

CSUN BUILD PODER

PIPELINE PARTNER MENTORS

Armando Rivera-Figueroa, East LA College, STEM/MESA, Chemistry

Janice Velazquez, East LA College, Family and Consumer Science

The purpose of the research will be to investigate correlations, if any, with atmospheric pollutants, health disparities and social justice. The research project will be carried by according to the following steps:

1. Identify appropriate atmospheric pollution related data utilizing the AQMD database. Specifically, we will be looking at atmospheric pollutants in areas adjacent to the college's community of East Los Angeles: particulate matter (PM_{2.5}), nitrogen oxides (NO_x) and ozone (O₃). Close continuous monitoring stations will be identified using the AQMD map. Attention will be placed in stations located in the cities of Los Angeles, Pasadena, Pico Rivera and Azusa.
2. Analyze data appropriately to relate it to meteorological parameters (precipitation, temperature, relative humidity and wind direction and velocity), in order to link measurements of the above-mentioned atmospheric pollutants to precursors and deposition zones, if any. Mathematical modeling and excel will be used in this section. Analyzing for trends, correlations among pollutants and meteorological variables the following site will be used: <http://www.aqmd.gov/home/library/air-quality-data-studies/meteorological-data>.
3. Once precursors and deposition zones are identified and understood, these will be studied in relationship with health disparities studies. Specifically, correlations (if any) between atmospheric pollutants and data on pulmonary (e.g. asthma) and heart conditions will be studied. The health disparities issues found (if any) between the ratio of health issues and ethnicities living in the area and adjacent areas of East Los Angeles will be evaluated in order to correlate the issues with social justice issues. To identify health disparities issue we will try to use a combination of census data and data provided by the National Health and Nutrition Examination Survey (NHANES). NHANES is a program of studies designed to assess the health and nutritional status of adults and children in the United States. Specifically, this investigation will collect data from Hospitals, Schools, community centers, grocery stores, restaurants, farmers' markets, and food banks to become aware of factors that could lead to the identification of health disparities. SPSS will group factors into variables allowing us to identify significant correlations. The data will be analyzed using factor analysis. The correlations among the factors will be identified by a correlation analysis. All statistical data analyses will use Statistical Package for the Social Sciences (SPSS), Version 14.0 for Microsoft Windows. The investigators hope that combining information from different scientific perspectives will, perhaps, allow the identification of the new correlations that have not been explored yet. A second phase of bullets
4. Will be to include the use of the program EpiInfo from the Center of Disease Control (CDC) for analyses and GIS data to see the distribution of health disparities in the communities. From the CDC website: Epi Info™ is flexible, scalable, and free while enabling data collection, advanced statistical analyses, and geographic information system (GIS) mapping capability.
5. After atmospheric studies are done and health disparities-social justice better understood in this community we will move to perform studies on the deposition of atmospheric pollutants. In a future study, dry or wet deposition of the pollutants will be study through water and soil quality analysis, using techniques such as ion and gas

chromatography (IC/GC), high performance liquid chromatography (HPLC) and mass spectrometry (MS), among others. (Over here is not only wet/dry deposition but also dispersion)

(e): Role of students: The big advantage of this research is that students at all levels can be engaged in research questions 1 – 4; for research question 5 we will focus on students above sophomore level (students with general chemistry completed). (f): Typical conferences students will attend are: 1. American Chemical Society (ACS) National meeting, 2. Health Disparities Conference, 3. Minority Health & Health Disparities Conference, 4. Air & Waste Management Association

Margarethe Cooper, LA Pierce College, Life Sciences

Purpose/Context: Identification and characterization of the sporulation mechanisms of *Sporosarcina ureae*, as a model for understanding sporulation in major spore-forming disease-causing bacteria (pathogens) such as *Clostridium difficile*, *Clostridium perfringens*, and *Bacillus anthracis*. *Sporosarcina ureae* is a non-disease-causing (non-pathogenic) aerobic, Gram-positive, spore-forming bacterium commonly isolated from the soil in association with human and dog activity. Spore-forming pathogenic bacteria such as *Clostridium difficile* are extremely environmentally hardy and very difficult to eliminate in hospitals and other health care settings, and thus result in numerous healthcare-associated infections. Additionally, major spore-forming pathogens like *Clostridium difficile*, *Clostridium perfringens*, and *Bacillus anthracis* cause potentially deadly disease in humans and animals; therefore they are difficult and dangerous to work with in the laboratory. However we still need to understand the sporulation mechanisms of these pathogens to create treatment and prevention methods, therefore using *Sporosarcina* as a laboratory model we can gain a better understanding about these organisms without needing to work directly with them in the laboratory.

Research Question: What genes does *Sporosarcina ureae* utilize to sporulate, and how do they relate to genes and known sporulation genes in major spore-forming pathogens?

a. Methods.

After identification of a potential sporulation gene in *Sporosarcina*, students will knockout the gene using a variety of molecular biology techniques, and confirm the inactivation of the gene by polymerase chain reaction (PCR). Students will then induce the mutant and wild-type strains to sporulate, and the number of spores will be quantified.

b. Analysis.

Students will perform bioinformatics analysis on the *Sporosarcina* genomes to determine potential sporulation genes, and determine how closely they are related to other spore-forming pathogens' genes. Students will learn to confirm site-specific mutagenesis using CR, and how to microscopically and quantitatively determine if there is a variation in sporulation ability between the mutant and wild-type strains of *Sporosarcina*, confirming the role of the targeted gene in sporulation.

Student roles:

Sophomores: Will begin performing basic laboratory and microbiological techniques and learn to make different types of microbiological media. Students will perform several molecular biology techniques including but not limited to PCR and site-specific mutagenesis, and several different microbiological assays to examine the targeted genes role in sporulation. Students will also perform bioinformatic analysis of gene sequences, and determine how closely related genes across different genera.

Conferences:

The conferences that Dr. Cooper attends including an in-state conference: American Society for Microbiology (ASM) Southern California Branch; Annual Meeting and national conferences: ASM General Meeting, Anaerobe Society of the Americas Annual Meeting.

Other Information:

My husband is an Assistant Professor of Biology at CSUN, who conducts research on the epidemiology, pathogenesis, and genomics of foodborne pathogens, and is also a faculty mentor for the NIH BUILD PODER program. Therefore, students will have the opportunity to conduct research in a CSUN laboratory prior to transferring, and will have the option to transfer directly into a BUILD PODER laboratory that they have become familiar with prior to attending CSUN.

Shannon DeVaney, LA Pierce College, Life Science

As an evolutionary biologist and ecologist, I offer students the opportunity to study how human health is affected by interactions with other species. The primary research area available to students is the use of ecological niche modeling to predict distributions of invasive species and/or disease vectors, allowing us to know what regions are most at risk while prevention is still an option. Niche modeling algorithms such as the Genetic Algorithm for Rule Set Production (GARP) and Maximum Entropy Modeling (MAXENT) will be used in conjunction with open source GIS software to build models of a species' abiotic niche based on known occurrence data. These models can then be projected onto a new range to determine areas suitable for the species of interest. There may be possibilities in the future to perform specimen-based research on the effects of pollutants on food dishes. Possible conferences include the Southwestern Association of Naturalists and the Society for Integrative and Comparative Biology.

Jennifer Moses, LA Pierce College, Psychology

PROJECT ONE

- a) The first project looks at volunteerism in online settings. There is a sharp increase in recent years in individuals and organizations moving helping activities to online (over the internet), as opposed to traditional face-to-face settings. This presents barriers to involvement for those who may be motivated to help others, those who have strong social motivations. Online settings may not satisfy the social motives of would-be volunteers.
- b) The specific questions that students might ask around this topic are broad; however, the guiding questions should involve findings ways of increasing online helping behaviors.
- c) In the past, research in this domain has employed large-scale online survey methodology using extant volunteer-related websites (e.g., Cyclopath), as well as targeted online experiments to test specific causal theories (e.g., Mturk).
- d) Analytic processes used in the past on similar projects have included multivariate ANOVA, multiple regression, and structural equation modeling. The specific analyses that will be used in the future will be dependent on the specifics of the data collected.

PROJECT TWO

- The second project looks at the problem of intimate partner violence. Those who are victims of violence often suffer psychological effects far beyond any physical damage. Exploring how and why victims develop ongoing problems is an important societal concern.
- b) The specific questions that students might ask around this topic are broad; however, the guiding questions should involve determining how violence leads to increased risk for psychological disorders.

- c) In the past, research in this domain has employed medium-scale face-to-face survey methodology, as well as targeted focus groups.
- d) Analytic processes used in the past on similar projects have included multivariate ANOVA, multiple regression, structural equation modeling, as well as the Actor-Partner Interaction Model approach to dyadic research.. The specific analyses that will be used in the future will be dependent on the specifics of the data collected.
- e) In that I am at a Community College, any mentees would be sophomores. They would be involved in designing specific studies to address the broad research goals outlined above. Furthermore, they would be involved in all aspects data collection and analysis.
- f) I have attended the yearly conferences for the Society for Social and Personal Psychology (SPSP), The American Psychological Association (APA), the Western Psychological Association (WPA), and the International Society for Political Psychology (ISPP).

Chander Arora, LA Valley College, Biology

Purpose: To explore gender-specific disparities in obesity of US born and foreign born youth.

Research Question: Identifying factors of obesity that are gender and region specific

Method: Questionnaires would be developed to collect data by personal interviews with equal number of young male and female subjects. Surveillance of behavioral risk factors in men and women of different races in college student population would be conducted using these questionnaires.

Analytic process: Obesity is operationalized as having a body mass index (BMI) equal to or greater than the 95th percentile among individuals younger than age 18 years or a BMI of 30 or greater for individuals age 18 years or older. Examination of racial/ethnic disparities in obesity among U.S. - and foreign-born Whites, Blacks and Hispanics would reveal complex variations by sex and educational level. Comprehension of these relationships is vital for designing future obesity research and intervention strategies. The data would be analyzed for correlation of different risk factors and calculating odds ratios.

Roles students can play: There is a wide spectrum of roles that students at each level can play. Review of literature and developing the questionnaires, could be developed by sophomores, interview questions and timing, data collection data entry and preservation could be done by juniors, data analysis, testing different models for males and females and presentation can be done by seniors. The roles could easily be exchanged between students based on their interest and capabilities.

Conferences: CSUPERB, Society of Reproductive Investigators (SRI), American Heart Association.

Other Information: Obesity is frequently cited as one of America's more pressing public health problems. It poses the underlying threat to multiple and complex diseases. Although its incidence appears to be steady, a substantial proportion of adult Americans remain obese. According to estimates from National Health and Nutrition Examination, several studies have linked obesity to an increased risk of chronic disease poor health -related quality of life, and functional disability. In fact, the public health impact of obesity has been shown to exceed that of two other behavioral problems, smoking and heavy alcohol use. Understanding obesity could

be instrumental in understanding the common mechanisms of diseases. The project can be ramified into multiple directions. Behavioral modifications of significant risk factors could be recommended in presentations and publications.

Funding: To be explored from American Heart Association, government and private agencies.

Erika Brockman, LA Valley College, Biology
Pamela Byrd-Williams, LA Valley College, Biology

We are interested in the antioxidant, anti-inflammatory and antimutagenic properties of *Salvia hispanica* seeds, commonly known as Chia seeds, on various types of mammalian cells. Recently, from various media sources, Chia seeds have been touted as the new “superfood”. It is high in omega-3 and omega-6 fatty acids, phenols and other antioxidants that are known to be anti-inflammatory but scientific research is still required to elucidate the mechanisms which confer health benefits at the cellular level.

We propose two potential projects that will allow us to determine if the direct treatment of mammalian cells with Chia seed extract effect the activity of either Natural Killer (NK) Cells or macrophages. These are both cells of the immune system that are known to respond to tumor formations or presence of cancer cells. Both cells also produce cytokines which are important in cell signaling responding to events that include tumor formation, the inflammation and the anti-inflammatory responses.

Potential projects include:

Project 1: Determine the effect of chia seed extract on the activity of activated mouse natural killer (NK) cells.

Does Chia seed extract effect their proliferation? Does it affect their production of cytokines Tumor Necrosis Factor alpha (TNF-a) or Interleukin-10 (IL-10)?

Project 2: Determine the effect of Chia seed extract on mouse macrophage production of IL-1 levels.

Skills students will acquire include:

- Maintaining a detailed and accurate laboratory notebook
- Serial dilutions in dose dependency experiments
- Seed extraction & purification methods
- Tissue culture methods and techniques
- Aseptic techniques
- Media preparation
- Gel electrophoresis & Western blot techniques
- Microscopy (phase contrast, DIC, immunofluorescence)

This research will apply to broad fields such as cancer, inflammatory diseases such as rheumatoid arthritis, Crohn’s disease & celiac disease with regards to nutrition as a supplement to other therapeutic or curative treatments. As part of the analytic process, students will be required to review scientific literature as it relates to the projects and meet with mentors to discuss data interpretation and progress of the project.

Students at any level can participate.

Conferences may include American Society of Nutrition, American Cancer Society and SACNAS. Professors Byrd-Williams and Brockmann are full time faculty within the Biology Department at Los Angeles Valley College. Both have worked in basic science research in cell, molecular and

microbiology laboratories. We will be teaming up in a facility at LA Valley College that has the equipment necessary for tissue culture and microscopy techniques required for both projects.

Ruby Christian-Brougham, LA Valley College, Psychology

My research focuses on the relationship between language acquisition and the socio-emotional development of children between the ages of birth – 3.5 years. The main goals of the project are to use Critical Race Theory to identify elements of society, race, and culture that influence the understanding and expression of emotion in children ages birth-3.5 years. In particular, the use of positive and negative emotions expressed in language, the value placed on the displayed emotion by the parent or another child and the amount of cooperative behavior displayed by the child will be studied. Students will be involved in all aspects of the research project and will be mentored as developing scholars. Students will work as part of a research team and will learn about research design, data collection, data analysis, and dissemination of research results through participation at a regional or national research conference along with manuscript preparation. Students will also have opportunities to work on innovative projects at the Family Resource Center and in some cases students will collect empirical data that subsequently informs a workshop. Involvement in research enhances the students' ability to understand the merits of theoretical models, empirical data collection, logic-based arguments and aids in their integration and synthesis of new learning with existing information learned in the classroom, resulting in a richer and deeper understanding of psychology. Involvement in research also broadens the students' professional options and helps them to prepare for graduate school and professional work. If I am an NIH BUILD PODER mentor, I plan to apply for an NIH pilot project grant.

Gary Huff, LA Valley College Family Resource Center

My research focuses on the connection between the quality and quantity of language exposure between fathers or other male primary caregivers, and very young children. Through the lens of Critical Race Theory, this project will identify elements of society, culture and race that influence early language exposure and acquisitions techniques that occur between father and child. Students participating in this project will have access to the LAVD Family Resource Center's infant and toddler lab. In this environment, caregivers and their children ages birth-2.5 years attend weekly play sessions. Working as part of a research team, students' responsibilities will include review of the literature, observation, conducting interviews, data collection/analysis, and presenting at conferences. Findings will assist in assessing various strategies to be used in the implementation of an emergent literacy program for fathers.

Marni Roosevelt, LA Valley College, Family Resource Center

My research focuses on the family needs of community college student-parents with young children (birth-8 years). From my work in the Los Angeles Valley College Family Resource Center with community college student-parents, I know that they have challenges beyond those of the typical college student that greatly influences their relationship with their children. Using Critical Race Theory as a lens, students will research student-parent's family challenges, attachment and attunement issues, and existing model programs with support strategies for this group. In addition, they will analyze and determine which strategies can be implemented by the LAVC Family Resource Center. Data will be collected and evaluated to determine the outcomes and success.

Dr. Jared Ashcroft, Chemistry, Pasadena City College
Bio and Nanotechnology in Pasadena City College's Early Career Undergraduate Research Experience (eCURE)

The Early Career Undergraduate Research Experience (eCURE) is a program at Pasadena City College (PCC) designed to give underrepresented students an undergraduate research experience in the natural or physical sciences. Through this program, we have developed collaborative and interdisciplinary research projects to provide underrepresented students with research experience at the onset of their scientific careers to better inform their decision to pursue a career in science. This unique experience inspires enthusiasm for scientific research by introducing students to cutting edge projects with a broader impact in terms of energy, the environment and emerging scientific technologies in drug diagnostics and therapeutics. Current eCURE research projects utilize synthetic and characterization bio/nanotechnology techniques.

It is proposed that we will study the synthesis and characterization of nanomaterials made from graphene oxide and inorganic nanoparticles, such as silver and gold nanoparticles. These materials have been shown to be used in biomedical, solar and water purification applications. We will develop novel graphene oxide conjugates to inorganic nanoparticles and study their cellular uptake, as well as their use in diagnostic imaging. We will also study graphene oxide's use as a water purification material and its use in solar energy. The nanoparticle conjugates will be developed through covalent linkage using the organic cross linkers EDC and NHS. Silver nanoparticle graphene oxide conjugates have been used in protein detection and as a DNA nanocomposite film. Non-conjugated silver and gold nanoparticles have also been used as biosensors. The new graphene oxide-gold nanoparticle conjugates will be studied for their biosensing capabilities. Initial work will be to develop a water solubilized conjugate that is stable at various temperatures and pH.

A second application, water purification using graphene oxide based materials will also be studied. Currently, carbon nanotubes have been shown to improve water purification techniques. Recent computer simulations have shown graphene oxide to have a high potential for water purification as well covalently linking graphene oxide to one another, thus making a graphene oxide framework. We will covalently link the graphene oxide particles to one another and study their water purification properties.

Lastly, the photocatalytic capabilities of the graphene oxide conjugates will be studied using the Solar Energy Activity Laboratory kit from the California Institute of technology. The novel nanomaterials will be studied in conjunction with metal oxides and compare the photocatalytic ability of the graphene oxide materials and metal oxides.

Pasadena City College students will assist in all synthesis, characterization and analysis aspects of these projects. They will be trained in the use of Scanning Electron, Atomic Force Microscopy and Ultraviolet Spectroscopy, as well as be trained in organic synthetic and purification techniques. They will begin their research during their General Chemistry course and be expected to continue with the research project for one year and submit applications to Poster on the Hill and the national Conference for Undergraduate Research (NCUR).

Grants Currently Applying for:

NSF for developing the Center for Nanoscale Catalysis with UC Riverside.

Veronica Jaramillo, Pasadena City College, Chemistry

Pasadena City College's Early Career Undergraduate Research Experience (eCURE)-Water Project

Water quality is a big concern for a healthy life. It is proposed that we study tap water quality related to where students reside. Although this information is posted by water companies, most students are not aware of these reports. Most of our students either live at home with their parents or are renters, so they generally are exposed directly to the water quality reports. It is proposed that students will be more engaged in the issue by hands on testing of their own tap water. After characterizing different tap water samples, we will map out the quality of the different tap waters versus location and have a greater discussion of the causes and implications. Water quality testing will include testing for nitrates, nitrites as well heavy metals. Normal water characteristics will also be explored such as pH, conductivity, hardness and dissolved oxygen. After water has been analyzed, water purifications techniques will be explored through the collaborative research project described eCure proposal. Students will explore different water purification techniques, but focus on nanoparticle purification. This experience will enlighten students to cost and effectiveness of water purification.

Pasadena City College students will be involved in water collection as well as water analysis. They will be trained in making standard solutions, performing spectroscopic studies and volumetric analysis. They will begin their research during their General Chemistry course and be expected to continue with the research project for at least one year and submit applications to the national Conference for Undergraduate Research (NCUR) and the national American Chemical Society (ACS) meetings.

Shaghayegh Esfandyari, Santa Monica College, Theatre Arts

Health in Art

Purpose/Context: to explore the connection between artists' lifestyles including the artistic process and its effects on mental and physical health to discover the potential therapeutic benefits of art.

Research question or hypotheses: (a) does art and specifically the process of "creating" having any behavioral effects?, (b) does the work market make artists more susceptible to health related problems? (c) does the pressure of being evaluating publicly and written about create stress and health problems? (d) does art (fine arts, music, dance, theatre) have the ability to heal and treat mental and physical conditions?

Method: Find and analyze preceding research; interview arts and health professionals.

Analytic process: to extract valuable ways of using art as a means of improving health.

Roles students can play and conferences attended: exposure to professional theatres and dance groups, exposure to professional literature in the arts and mental health, interviewing, the analytic process, writing materials for conferences and publication. Meeting and listening to artists in residence and researchers art institutions.