Rustagi and Vajraang Padiseti

Understanding the Effects of Clozapine in Transgenic Schizophrenia C. Elegans Models

Contributed by Sadhana Chari

**10th Grade, Irvington High School
Truong Research Group**

Schizophrenia is a neurological disorder known to cause social withdrawal and isolation, as well as a lack of motivation, among other things. In order to combat its harmful behavioral effects, several antipsychotic drugs have been developed. These drugs generally target either serotonin or dopamine receptors, as irregularities in serotonin and dopamine cause many of the main behavioral changes patients of schizophrenia undergo. This month, we began research on Clozapine, a drug targeting both dopamine and serotonin receptors that is often used to treat schizophrenic patients.

To better understand its effects, we will be testing the drug on C. elegans, a transparent roundworm species. Different strains of the worm exhibit various qualities of symptoms found in schizophrenic patients. Before working with these

transgenic strains, our group is practicing procedures to nurture and maintain wild-type *C. elegans*.

The main procedure we worked on over this month was synchronization, a process to make sure that all worms on the given plate are starting to grow at relatively the same point of time. After an unsuccessful attempt, we were able to properly execute synchronization and maintain the worms. As we continue with our experiments, we will be working with *C. elegans* that contain avolition phenotypes, or are prone to reduced movement. We will also be testing several movement assays (such as the thrashing assay) on the worms to see how the avolition phenotype is affected by Clozapine.

Microwave sensing using passive sensors

Contributed by Priyanka Ganguly
9th Grade, Milpitas High School
Dani Research Group

Area of research: Microwave sensing using passive sensors. Input signals are analyzed using DSP to generate desired output.

The eventual project goal is to use passive sensors to collect data pertaining to soil moisture, which will enable a determination of how much water the soil needs.

The rapid high-precision and nondestructive determination of shallow soil water content (SWC) is of vital importance to precision agriculture and water resource management. The current available technology is insufficient for precisely determining the shallow SWC. We need new technologies essential to develop and use a high-precision detection technology to determine SWC.

Applications of Microwave Remote Sensing:

Microwave remote sensing is used to collect data of the soil moisture. Based on the frequencies reflected off the soil, one can figure out how much water the soil has and how much water the soil needs.

If this method is used, one could control the amount of water in the soil and could help one understand how much more water is needed in the soil.

This method is helpful as it can prevent water stress and the soil moisture data can help one give controlled amounts of water to the crops. This kind of efficient and real time determination will result in optimal water utilization in millions of acres of remote farmland.

Sensor options considered:

Active sensors were evaluated. Active sensors need to be powered and have their own source of illumination. Examples are a camera with a flash, which emits light, illuminates the target and captures reflected energy back into the camera. Passive sensors were evaluated. Passive sensors use the sun as their power source, which enables them to sense the desired signals. Given the vast application space, using active sensors was not viable and we decided to use passive sensors.

Ongoing activities:

Currently working with the network analyzer to take data and use Python to collect, classify and display data. Continuing research on total power radiometers, signal processing techniques and working with the group to acquire instrumentation data in the lab.

Investigating the Relationship Between Water and Nitrogen Content in Native Grasses and Invasive Bromes and Wildfires in California

Contributed by Mohika Pandey
10th Grade, Irvington High School
Suresh Research Group

As California wildfires are projected to increase in volatility in the near future, studying the growing and drying process of surface forest fuels - such as grass and dead plants - will only become more important. The Suresh Wildfire and Climate Change Group aim to find which grass will be most beneficial to replant in wildfire restoration projects

and to investigate traits in grasses native versus invasive to California.

Over the last few weeks, both subgroups have been analyzing literature to understand the various factors contributing to wildfires and methods to conduct our experiment. We decided to split into two subgroups that will analyze two different properties of grasses. The water content subgroup's results will determine the plant's ability to act as a forest fuel and the nitrogen fixation subgroup's results will determine the plant's ability to grow.

At the beginning of November, both subgroups planted the four species of grass: *Poa Secunda*, *Bromus Secalinus*, Smooth Brome, and Bluebunch Wheatgrass. By the end of this month, the nitrogen subgroup's plants will be placed in soil infected with *Azospirillum*, a nitrogen-fixing bacteria. By determining whether native or invasive grass species are more successful at fixing nitrogen when placed in the same environment, we can determine which grass species will be more successful at regrowing after a fire.

Tracking Berberine's efficacy as a Singlet Oxygen Sensitizer through endoperoxide formation on 1H NMR

Contributed by Sarah Su

10th Grade, Los Altos High School

Njoo Research Group

Singlet oxygen is a reactive oxygen species which gets its highly reactive nature from its pairing of electrons in its pi antibonding 2p orbital (1). This reactivity has been utilized in many medicinal settings, as this reactivity causes cytotoxic effects which can be useful in settings such as the photodynamic treatment of cancer (2,3).

Berberine, which is an isoquinoline alkaloid natural product, is hypothesized to derive its medicinal properties from being a singlet oxygen photosensitizer (4,5,6,7). Singlet Oxygen Photosensitizers work upon photoirradiation by transferring energy to triplet oxygen, which allows

electrons in the pi antibonding 2p orbital to pair, turning triplet oxygen into singlet oxygen (8).

In our experiment, we aimed to test whether or not Berberine was a singlet oxygen photosensitizer by quantifying the singlet oxygen production of Berberine through 1H NMR. We did so through tracking the endoperoxide formation of alpha terpinene with various photosensitizers, such as Berberine, Rose Bengal, and Methylene Blue. Alpha terpinene reacts with singlet oxygen in a Diels-Alder like fashion to form an endoperoxide, which we could track with proton NMR and use to quantify singlet oxygen production (9). We set up 4 NMR tubes - one of which was a control NMR tube with simply Alpha Terpinene, d-6 Acetone, Dimethyl Terephthalate, and triplet oxygen (10). The other three NMR tubes had the following and also the photosensitizer that was being tested. These NMR tubes were irradiated for 30 minute intervals, and spectra was collected in between these intervals of irradiation.

We found that Berberine was a singlet oxygen sensitizer, although its efficacy was far lower than Methylene Blue and Rose Bengal. However, this supports the theory that Berberine is a photosensitizer, and thus, can direct the future synthesis of Berberine analogs.

Hypoglycemic activity of Fenugreek (*Trigonella foenum graecum*) in the *C. elegans* model

Contributed by Chloe Chan

10th Grade, Lowell High School

Renganathan Research Group

Diabetes Mellitus is a disease that is the 7th leading cause of death in the United States. Insulin is a key hormone in the body that stimulates the conversion of glucose into usable energy. In type 2 diabetes, insulin production is inhibited, causing excess unprocessed glucose within the bloodstream, hyperglycemia.

Fenugreek is a medicinal plant shown to have antidiabetic properties which stem from the

bioactive compounds within the plant. In this study, we have started off by researching compounds like diosgenin, trigonelline, galactomannans, and 4-hydroxyisoleucine and their functions. We aim to identify the phytoconstituents responsible for hypoglycemic activity by research of hypoglycemic activity of fenugreek extract and to examine the effect of fenugreek in the *C. elegans* model.

To achieve our goal, we have started extraction using an apparatus known as Soxhlet. We are running a solvent screen and plan to use solvents such as n-hexane, methanol, and ethanol in order to obtain fenugreek extracts with high concentrations of these phytoconstituents. Further research has allowed us to analyze these samples by FTIR and NMR. We hope to continue this

process using methods aforementioned, ultrasonic assisted extraction, LCMS, HPLC, and TLC.

We have also researched and started to conduct multiple assays, which are tests that evaluate the overall hypoglycemic effect of our compounds. In vitro assays include alpha-amylase and a- glucosidase assay. In vivo assays include Bradford, lifespan assay, and Nile Red assay.

Lastly, we have begun propagation of *C. elegans*, microscopic worms, to test our compounds on them in December!

Student Colloquia

Every week, some of our senior researchers in each department at ASDRP give public seminars presenting the current state of the field and disseminating how their research at ASDRP fits into the broader context of the frontiers of modern science and engineering. Colloquia are public events, and anyone can join. Click [here](#) for the latest Colloquia Information and Presenters.

December 2020

[Department of Biological, Human & Life Sciences](#)

Held every Tuesday from 8:00-9:00pm

Anika Edara | 10th Grade | **Monte Vista High School** | Tallapaka Research Group
Examining Yogurt Bacterial Strains for Horizontal Gene Transfer

Anika Iyengar | 12th Grade | **Evergreen Valley High School** | Kaur Research Group
Determining the Presence of Coccidioidomycosis in Contra Costa Soil for Valley Fever

Aditi Venkatraman | 11th Grade | **Prospect High School** | Mikhail Research Group
Study the effect of eugenol and its analogs on the opportunistic human pathogen, *Alternaria alternata*

Khushi Yadav | 12th Grade | **Basis Independent High School** | Truong Research Group
Amyloid beta aggregation effects on STAM and LTAM in muscle cells and neurons

[Department of Chemistry, Biochemistry & Physics](#)

Held every Friday from 8:00-9:00pm

Mathavan Murali | 12th Grade | **American High School** | Clark Research Group
Synthesis and Structure-Activity Relationship of 2-substituted Benzimidazole KRAS Inhibitors

Prahan Proreddy | 12th Grade | **Mission San Jose High School** | Brah Research Group
Molecular design, synthesis, and in-silico screening of novel isatin dye based G-Quadruplex stabilizers as a cancer therapeutic approach

Rohit Suresh | 10th Grade | **Lynbrook High School** | Renganathan Research Group
Synthesis, Characterization, and Evaluation of alpha-hederin loaded PLGA nanoparticles as an Anticancer Therapy

Andrew Wang | 12th Grade | **Dublin High School** | Njoo Research Group
Derivatives of Specific Pharmaceutical Molecules for Enhancement of Usage In the Medical Field

[Department of Computer Science & Engineering](#)

Held every Wednesday from 8:00-9:00pm

Aaryan Divate | 11th Grade | **Moreau Catholic High School** | Downing Research Group
Application of Data Mining to Search for Potentially Habitable Exoplanets

Jagannath Prabhakaran | 11th Grade | **American High School** | McMahan Research Group
Building a Heuristic Genetic Algorithm for Stock Market Prediction

Eric Wetzel | 12th Grade | **Mountain View High School** | Johnson Research Group
Using speech emotion recognition to analyze sentiment in speeches and debates from the 2020 US presidential race

Robert Downing, Department Chair, CSEN
The many ways research can blow up in our face