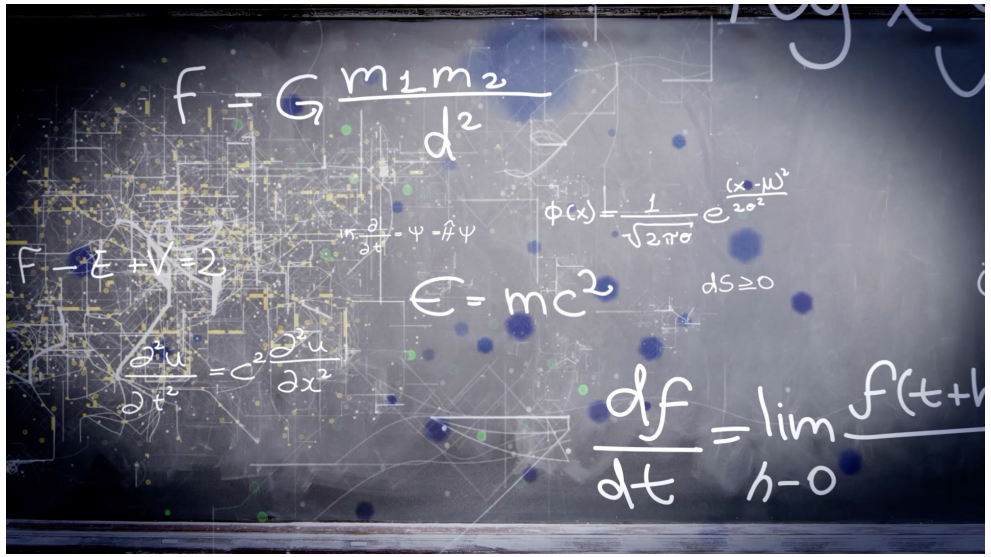


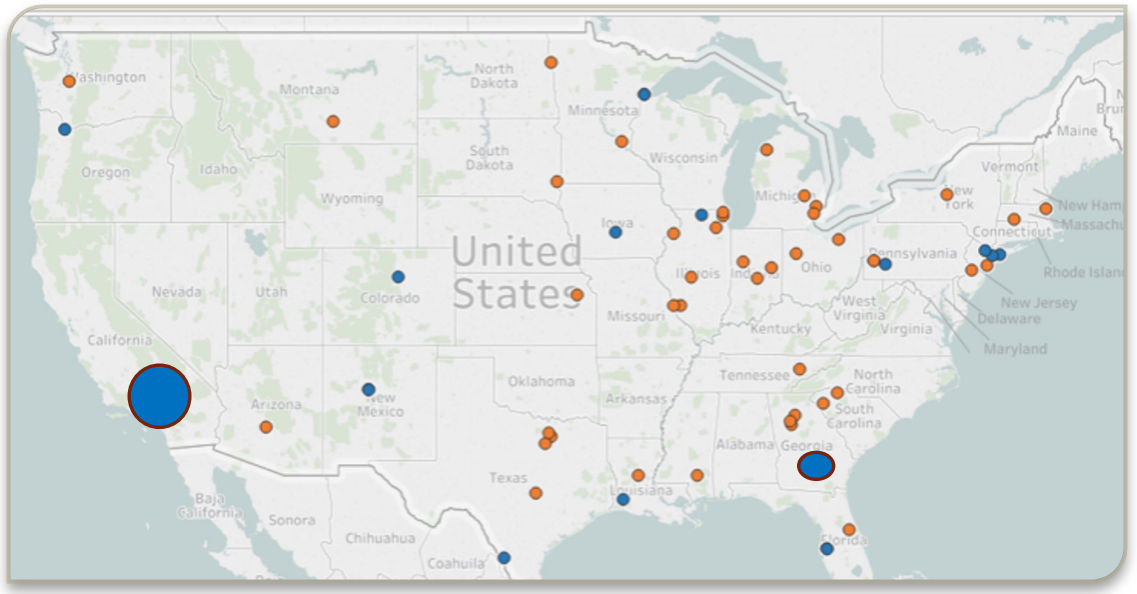
Crossroads-Classroom To Career in Biotechnology

Dr. Chander Arora

Award # 2054891

Los Angeles Mission College

- **Los Angeles Mission College Biotechnology Program**
- **100% Employment Rate**
  - Located in Sylmar, CA
  - One of nine colleges within the LA Community College District
  - 77.2% Hispanic Students



Award # 2054891

LOS ANGELES MISSION COLLEGE

Biotech Programs Review

BIOTECHNOLOGY STACKABLE CERTIFICATES*

BIOTECHNOLOGY LAB ASSISTANT CERTIFICATE

- **BIOTECHNOLOGY I**
- **BIOTECHNOLOGY II**
- **FUNDAMENTALS OF CHEMISTRY I**

BIOTECHNOLOGY RESEARCH LAB ASSISTANT CERTIFICATE

- **GENERAL MICROBIOLOGY**
- **STATISTICS**
- **BIOLOGICAL RESEARCH INTERNSHIP**

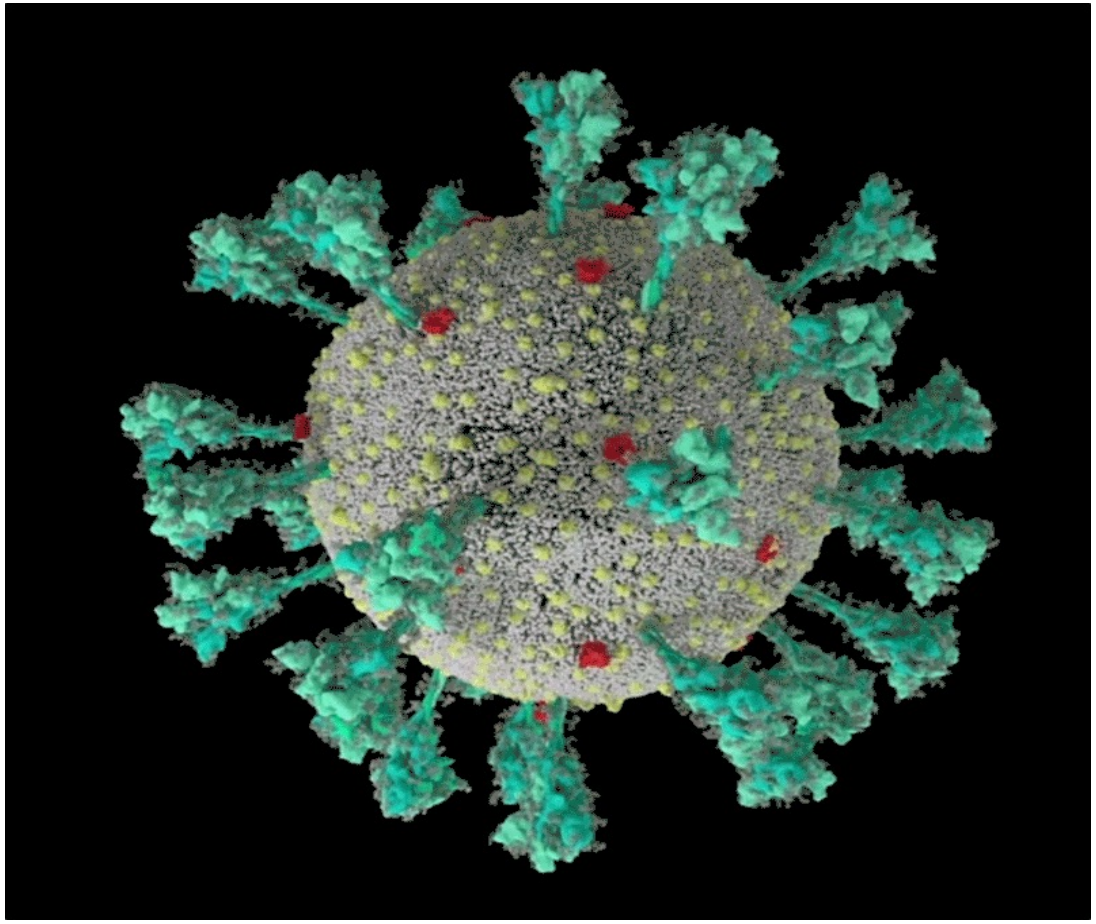
ASSOCIATE IN SCIENCE DEGREE - BIOTECHNOLOGY (60 UNITS)

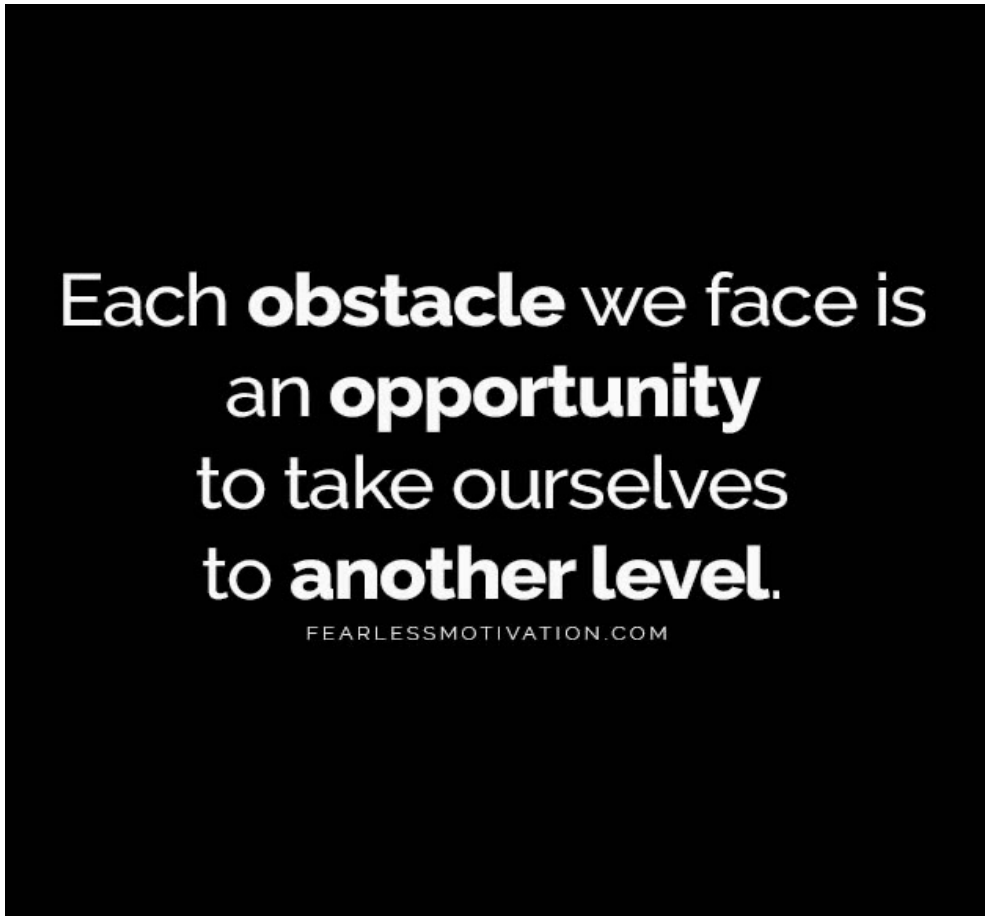
- **QUALITY CONTROL/ASSURANCE**

**Included in I-TRAIN*

Award # 2054891

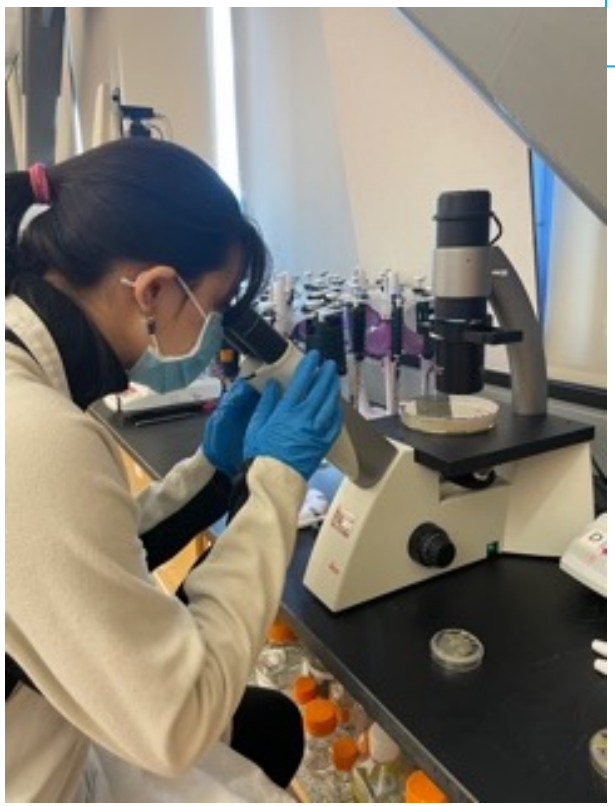
Paradigm Shift due to COVID-19





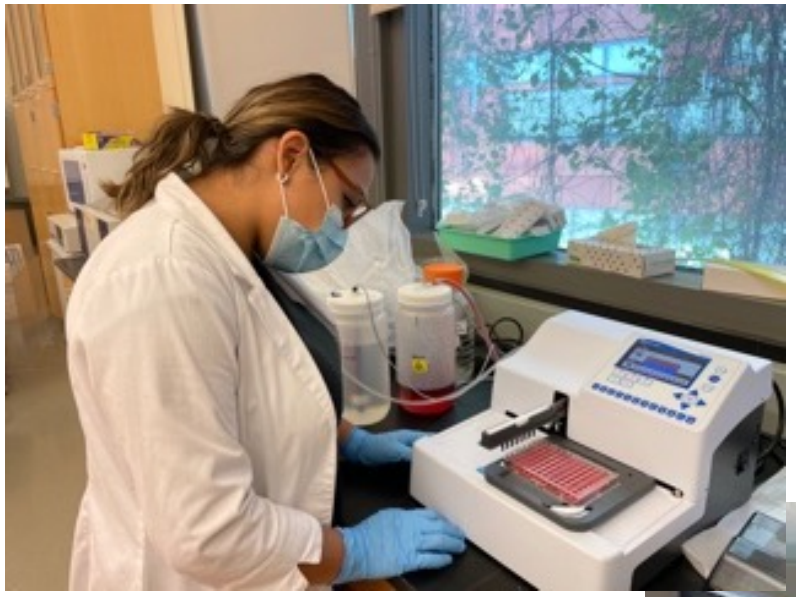
Award #
2054891

Hands-On Lab Training



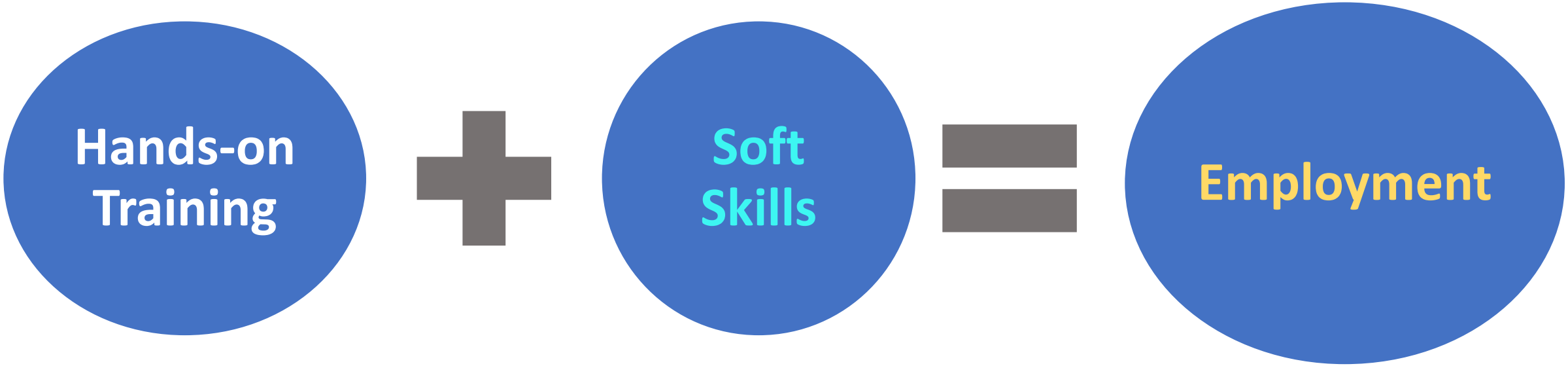
Award # 2054891

Hands-On Lab Training



Award # 2054891

Classroom to Career

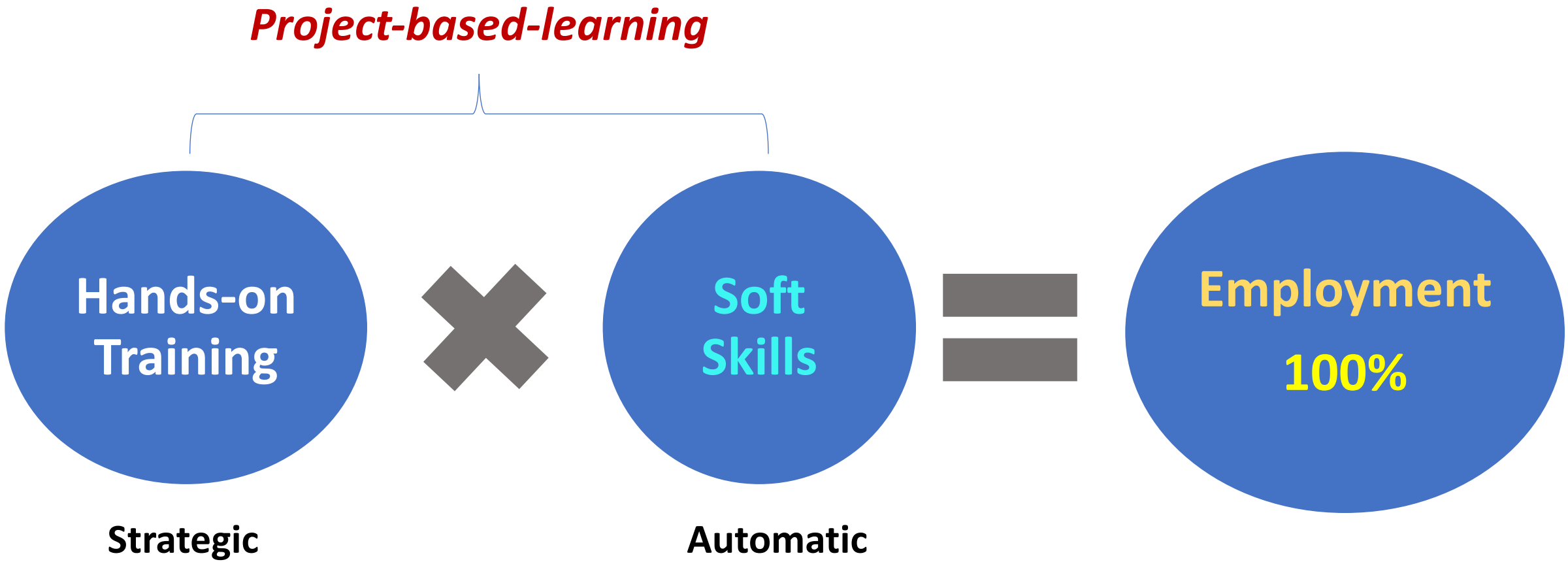


POST- PANDEMIC HIGHLIGHTS FALL 2021 & SPRING 2022

Award # 2054891

Crossroads–Classroom to Career

Contextualized Soft Skills



Project Phases – Biotech

Scientific Method

1. Driving Question/Objective/Hypothesis
2. Review Literature, Build Experimental Plan, Assign Team Roles to Answer the Driving Question.
3. Execute the Experimental Plan, Acquire Results, Review and Critique.
4. Tabulate the data, plot graphs *and* Answer the Driving Question

Project Phases - Biotech

Phase 1 -THINK

Driving Question/Objective/Hypothesis

Phase 2- PLAN

Acquire Knowledge & Skills, Build Experimental Plan, Assign Team Roles to Answer the Driving Question.

Phase 3- EXECUTE

Execute the Experimental Plan, Acquire Results, Review and Critique.

Phase 4- CONCLUDE

Tabulate the data, plot graphs, Draw Conclusion to **Answer the Driving Question**

Soap Federales: Bacteria Elimination

Sabrina Perez, Jorge Yuami, Carlos Maldonado, Nicole White, Edith Alvarez, Brett Dahlquist

Dept. of Life Sciences, Biotechnology Program, Los Angeles Mission College, CA

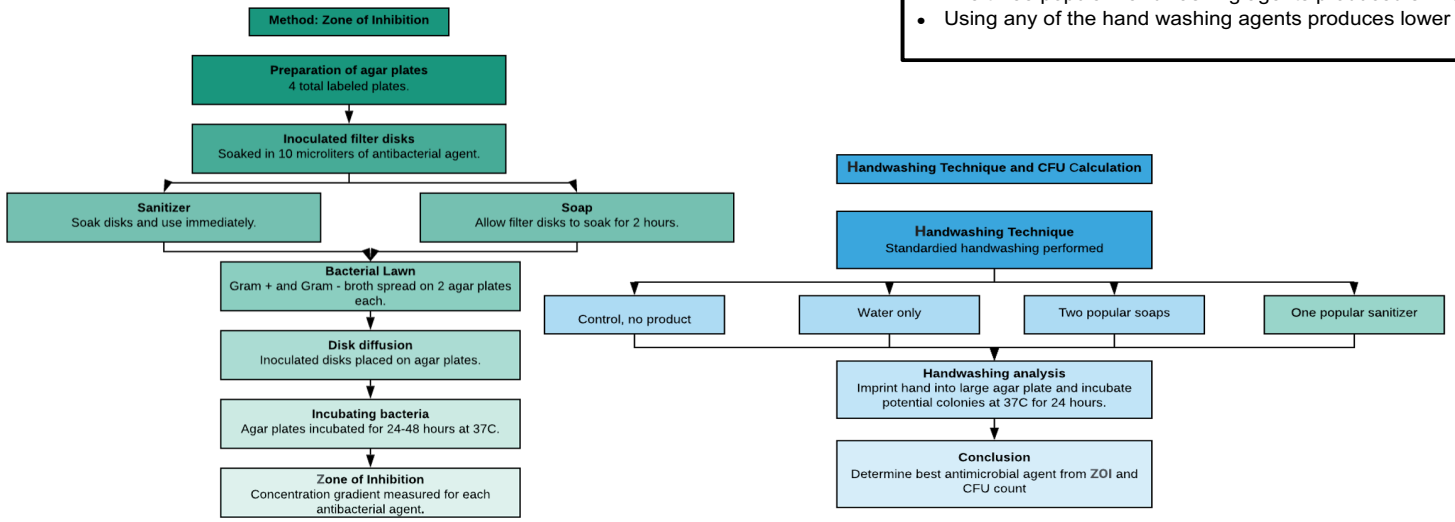
Abstract

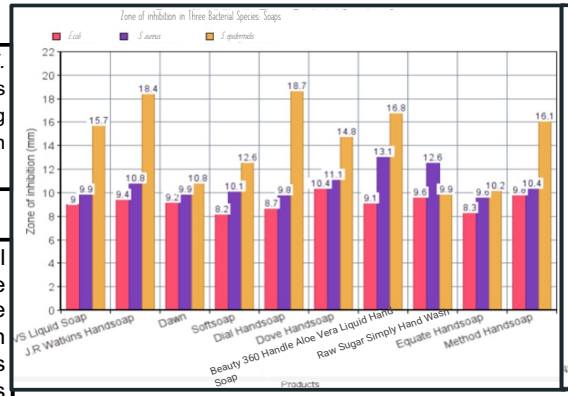
In this project antibacterial soaps, non-antibacterial soaps, and sanitizers were tested against *E. coli, S. aureus, and S. epidermidis*. This experiment used the zone of inhibition and CFU counts to determine which product was the most effective against stopping bacterial growth and killing bacteria. Additionally, these experiments were conducted to determine how each bacterial strain reacted to the different antimicrobial agent.

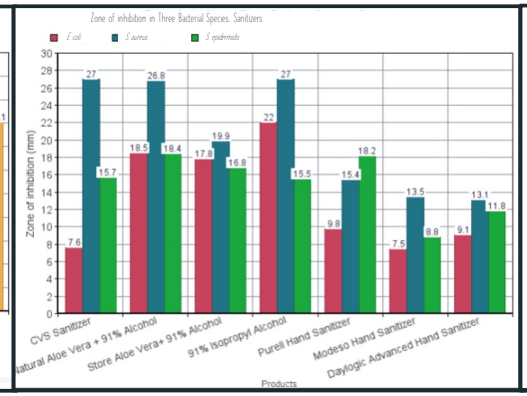
Introduction

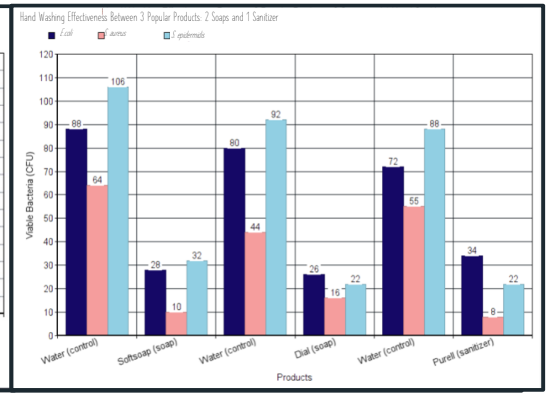
Liquid soaps are formulated to kill and prevent bacteria from growing. Antimicrobial soaps are popular because they claim to destroy 99.99 percent of bacteria and some viruses. In this project antimicrobial soap, non-antimicrobial soap, and sanitizers were tested against three different bacterial strains to show which soap is most effective in killing and stopping the growth of bacteria. Zone of inhibition showed the effectiveness of the antimicrobial agents against the different bacterial lawns. The CFU count was taken for the three most popular antimicrobial products and the percent of effectiveness was calculated. The presence of surfactants and antimicrobial ingredients was also recorded for each product due to their bacteria inhibiting properties.

Method









Results

- Each antimicrobial agent produced varying zones of inhibition against the three different bacteria strains. Products that had antimicrobial ingredients produced greater overall zones of inhibition.
- Dial and Equate Soap had Benzethonium Chloride, an antimicrobial ingredient. These soaps produced larger zones of inhibition across all three bacterial species. Overall, each product produced varying ZOI between each bacterial species.
- The three popular handwashing agents produced similar CFU counts and percent effectiveness, but more viable bacteria were found on the more resistant *E. coli.*
- Using any of the hand washing agents produces lower CFUs than washing your hands with just water.

Conclusion

After measuring each soap and sanitizer product's zone of inhibition it was found that other products had larger zones of inhibition than the three popular products that were tested known as Soft Soap, Dial Soap, and Purell Hand Sanitizer. In the hand washing experiment it is shown that washing your hands with soap and water rather than only water reduces bacteria on your hands for up to four to six times less. The CFU and ZOI proved that overall Gram - bacteria were more resistant to hand washing agents than Gram + bacteria. The presence of antimicrobial ingredients produced varying results across the 3 bacteria, but produced the lowest CFU on infectious *E. coli.* Washing your hands with soap and using a sanitizer when unable to use a sink and running water will reduce bacteria on your hands and assist in preventing you from getting sick from a potentially harmful bacteria

References

https://www.cdc.gov/handwashing/show-me-the-science-hand-sanitizer.html
https://academic.oup.com/clinchem/article-abstract/65/6/819/5608076?redirectedFrom=fulltext
https://microchemlab.com/test/zone-inhibition-test-antimicrobial-activity

Award # 2054891

Bioburden: Does Our Water Measure Up?

Joel Gonzales, Ateka Husain, Zander Zantua, Leslie Ramos

Dept. of Life Sciences, Los Angeles Mission College, CA

Award #: 2054891

ABSTRACT

Bioburden refers to the total number of contaminated microorganisms found in a substance before it gets sterilized. In our case, it is the quantity of bacteria in different water samples and we measured this through different means. We also ran the samples through numerous tests in order to accurately assess its contents, in the hopes that it did not deviate from federal standards

INTRODUCTION

Humans' relationship with water is changing. The accidental oil spills pollute our oceans. We often relate to its effect on ocean life but rarely pay attention to the microbial life. We aimed to see that effect after the recent oil spill polluting the Orange County Beaches. We also aimed to check the bioburden in fountain waters at our institution and the water reservoir at Sepulveda Basin after the lock down. Frequent testing to assess chemical composition and bioburden of upstream and downstream water sources is necessary. We propose that significant changes in publicly accessible water sources are detectable by conventional and inexpensive laboratory analysis.

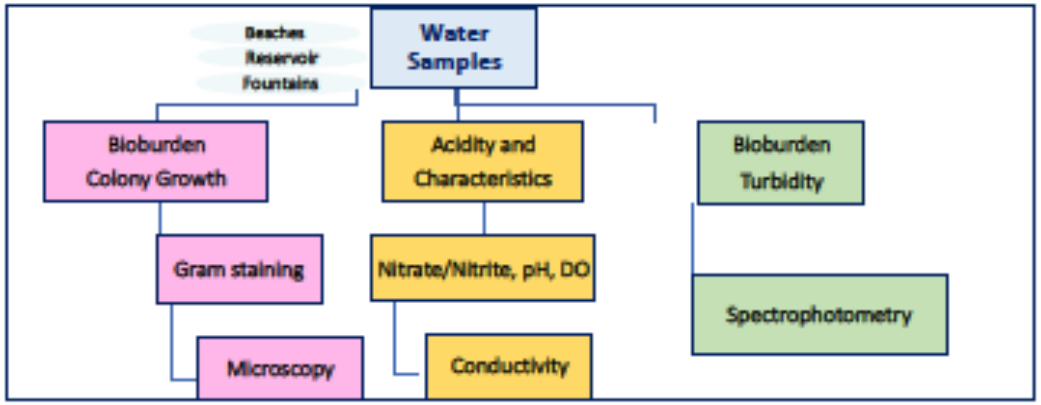
REFERENCES

Bacteria in Your Drinking Water| How to Fix It – wardwater
7 Reasons Why Acidic Water Is Bad For You (tyentusa.com)

ACKNOWLEDGEMENT

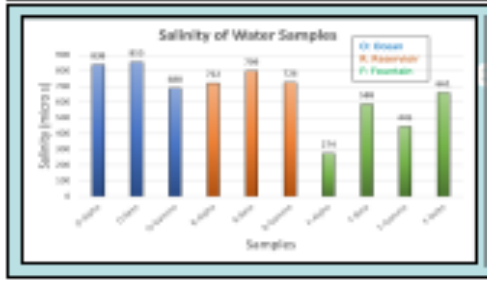
A special acknowledgement to Dr. Arora for helping and mentoring us through this project. We are so glad to have such a hands-on learning opportunity.

METHODS

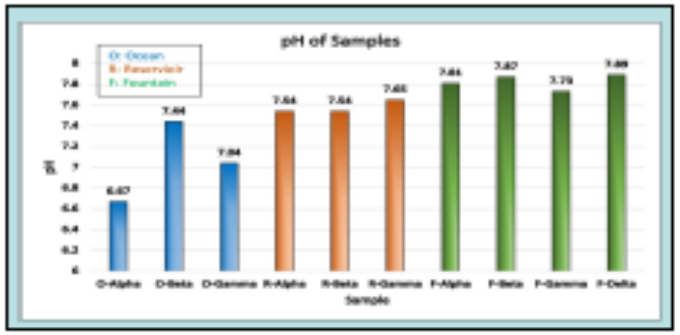


BIOBURDEN AND TEST RESULTS

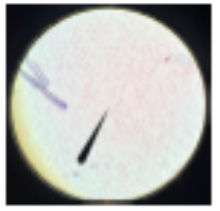
Water Sources	pH	Petri Dishes	Gram Staining	Conductivity	Nitrate	Nitrite	DO	Acidity	Alkalinity	Turbidity
Reservoir	Alpha 7.64 Beta 7.84 Gamma 7.64	Alpha - Growth Beta-Growth Gamma - no growth	Alpha Negative; Bacilli Beta Both; Bacilli Gamma Both; Bacilli	Alpha 720uS Beta 750uS Gamma 730uS	Alpha 25ppm Beta 25ppm Gamma 25ppm	Alpha 0.5ppm Beta 0.5ppm Gamma 0.5ppm	12ppm	Alpha 4ppm Beta 4ppm Gamma 4ppm	Alpha 90ppm Beta 170ppm Gamma 100ppm	Alpha 0.0045 Beta 1.145N Gamma 0.888A
Water Fountain	Alpha 7.64 Beta 7.87 Gamma 7.73 Delta 7.92	Alpha - Growth Beta-Growth Gamma - no growth Delta - Growth	Alpha Positive; cocci Beta both; Cocci Gamma Negative; Cocci Delta	Alpha 870uS Beta 885uS Gamma 640uS Delta 881uS	Alpha 12ppm Beta 10ppm Gamma 10ppm Delta 12ppm	Alpha 0.5ppm Beta >0.5ppm Gamma 0ppm Delta 0ppm	10ppm	Alpha <2ppm Beta <2ppm Gamma <2ppm Delta <2ppm	Alpha 240ppm Beta 340ppm Gamma 240ppm Delta 250ppm	Alpha 0.172N Beta 0.150N Gamma 0.001A Delta 0.004N
Ocean/ Orange County Beach	Alpha 8.67 Beta 7.44 Gamma 7.64	Alpha - Growth Beta-Growth Gamma - no growth	Alpha Negative; Cocci Beta Negative; Endospore Gamma Both; Cocci	Alpha 830uS Beta 865uS Gamma 880uS	Alpha 10ppm Beta 10ppm Gamma 10ppm	Alpha 0ppm Beta0ppm Gamma 0ppm	25ppm	Alpha 8ppm Beta 8ppm Gamma 4ppm	Alpha 280ppm Beta 20ppm Gamma 100ppm	Alpha 0.004N Beta 0.302N Gamma 0.002A



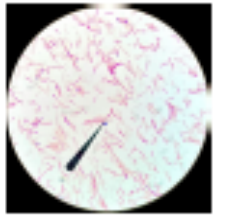
RESULTS



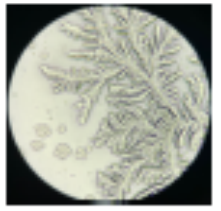
R-Alpha (Entrance Point)
Gram Negative, Bacilli



O-Beta (Spill Site)
Gram Negative, Endospores



R-Gamma (Exit Point)
Microflora



CONCLUSION

In an attempt to assess different water samples through various lab techniques, we tried to find out if there are any signs of bioburden in our samples, and quantify that result. We took about six different tests on each of our samples and found lots of results. The tests we did were gram staining, colony growth, checked the pH for our waters, turbidity, microscopy, and spectrophotometry. At the end of all our tests we were able to find bioburden and much more.

BPA: Clearly Bottled in Disguise or Deception

Odet Alfaro, Jonathan Quijano, Daniel Padilla

Dept. of Life Sciences, Los Angeles Mission College, CA

ABSTRACT

The total daily intake of BPA is set at 0.05 mg/kg of body weight. The tendency of BPA to migrate to food from contact materials has been found, hence it is a health concern. Seven different water samples were taken from different brand bottles (grade 1 plastic) before and after heating for 90 seconds (158°F), one heated for 5 minutes (194°F), and one from a bottle that had been in a car for 1 year. In addition, samples were also taken of water heated for 90 seconds and 5 minutes in a grade 6 plastic cup and a grade 7 plastic cup, as well as a sample from a 10 year old emergency bag. All samples were then tested for BPA content,

INTRODUCTION

Bisphenol A (BPA) is one of the most produced chemicals worldwide on the order of 6 billion pounds per year, mainly used in the production of clear plastic for water bottles, baby bottles and food containers. In an effort to be healthier individuals we often reach for water to keep us hydrated. Unfortunately, for the sake of convenience water bottles are often left in the car or garage where they get exposed to heat, which is thought to be a contributor in the release of BPA from plastics. BPA has been shown to have many side effects in our body, including the reproductive, immune, and neurological systems. In this project we tested BPA released into water by heat or over an extended period of time. Grade 1 through 7 have been assigned to the types of plastics in the increasing order of BPA content. Water bottles are mostly grade 1 but we tested water boiled in containers of grade 6 and 7 for comparisons. We also extended our investigation to chemical testing of these samples to include Dissolved Oxygen, Acidity, Alkalinity, Hardness, pH, and Nitrate/Nitrite.

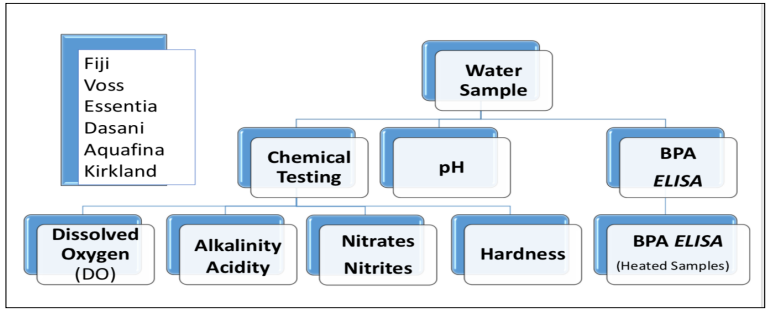
REFERENCES

1. Vom Saal FS, Hughes C. An extensive new literature concerning low-dose effects of bisphenol A shows the need for a new risk assessment. Environ Health Perspect. 2005 Aug;113(8):926-33.

ACKNOWLEDGEMENTS

We are sincerely grateful to Dr. Chander Arora for going above and beyond her class time to guide and mentor us. We are also thankful to Los Angeles Mission College, especially the Dept. of Life Sciences for such a learning opportunity.

METHODS



RESULTS

The BPA content in plastic water bottles was tested out of sealed water bottles and then heated to simulate the sun by microwaving (Fig.1). Heating increased the BPA amount in water of all brands tested. Aquafina had the highest amount of BPA to begin with but after heating for 90 seconds, Dasani brand resulted in the highest content of BPA. The measurement range was 0.3 to 100 ng/ml. In addition to BPA, the drinking water was tested for chemical parameters (Table 1).

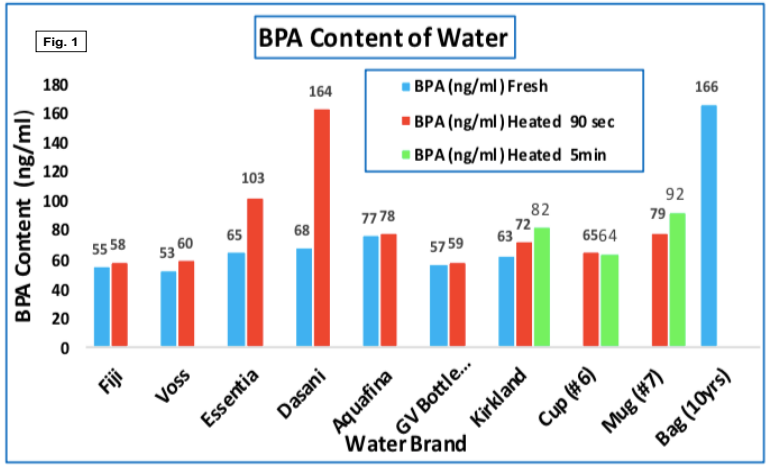
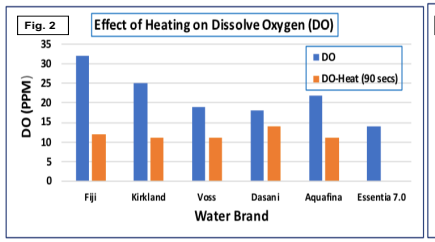
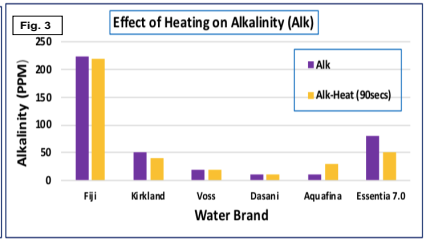


Table 1. Chemical Tests of Water

BRAND	pH	DO	Alkalinity	Acidity	Hardness	NO_3	NO_2
		PPM					
Fiji	7.71	32	224	48	180	None	None
Voss	6.59	19	20	12	30	None	None
Essentia	7.02	14	80	16	30	None	None
Dasani	5.97	18	10	10	40	None	None
Aquafina	6.79	22	10	8	None	None	None
Kirkland	7.55	25	50	12	None	None	None
Bag (10yrs)	7.00	13	20	4	None	None	0.15





RESULTS

Heating the water in disposable plastic lowered the Dissolved Oxygen (DO) (Fig. 2) and decreased alkalinity (Fig. 3) and hardness in most brands. Plastics left in heat over time would also gradually lead to changes in chemical properties. Nitrite was found only in water tested from Bag in Emergency kit of 10 years.

CONCLUSION

Heating plastic increased the leeching of BPA into the water. Plastic exposed to heat through time had higher risk of BPA leached into the contents, water or food. Therefore, leaving water bottles in cars or even heating food in plastic containers has been proven to have BPA in its contents. Total Daily Intake (TDI) of BPA is set at 0.05 mg/kg (ppm) of body weight. The levels in drinking water are much lower (ng/ml) but might accumulate in the body over time. This project reflects the need for awareness.

Probiotic Proficiency – Surviving cGMP

Diana Lopez and Leslie Ramos

Dept. of Life Sciences, Los Angeles Mission College, CA

Award #: 2054891

ABSTRACT

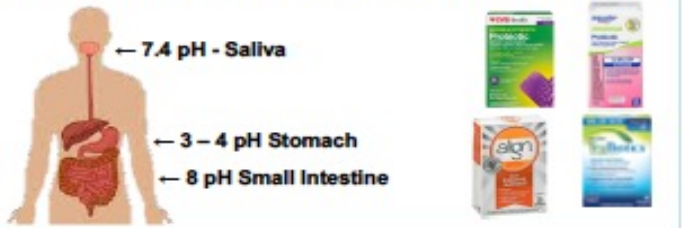
Probiotic supplements have been widely available with claims of better digestive health in the form of convenience. We explored the proposed health claims by testing if the bacteria in probiotics could survive manufacturing and the human digestive system. Four widely available commercial probiotic supplements were tested for growth in three different pH levels, 3.5, 7.4, and 8 pH. Bacteria concentration was measured using a spectrophotometer at 600 nm and identified by using gram staining and microscopy.

INTRODUCTION

Probiotics are defined as live microorganisms that can be beneficial to the body. It comes in various forms from yogurt, sauerkraut, and supplement capsules. The most common strain found in capsule for is Lactobacillus and Bifidobacterium. Both types have been hailed for having a wide range of benefits. In this project will test if there is any viable bacteria in various commercial probiotic brands

METHODS

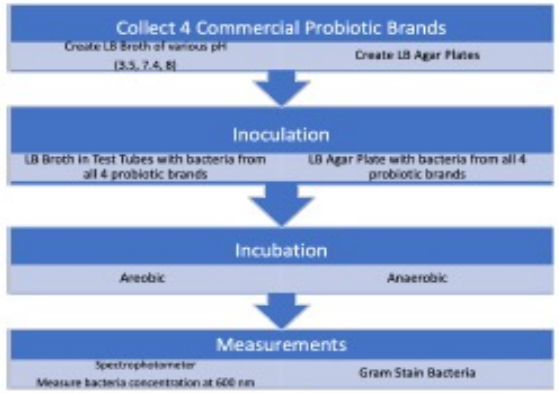
The Environment vs 4 Commercial Probiotic Brands

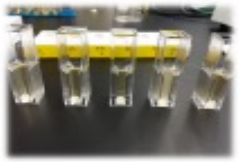


ACKNOWELDGEMENTS

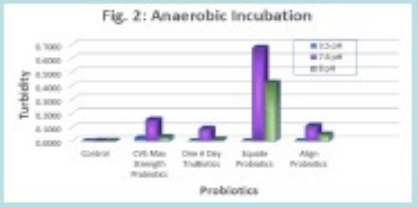
Special thank you to Professor Arora for providing us with exceptional guidance and knowledge to pursue greater achievements. And to the joined efforts of the class whose additions modeled brilliant teamwork.

METHODS





RESULTS



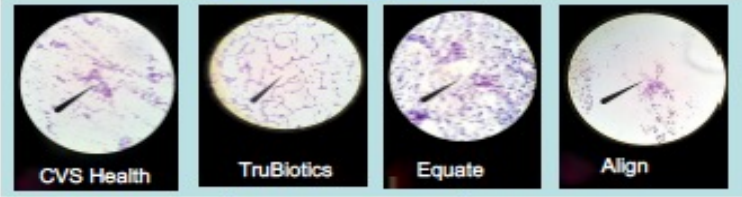
Aerobic Incubation Turbidity

	pH 3.5	pH 7.4	pH 8.0
Control	0.000A	0.000A	0.000A
CVS Max Strength Probiotics	0.004A	0.114A	0.024A
One A Day TruBiotics	0.006A	0.129A	0.010A
Equate Probiotics	0.000A	0.892A	0.806A
Align Probiotics	0.003A	0.092A	0.001A

Anaerobic Incubation Turbidity

	pH 3.5	pH 7.4	pH 8.0
Control	0.000A	0.000A	0.000A
CVS Max Strength Probiotics	0.021A	0.154A	0.027A
One A Day TruBiotics	0.000A	0.088A	0.010A
Equate Probiotics	0.000A	0.674A	0.422A
Align Probiotics	0.000A	0.107A	0.046A

Gram Stain Results



RESULTS

- All bacteria found in the four probiotic brands tested gram positive
- In LB Broth of 3.5 pH (stomach) there was no growth
- In LB Broth of 7.4 pH (saliva) there was growth visible and detectable
- In LB Broth of 8 pH (small intestine) there was growth
- Strains found in these products were facultative bacteria, and were able to grow with and without the presence of oxygen

CONCLUSION

The claims in which these companies say that there are live bacteria holds true. However, it's ability to withstand the entire human digestive system does not hold up. Food goes through our body quickly except for the time amount spent in the large intestine. As these supplements travel through the body, it can survive saliva and the small intestine. Equate probiotics showed the most promising results.

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Ouwehand A.C., Salminen S., Isolauri E. (2002) Probiotics: an overview of beneficial effects. In: Siezen R.J., Kok J., Abee T., Schasfsma G. (eds) Lactic Acid Bacteria: Genetics, Metabolism and Applications. Springer, Dordrecht. https://doi.org/10.1007/978-94-017-2029-8_18

Food's journey through the digestive system. (2011). Science Learning Hub; Science Learning Hub. https://www.sciencelearn.org.nz/resources/1849-food-s-journey-through-the-digestive-system

Got Fractions? Animal and Plant Based Milk

Amal Ballout Sizemore & Sakunta Keratisomphan

Dept. of Life Sciences, Los Angeles Mission College, CA

Award #: 2054891

ABSTRACT

The samples compared were two animal-based and two plant-based milks: Cow (M1), Goat (M2), Soy (M3), and Oat (M4). By reducing the pH of the medium and altering salt concentrations, we fractionated proteins from milk using centrifugation. The purpose of using fractionation was employed to enhance the targeted proteins and improve detection of low abundance proteins. Potential Hydrogen (pH) was checked for compatibility in stomach. Protein was quantitated using spectrophotometer. Milk in final form is ingested into its molecular form via absorption through the small intestine, with mucosal intestinal enzymes processing the final digestion. Lastly, absorption occurs as two sodium ions per sugar and 260 water molecules transport across a 100-nm pore size wall.

INTRODUCTION

Milk is recognized as a complete source of essential nutrients including carbohydrates, lipids, proteins (such as Casein and whey), vitamins, and minerals. Each milk has unique attributes for nutritional, biological, and food ingredient application. Some people prefer to avoid "dairy" because they experience milk allergies or lactose intolerance; or may switch from animal milk to plant-based milk. Animal-based milk contains various protein concentrations than plant-based milk. This lab verifies compatibility of the derived proteins pH to human's stomach pH environment.

REFERENCES

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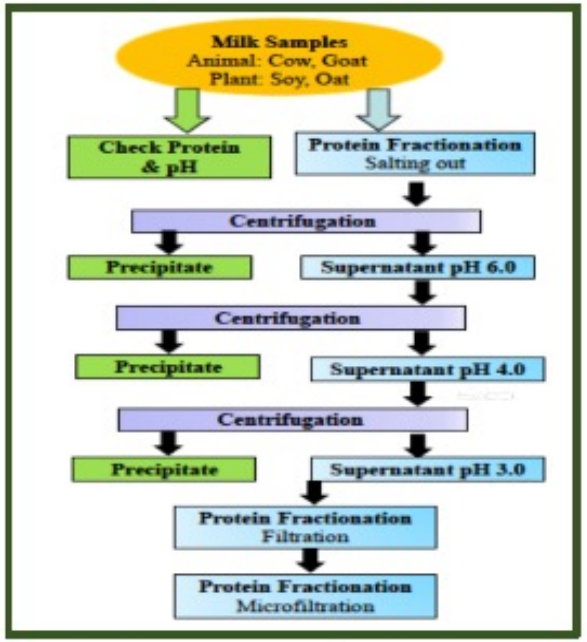
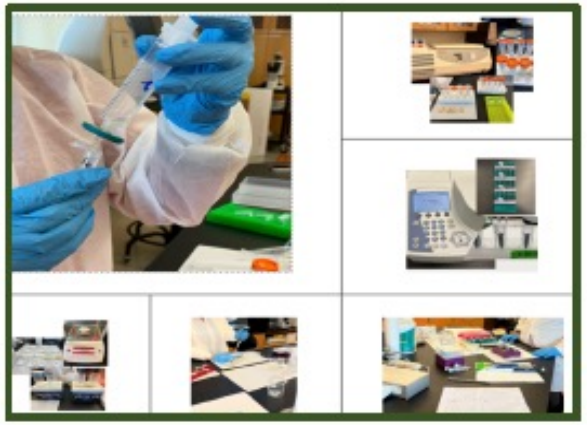
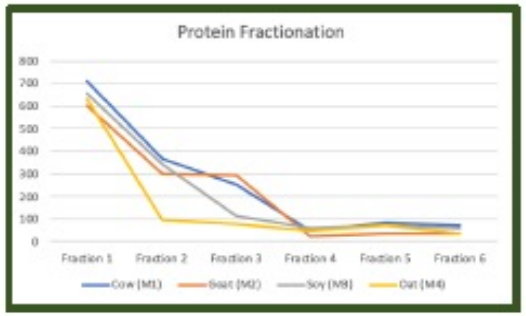
METHODS





RESULTS

Protein concentration also decreased, with fractionation depending on the type of milk studied. cow milk as compared to the other types of milks, persisted fractionation and micro-filtration



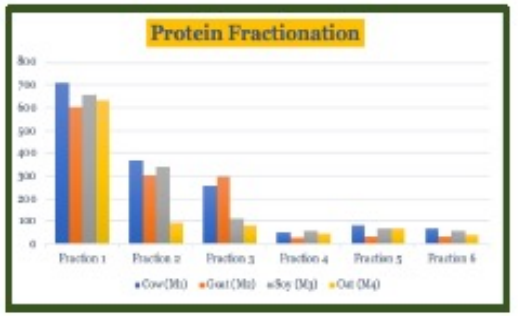


Table 1- Protein Concentration & pH Level

Milk \ Aliquot	A1 Protein Concentration (mg/ml) pH = 6	A2 ~ S1 Protein Concentration (mg/ml) pH = 6	A3 ~ S2 Protein Concentration (mg/ml) pH = 4	A4 ~ S3 Protein Concentration (mg/ml) pH = 3	A5 ~ Filtration Protein Concentration (mg/ml) pH = 3	A5-Ultra-Filtration Protein Concentration (mg/ml) pH = 3
Cow M1	711.0	367.5	252.9	50.2	83.2	72.0
Goat M2	601.0	303.5	296.8	26.3	35.4	35.6
Soy M3	657.0	340.8	111.8	57.7	71.9	58.5
Oat M4	631.0	93.0	80.7	46.5	70.6	37.9

CONCLUSION

The best quality milk is the one that is high abundant with stomach friendly pH. Cow-based milk contains highest protein concentrations among this group of four and all four milk show safe pH level for stomach absorption. However, oat milk gets denatured the most under stomach pH conditions. (This is the yellow line in the graph.)

Operation GMO: Verification of GMO-free products

Gabriela Hernandez, Ignacio Joaquin and Ivan Segovia
Dept. of Life Sciences, Los Angeles Mission College, CA

Award # 2054891

ABSTRACT

The topic of Non-GMO products has become more popular in recent years. Products that claim to be Non-GMO are usually more expensive but is there a real difference between regular products and those label Non-GMO or is it only a marketing strategy. We used 5 products: GMO tomatoes, Non-GMO Tomatoes, Doritos Chips, and Veggie Straw Chips and Non-GMO grain to conduct our experiment. We extracted DNA, verify our samples with a NanoDrop machine, amplify specific DNA sequences using PCR, conducted Gel Electrophoresis and viewed our results under UV light and in a Gel Doc XR+.

INTRODUCTION

In the US food products with Genetically modified content under a 5% threshold can be labeled as "GMO-free" and foods over that threshold do not need to be labeled as GMO containing products.
The purpose of this experiment is to look for the presence of genetically modified organisms in chips, grains, and tomatoes labeled as Non-GMO.
We believe that these products are being labeled as GMO free as a marketing strategy to sell more of their products and being mislabeled to look like a healthier option.

REFERENCES

an Commission, Joint Research Centre, Review of GMO
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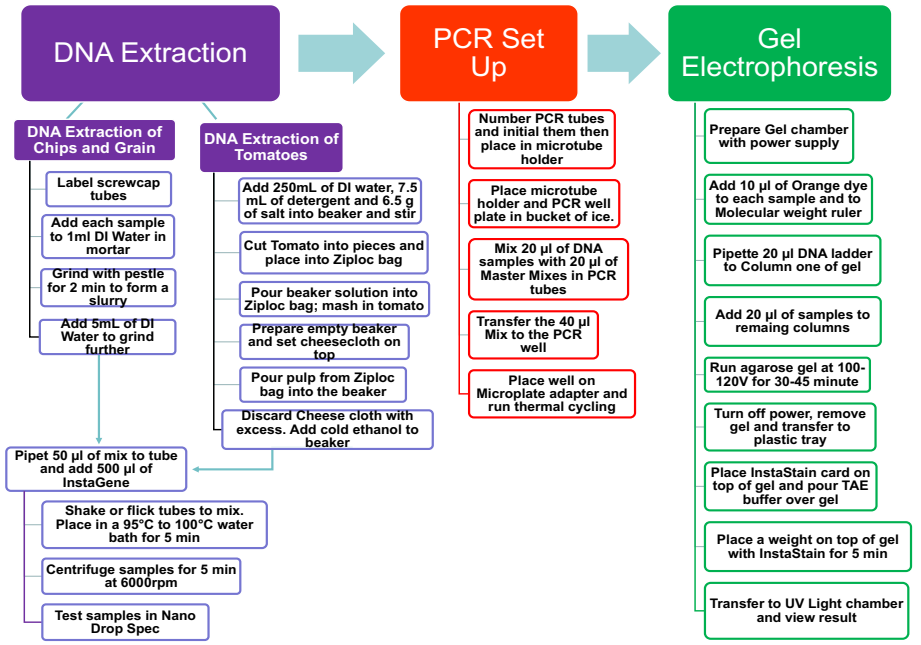
et. al.
nbg.jrc.ec.europa.eu/home/documents/EUR20384Review.

:.bio-rad.com

Award # 2054891

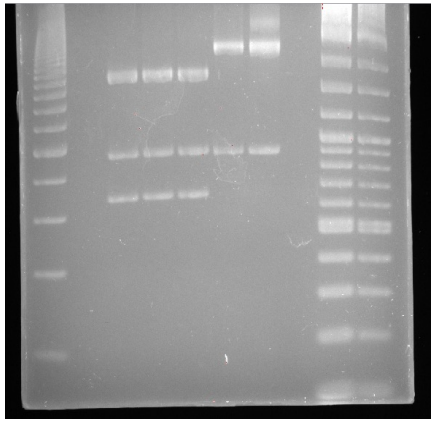
METHODS



Results

Order of Samples on Gel

1	Ladder 200bp
2	Blank –No sample-
3	Control sample Non-GMO Grain
4	Non-GMO Potato chip -Veggie straws-
5	Non-GMO Tomato
6	GMO Tomato
7	GMO Potato chip -Doritos Nachos-
8	Blank –No sample-
8	Ladder 1kb
9	Ladder 1-10kb

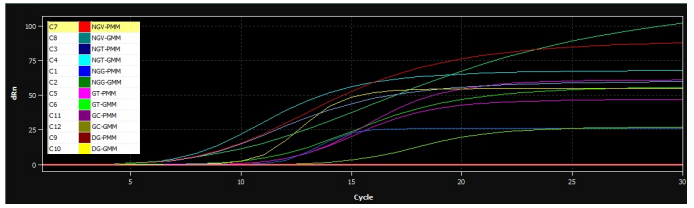


Results

NanoDrop DNA Content (ng/µL)

Sample #1 Control Nucleic Acid (ng/µL)	12.78
Sample #2 Test Doritos	43.92
Sample #3 Non-GMO Veggie Straws	11.05
Sample #4 Non-GMO Tomato	109.93
Sample #5 Regular Tomato	58.81

PCR Amplification



DISCUSSION

For selected products, using the BioRad Gel Doc XR+, we were able identify the differences between GMO and Non-GMO products.
Our results identified the three DNA fragments of selected GMO products, verified with GMO-Free grain.
We conclude that companies may not be using GMO-Free label only as the marketing strategy.

CONCLUSION

For selected products, we conclude that companies may not be using GMO-Free label only as the marketing strategy.

ACKNOWLEDGEMENTS

We are grateful to the LAMC Biotech Program for a very robust learning experience through Biotech Program and Dr. C. Aora for an exceptional educational experience.

Nurturing Gut Microbiome

Diana Garcia, Gisselle Basilio, Maryam Wissa

Dept. of Life Sciences, Biotechnology Program, Los Angeles Mission College, CA

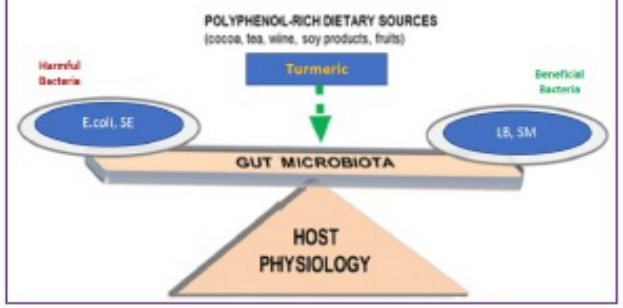
Award #: 2054891

ABSTRACT

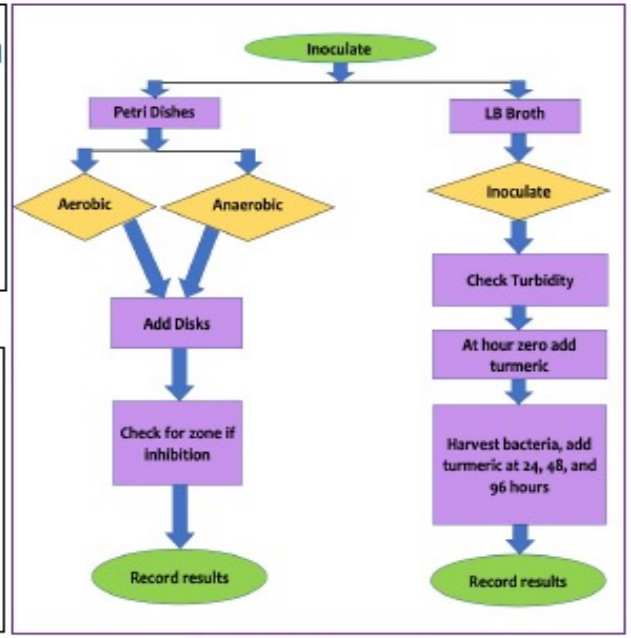
The human microbiome houses different bacteria. From our data, we were able to see a pattern between bacterial growth and turmeric. The effect of turmeric was tested over 96 hours at three different pH simulating the physiological pH of human gut. Turmeric suppressed the growth of harmful bacteria, *Escherichia coli* and *Serratia marcescens*. When turmeric was added to the beneficial ones, *Staphylococcus epidermidis* and *Lactobacilli,* it promoted the growth.

INTRODUCTION

One of the most popular health product that is the use of turmeric. The goal of this experiment is to simulate the gut microbiome of human body with some of the representative bacteria. We used two representative beneficial, Lactobacillus and Serratia marcescens (SM) and two harmful, Escherichia coli (EC) and Staphylococcus epidermidis (SE) We want to show and prove that the use of turmeric will show the extent of these bacteria.

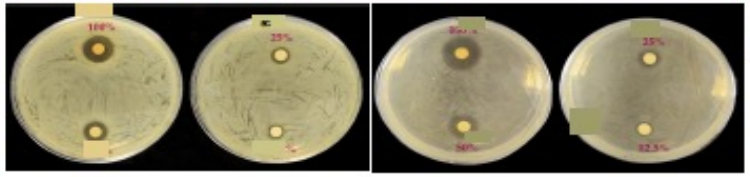


METHODS



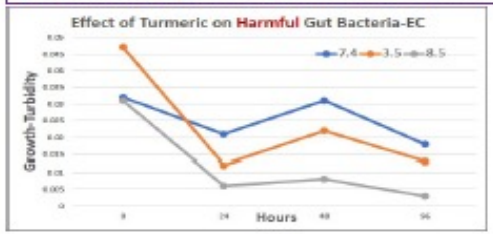
RESULTS

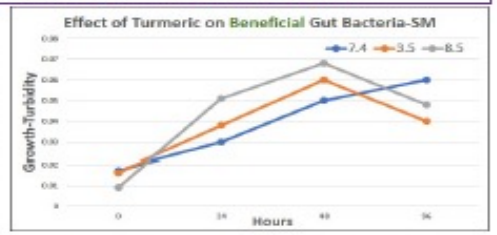
Harmful bacteria showed the MIC correlation to the concentration of turmeric : 10, 5, 2.5 and 1.25mg/ml, in *E.coli and S. epidermidis*.

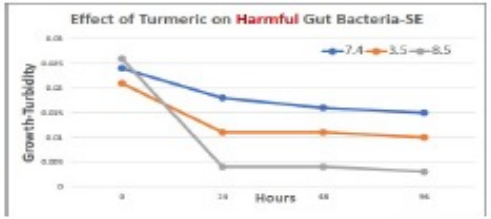


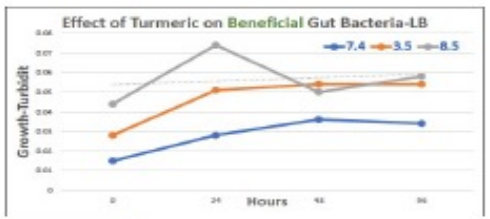
RESULTS

The harmful bacteria and beneficial bacteria showed the reverse trend in their growth in the presence of turmeric at all time points: 24, 48 & 96 hrs.









CONCLUSION

Through harvesting bacteria in medium with turmeric we were able to analyze the turbidity. Our data shows that there is a correlation between turmeric and bacteria. With consistent consumption of turmeric, bacteria will either increase or decline in different areas of the body.

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Acknowledgements

We would like to thank Dr. Arora for her expert advice, guidance and support throughout this project, as well as Serob for his brilliance in the lab.

COVID Does it: Salivary IgG by ELISA

KAETHE SCHAEFER, DEXTER WILLIAMS, RAY RUIZ

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Award # 2054891

ABSTRACT

Find the quantitative difference in concentration of IgG present in saliva between each dose. Saliva samples were collected directly from participants through the drool method. At least 5mL of each sample was collected, centrifuged, and diluted in preparation of the ELISA testing. An ELISA Reader using precoated Invitrogen plates, were used to detect and measure levels of IgG in each well of the microplate.

INTRODUCTION

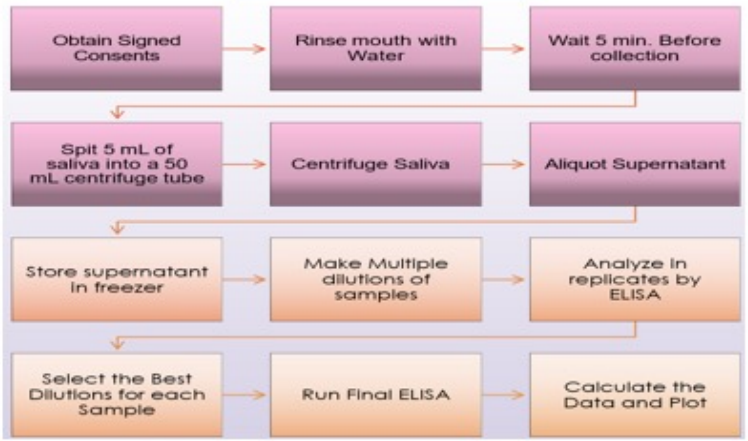
In the human immune system, immunoglobulin (IgG) is an important indicator of response an infection. It functions by attaching itself to the outer surface of the antigens and deactivates them. IgG can remain in the body for extended periods of time in order to defend our body from the antigen. Antibodies are not limited to only Immunoglobulin G but also IgA, IgM and others. In this experiment, saliva sample with IgG were collected for testing after getting consent from each saliva donor.

METHODS

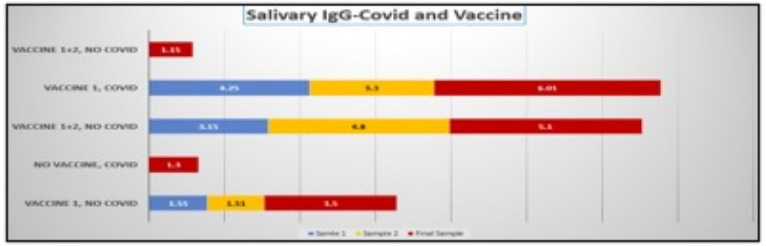
A case study was done with five people with varying circumstances concerning their COVID vaccinations.The age range of each sample was 16-46 years. 5ml of saliva sample was collected from each candidate during specific times when taking the vaccine. The samples were centrifuged at 8000 RPM for 10 min at 4 degrees C. The ...atant was collected to be serial diluted. With the ...e Linked Immunosorbent Assay(ELISA) the ...y Immunoglobin (IgG) were quantitively analyzed and ...50 nm.

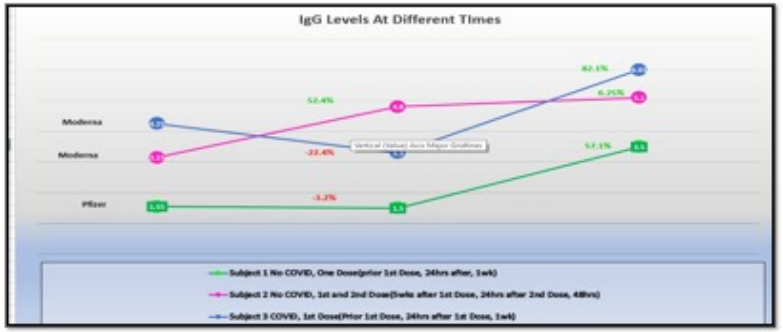
Award # 2054891

METHOD



RESULTS





RESULTS

SAMPLE	S1	S2	S3	S4	S5	S6	S7	S8
1:500 (O.D.)	0.088	0.076	0.105	0.102	0.286	0.223	0.212	0.172
1:1000 (O.D.)	———	———	0.081	0.116	0.300	0.202	0.162	———
1:1000 ul/ml Concentration	1.300	1.500	3.500	1.500	5.100	4.800	6.010	4.250

DISCUSSION

In our research, we discovered IgG levels were higher compared to those who did not take the vaccine. The subject with COVID, 1st Dose had the highest increase in IgG levels. The subject with no COVID, 2nd Dose had the most consistent increase in IgG levels. The subject with no COVID, 1st Dose had the lowest increase in IgG levels compared to the previous subjects. We also found that mRNA increases IgG levels.

CONCLUSION

Hypothesis was proven. Saliva IgG concentration levels were higher. Highest acquired number of total protein in saliva was 6.0µg/mL vs. 1.3µg/mL in subject would did not receive the COVID vaccine.

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https://www.livescience.com/antibodies.html

ACKNOWLEDGEMENT

Special thanks and acknowledgments to Dr. Arora for her persistant guidance, encouragement and motivative insights to help us strive towards new accomplishments, and to Serob M. For his time and expertise on the ELISA process.

Biofilms: An Invisible Burden

Authors: Denisse Nava & Keylin Mejia

Dept. of Life Sciences, Los Angeles Mission College, CA

Award # 2054891

ABSTRACT

Biofilms are a social structure composed of one or more types of microorganisms that can grow to almost any surface. They can be so thin they are undetectable to the naked eye. In this project biofilm samples were collected, ELISA plates were coated with these bacteria, and after incubation these plates were checked by absorption spectrum to see if there was biofilm buildup and adhesion to plate wells. The biofilm was then treated with various disinfectants to test their efficacy against Bioburden production.

INTRODUCTION

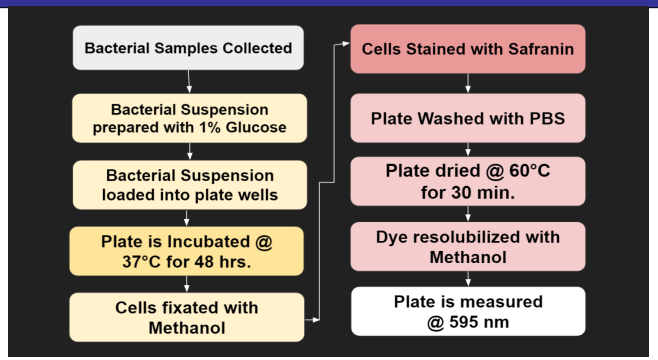
Biofilms are a structure composed of bacteria that secrete a glue-like slime used to adhere to almost any surface. Biofilms are social structures composed of microorganisms such as bacteria, fungi, yeasts, algae, and other microorganisms. Biofilms are held together by sugar molecule strands termed “extracellular polymeric substances” or EPS. The cells produce these strands and develop a complex community that are resistant to antimicrobial attacks and are permanently attached to a surface and encased in a polysaccharide matrix. We wanted to prove the presence of these invisible biofilms using staining and microplate reading. We extended our investigation by testing different solutions on these developed biofilms to determine their efficacy against biofilm adhesion.

METHODS

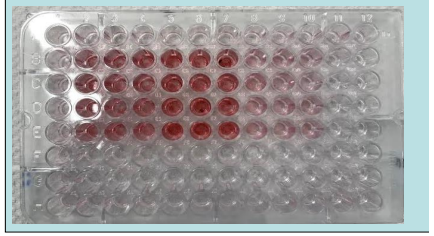
les were collected and coated onto ELISA plates. After urs of incubation, wells were stained and checked via plate Reader to verify adhesion of biofilm.

Award # 2054891

Growth and Detection of Biofilms - Flowchart



Staining of Adhered Biofilms



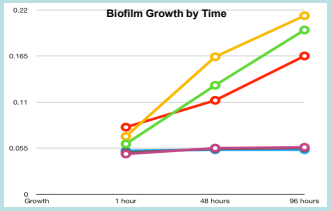
Remediation Testing Layout

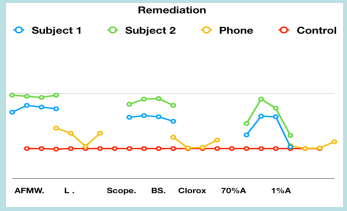
	1	2	3	4	5	6	7	8	9	10	11	12
A	BLANK	BLANK	BLANK	BLANK	BLANK	BLANK	BLANK	BLANK	BLANK	BLANK	BLANK	BLANK
B	BLANK	S1	S1	S1	S2	S2	S2	Phone	Phone	Phone		
C	BLANK	S1	S1	S1	S2	S2	S2	Phone	Phone	Phone		
D	BLANK	S1	S1	S1	S2	S2	S2	Phone	Phone	Phone		
E	BLANK	S1	S1	S1	S2	S2	S2	Phone	Phone	Phone		
F	BLANK											
G	BLANK											
H	BLANK	BLANK	BLANK	BLANK	BLANK	BLANK	BLANK	BLANK	BLANK	BLANK	BLANK	BLANK

Remediation Results

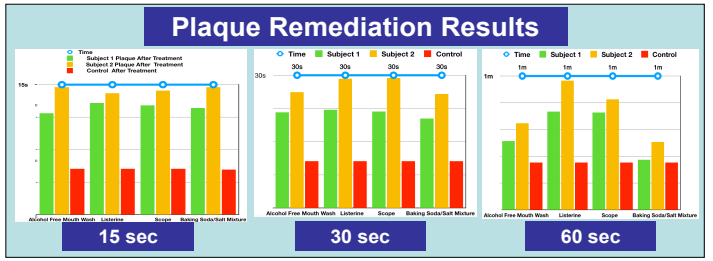
Biofilm Growth By Time (Measured by Turbidity)

Time (Biofilm formation after X time in the incubator)	Subject 1 Plaque	Subject 2 Plaque	Phone	S. epidermidis	E. coli	Control
1h(60 minutes)	0.060	0.069	0.080	0.048	0.050	0.052
2d(48 hours)	0.130	0.164	0.112	0.055	0.054	0.053
4d(96 hours)	0.196	0.213	0.165	0.056	0.055	0.053

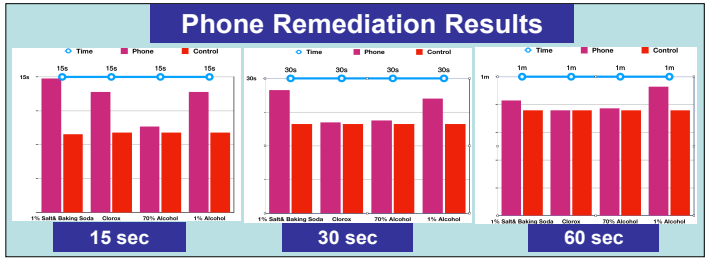




Plaque Remediation Results



Phone Remediation Results



CONCLUSION

- Our Hypothesis is supported based on our results.
- Based on our results, we were able to verify the presence of biofilms - by spectrophotometrically calculating the amount of biofilm formed on ELISA plate wells.
- We were able to conclude that 70% isopropyl is the best disinfectant for biofilms found on surfaces, and that a 1% mixture of baking soda and salt is most effective at eliminating biofilms found in the mouth.

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ACKNOWLEDGMENTS

Special thanks and acknowledgement to Dr. Arora for pushing us and guiding us through this project and learning process.

LAMC BIOTECHNOLOGY PROGRAM

AWARD #2054891

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FEATURING PRESENTATIONS:

1. COVID DOES IT: SALIVARY IGG BY ELISA
2. BIOFILMS: AN INVISIBLE BURDEN
3. BIOFUEL- PONDS TO POWER
4. OPERATION GMO: VERIFICATION OF GMO-FREE PRODUCTS

Award # 2054891

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BIOTECH 003 - Biotechnology II *(04/11-06/06)*

LEC: *(class#: 15536)* MoTuWeTh 7:50AM - 8:50AM

LAB: *(class#: 15537)* MoTuWeTh 9:00AM - 12:10PM

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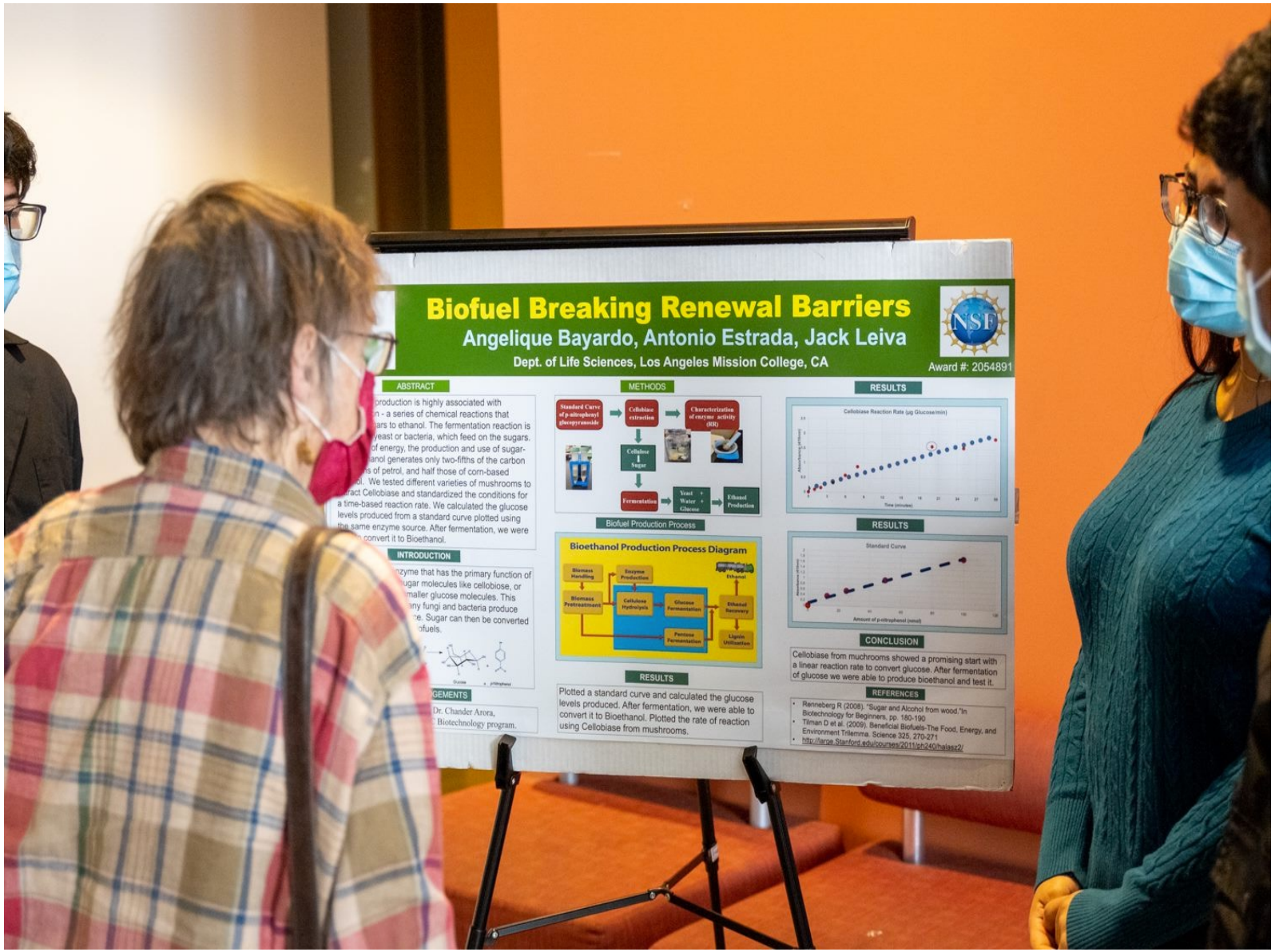

Biotech Poster Exhibition

Fall 2021

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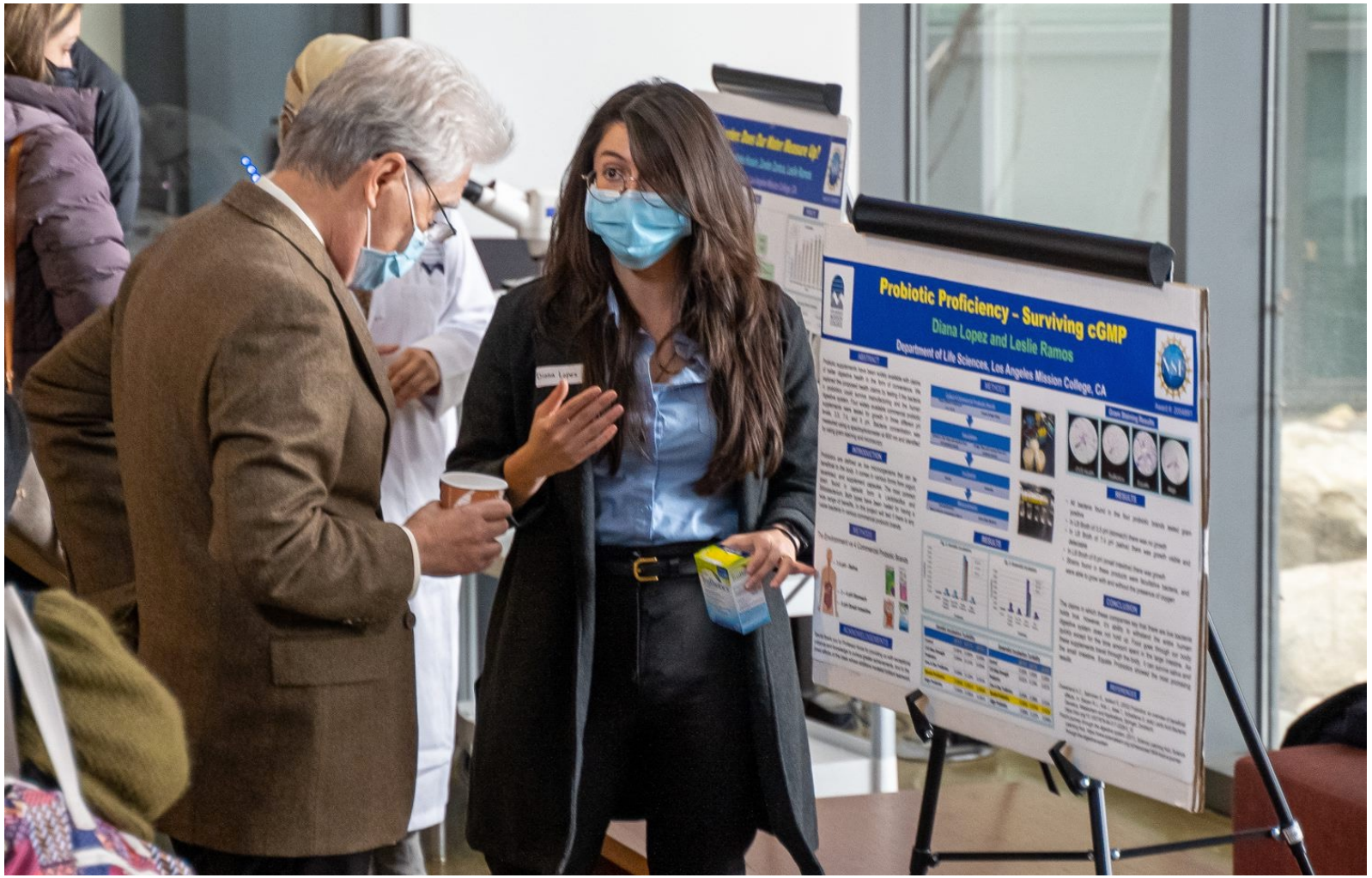

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Spring 2022
https://www.lamission.edu/Biotechnology

STUDENT PRESENTATIONS AT NSF-ATE CONFERENCE - 2020

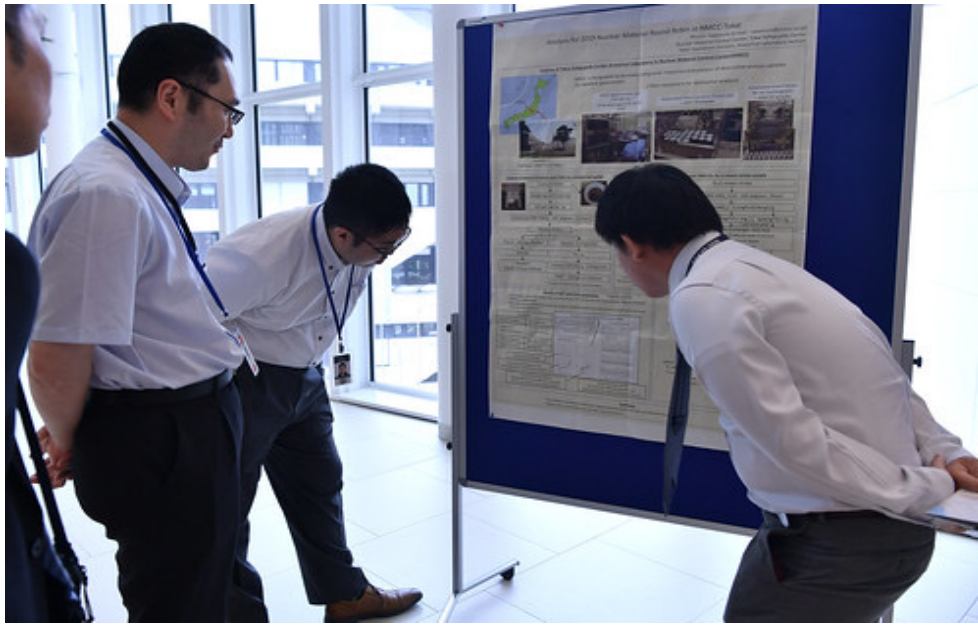
Serob Makhmurian

Laura Sweetman

Award # 2054891

CONTEXTUALIZED SOFT SKILLS

- TEAM-WORK
- TIME MANAGEMENT
- CRITICAL THINKING
- ROOT-CAUSE ANALYSIS
- PROBLEM SOLVING
- EFFECTIVE COMMUNICATION
- SCIENTIFIC STUDY DESIGN AND HYPOTHESIS DEVELOPMENT
- DATA COLLECTION AND TABULATION
- PUBLIC PRESENTATION
- SENSE OF ENGAGEMENT & PRIDE



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DISCUSSION

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ON CAMPUS INTERVIEWS & ON-THE-SPOT JOB OFFERS

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Inclusion of Non-Traditional Students

Dexter Williams

Law Enforcement Officer

Pharmavite

Ivan Segovia

Grocery Stocker
Frito Lay

Cedars-Sinai

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Diversity and Inclusion In Biotech Program

Denisse Nava

T-Cure Bioscience

Oscar Coxaj

Karma Biotechnology

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From Biotech Program to Covid-19 testing lab: An LAMC Success Story

Anand Mistry: Lab Assistant, WestPac labs: Running RT PCR on Cobas 8800 machines for Covid-19 Testing.

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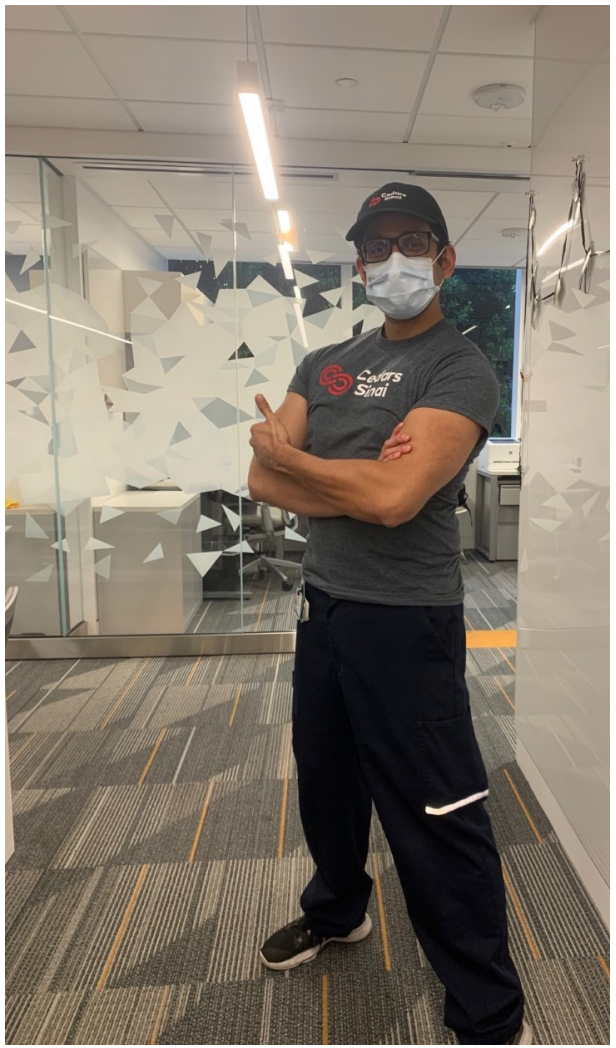

BIOTECHNOLOGY SUCCESS STORY (OCTOBER 2020)

Carlos Maldonado

Attended our Biotechnology Program while working as an Amazon Ambassador. He has been hired by Thermofisher Scientific as Manufacturing Operator II.

Amazon Ambassador

- **Carlos Maldonado**
- **Thermo Fisher Scientific**
- **Cedars-Sinai Biomanufacturing**

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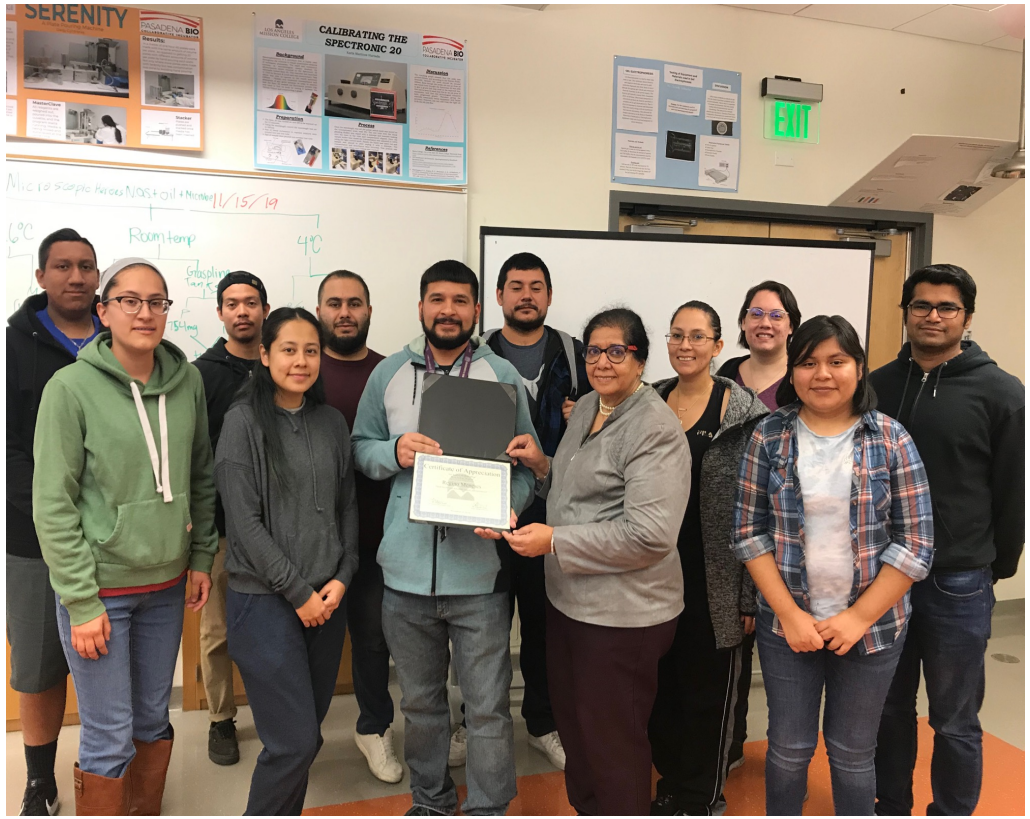
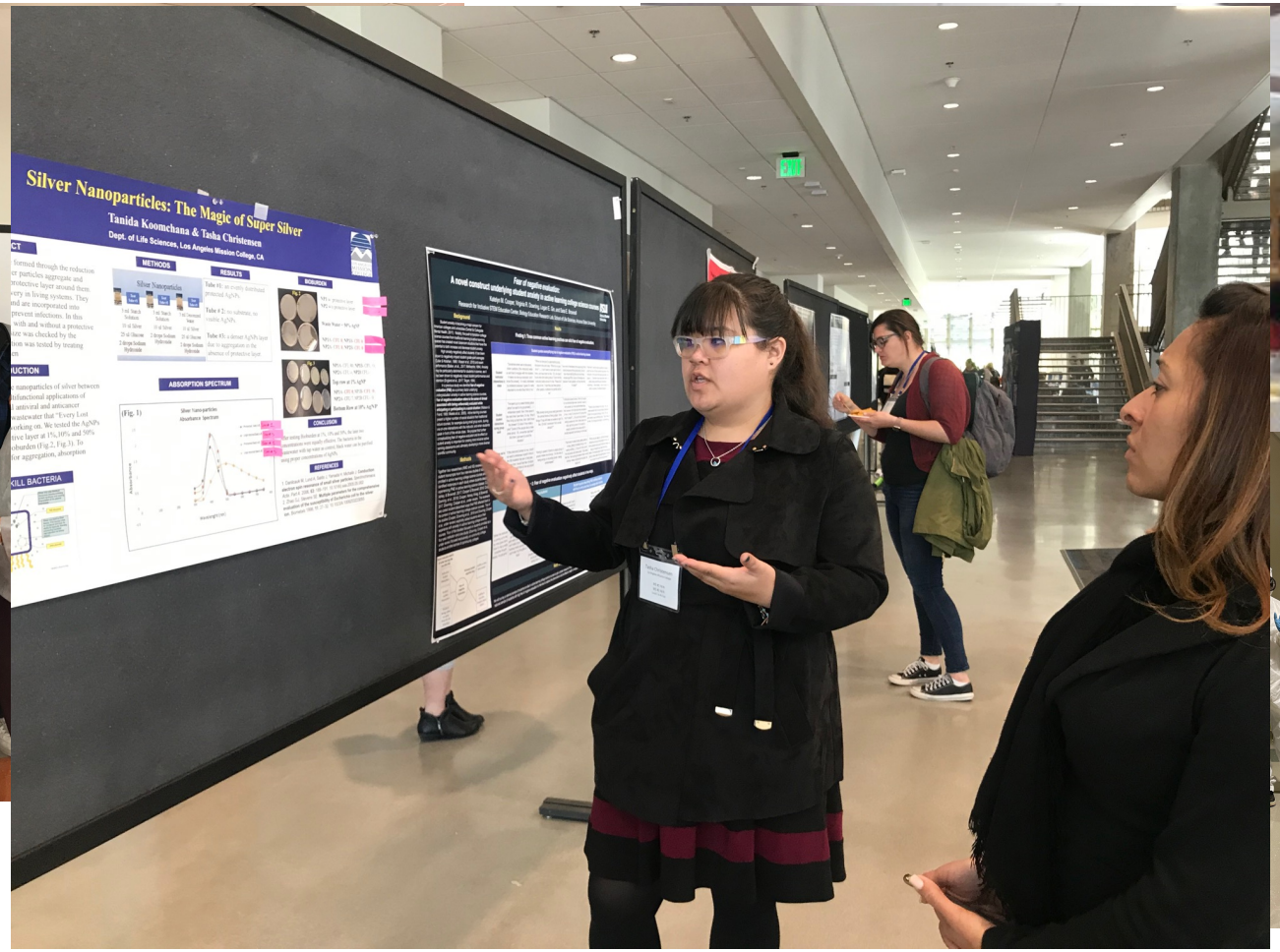
Biotech Program-LAMC-2019



Biotech Program-LAMC-2019



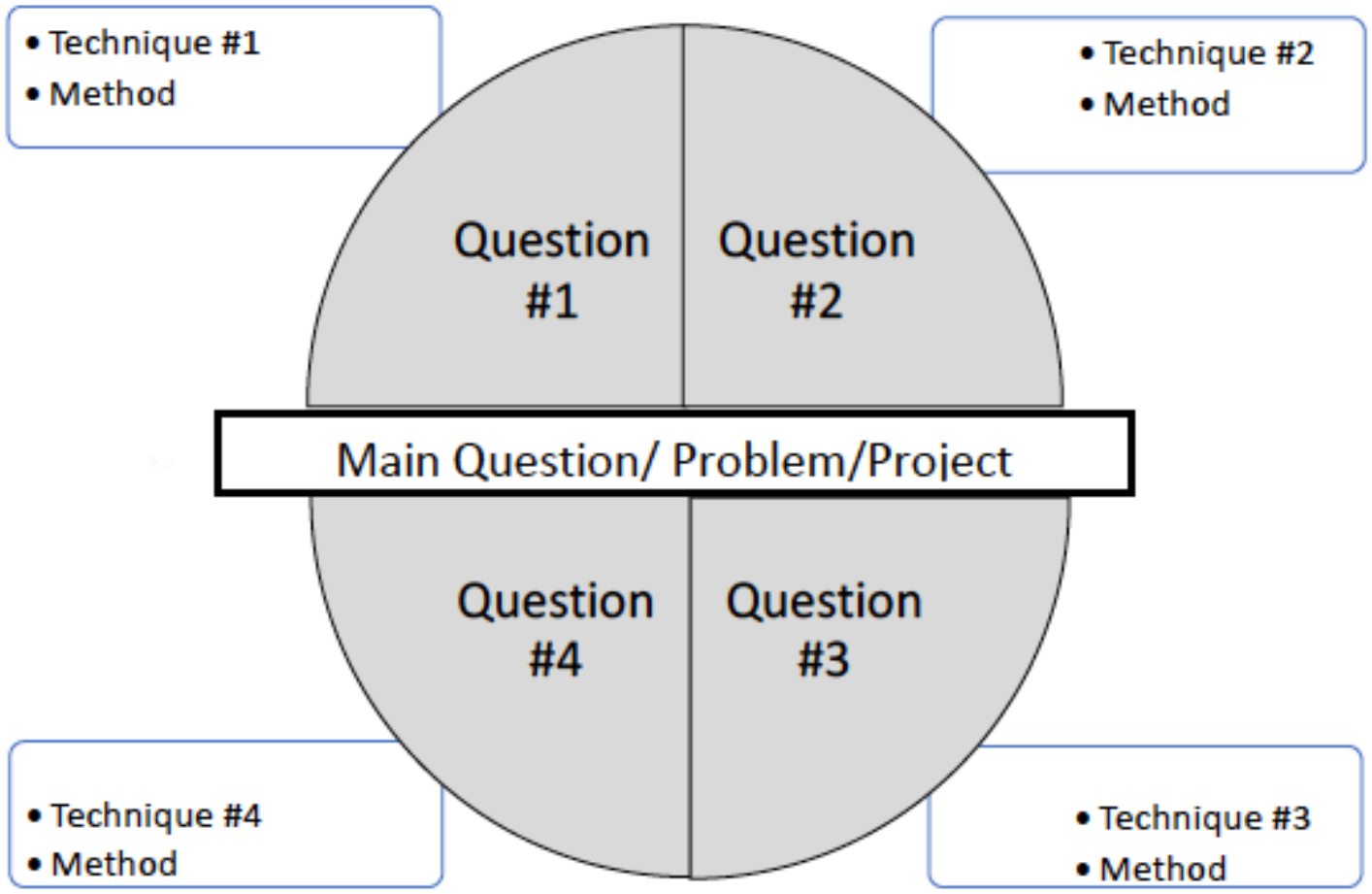
Project Ideas- Biotech

1. **Question:**
   - Which soap is most antimicrobial?
2. **Question:**
   - Is there any Bacterial growth in Water Fountains during Pandemic?
3. **Question:**
   - Which brand of water bottle has maximum BPA?
4. **Question:**
   - How many Live bacteria are present in different brands of Probiotics?
5. **Objective:**
   - Comparing Proteins in plant-based milk from animal based one.
6. **Hypothesis:**
   - GMO tomatoes DNA is different from Non-GMOs
7. **Hypothesis:**
   - Turmeric is good for health.
8. **Hypothesis:**
   - Covid survivors develop better immune system.

Project Planning - Biotech

- Team Roles & Title- (5 min.)
  - Leader, Reporter, Verifier, Recorder
- Group Discussion- 10 min.
- Gallery Walk-10 min
- Flow Chart- 5 min
  - Steps and Sequence: Connect steps with arrows
    - Start : oval shape
    - Continue : Rectangle shape
    - Rethink: Diamond shape
- Incorporate suggestions-5 min.

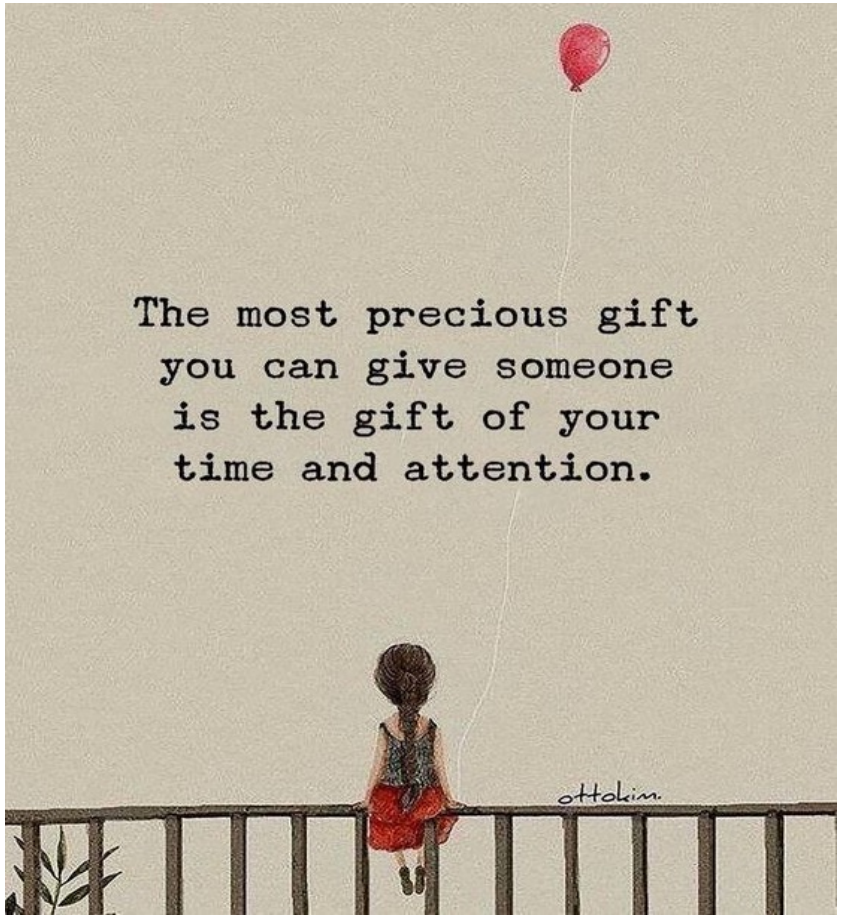
Gallery Walk Template



Project Ideas- Biotech

- – How can we create guidebooks for the botanical garden?
- – How can we promote our nature trail so it is used more?
- – How can we develop a guidebook for visitors to a nature preserve?
- – How can we plan for a possible weather emergency?
- – What can we do to help alleviate pollution in our region?
- – How can we influence our community to take best care of animals?
- – How can problems with stray animals be reduced?
-

aroracp@lamission.edu



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