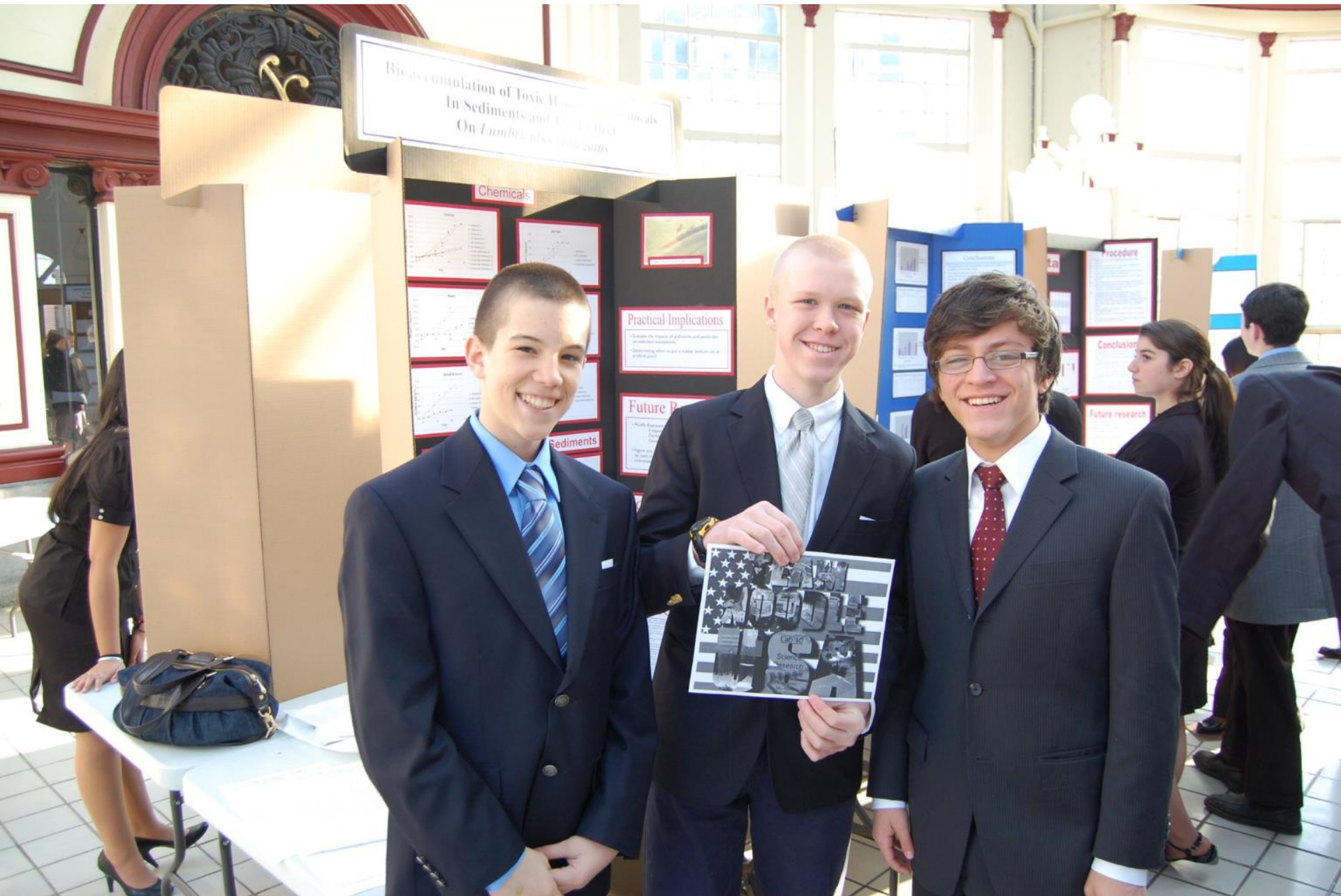


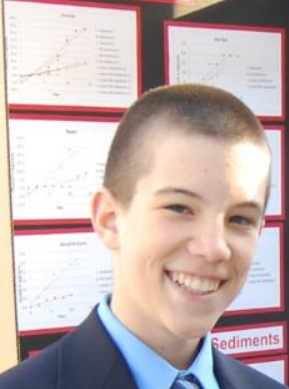
Science Fair Photos 2010-2011

Noyce @ Dowling



Bioaccumulation of Toxic Heavy Metals In Sediments and Aquatic Insects On *Lumbriolus terrestris*

Chemicals



Practical Implications

• Evaluate the impact of pollution and pesticides on sediment invertebrates.
• Determine whether or not a pollutant bioaccumulates in different species.

Future Research

• Identify the chemical species of heavy metals in the sediment.
• Determine the effect of different sediment types on the bioaccumulation of heavy metals.





EXIT

COMMACK HIGH SCHOOL
EDUCATION
BETTY M. POLK
WENDY M. SCOTT
WALTER T. GAIN
MICHAEL J. ROSSO

The Effects of Various Herbs on Mutant *Drosophila melanogaster*: Possible Applications to Type I Diabetes Treatment

Purpose

The purpose of this study was to investigate the effects of various herbs on mutant *Drosophila melanogaster* flies. The study aimed to determine if these herbs could potentially be used as a natural treatment for Type I Diabetes.

Hypothesis

The hypothesis was that the herbs would have a positive effect on the mutant flies, leading to a decrease in their mortality rate and an increase in their lifespan.

Background

Type I Diabetes is a chronic autoimmune disease that affects the pancreas, leading to a deficiency of insulin. This results in high blood sugar levels, which can lead to various complications. Natural treatments, such as herbs, are being explored as potential alternatives to insulin therapy.

Procedure

The procedure involved raising mutant *Drosophila melanogaster* flies on a diet of sucrose. The flies were then divided into several groups, each receiving a different herb extract. The flies were monitored for their survival and lifespan over a period of several weeks.

Table 1: Survival Rate of Mutant Flies (Survival %)

Herb	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10
Control	100	95	85	75	65	55	45	35	25	15
Herb A	100	98	90	80	70	60	50	40	30	20
Herb B	100	99	92	82	72	62	52	42	32	22
Herb C	100	97	88	78	68	58	48	38	28	18
Herb D	100	96	87	77	67	57	47	37	27	17
Herb E	100	94	84	74	64	54	44	34	24	14

Table 2: Survival Rate of Mutant Flies (Survival %)

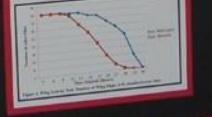
Herb	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10
Control	100	95	85	75	65	55	45	35	25	15
Herb A	100	98	90	80	70	60	50	40	30	20
Herb B	100	99	92	82	72	62	52	42	32	22
Herb C	100	97	88	78	68	58	48	38	28	18
Herb D	100	96	87	77	67	57	47	37	27	17
Herb E	100	94	84	74	64	54	44	34	24	14

Table 3: Survival Rate of Mutant Flies (Survival %)

Herb	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10
Control	100	95	85	75	65	55	45	35	25	15
Herb A	100	98	90	80	70	60	50	40	30	20
Herb B	100	99	92	82	72	62	52	42	32	22
Herb C	100	97	88	78	68	58	48	38	28	18
Herb D	100	96	87	77	67	57	47	37	27	17
Herb E	100	94	84	74	64	54	44	34	24	14

Table 4: Survival Rate of Mutant Flies (Survival %)

Herb	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10
Control	100	95	85	75	65	55	45	35	25	15
Herb A	100	98	90	80	70	60	50	40	30	20
Herb B	100	99	92	82	72	62	52	42	32	22
Herb C	100	97	88	78	68	58	48	38	28	18
Herb D	100	96	87	77	67	57	47	37	27	17
Herb E	100	94	84	74	64	54	44	34	24	14



Conclusions

- Control:** The survival of the Drosophila flies was significantly lower in the control group compared to the herb groups.
- Herb A:** The survival of the Drosophila flies was significantly higher in the Herb A group compared to the control group.
- Herb B:** The survival of the Drosophila flies was significantly higher in the Herb B group compared to the control group.
- Herb C:** The survival of the Drosophila flies was significantly higher in the Herb C group compared to the control group.
- Herb D:** The survival of the Drosophila flies was significantly higher in the Herb D group compared to the control group.
- Herb E:** The survival of the Drosophila flies was significantly higher in the Herb E group compared to the control group.

Limitations

- The study only used mutant flies, which may not represent all *Drosophila melanogaster* flies.
- The study only used sucrose as a diet, which may not represent a natural diet.
- The study only used five herbs, which may not represent all natural treatments.
- The study only used a short-term experiment, which may not represent long-term effects.

Future Research

- Investigate the effects of other herbs on mutant flies.
- Investigate the effects of other diets on mutant flies.
- Investigate the effects of other treatments on mutant flies.
- Investigate the effects of these herbs on wild-type flies.

References

1. American Diabetes Association. (2014). Standards of Medical Care in Diabetes—2014. *Diabetes Care*, 37(1), S1-S8.

2. American Diabetes Association. (2015). Standards of Medical Care in Diabetes—2015. *Diabetes Care*, 38(1), S1-S12.

3. American Diabetes Association. (2016). Standards of Medical Care in Diabetes—2016. *Diabetes Care*, 39(1), S1-S12.

4. American Diabetes Association. (2017). Standards of Medical Care in Diabetes—2017. *Diabetes Care*, 40(1), S1-S12.

5. American Diabetes Association. (2018). Standards of Medical Care in Diabetes—2018. *Diabetes Care*, 41(1), S1-S12.

The Effects of An A Food Recognition Behav (Palaram)

Background

Worldwide, more than 10 billion tons of concrete are produced each year. In 2008, concrete industry produced 1.9 billion tons (2.0 billion metric tons). Current practices CO₂ intensity by calculation of emissions and related to construction a. Manufacturing, etc. (Parks and Gammeter, 2012). CO₂ released into the atmosphere leads to global warming and ozone layer.



Research Goals

The Effect of Concrete Aggregate Size on CO₂ Absorption

Procedure and Results

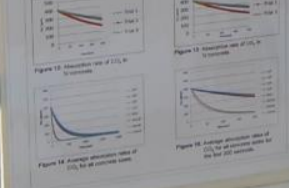
Sample Preparation (ASTM C136-06)



Experimental Setup



CO₂ Absorption Data

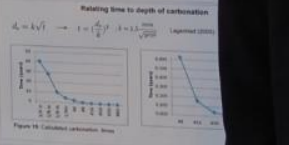


Results (cont.)

Surface area analysis

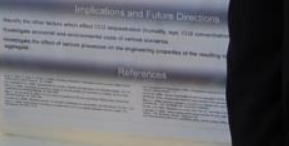
Table 1: Concrete inherent surface area and surface area in lab by reference scale of concrete.

Concrete Type	Inherent Surface Area (m ² /m ³)	Surface Area in Lab (m ² /m ³)
1	1.5	1.5
2	1.5	1.5
3	1.5	1.5
4	1.5	1.5
5	1.5	1.5
6	1.5	1.5
7	1.5	1.5
8	1.5	1.5
9	1.5	1.5
10	1.5	1.5



Relating time to depth of carbonation

$$x = k\sqrt{t} \rightarrow t = \left(\frac{x}{k}\right)^2 \quad \text{Laplace (2005)}$$



Conclusions

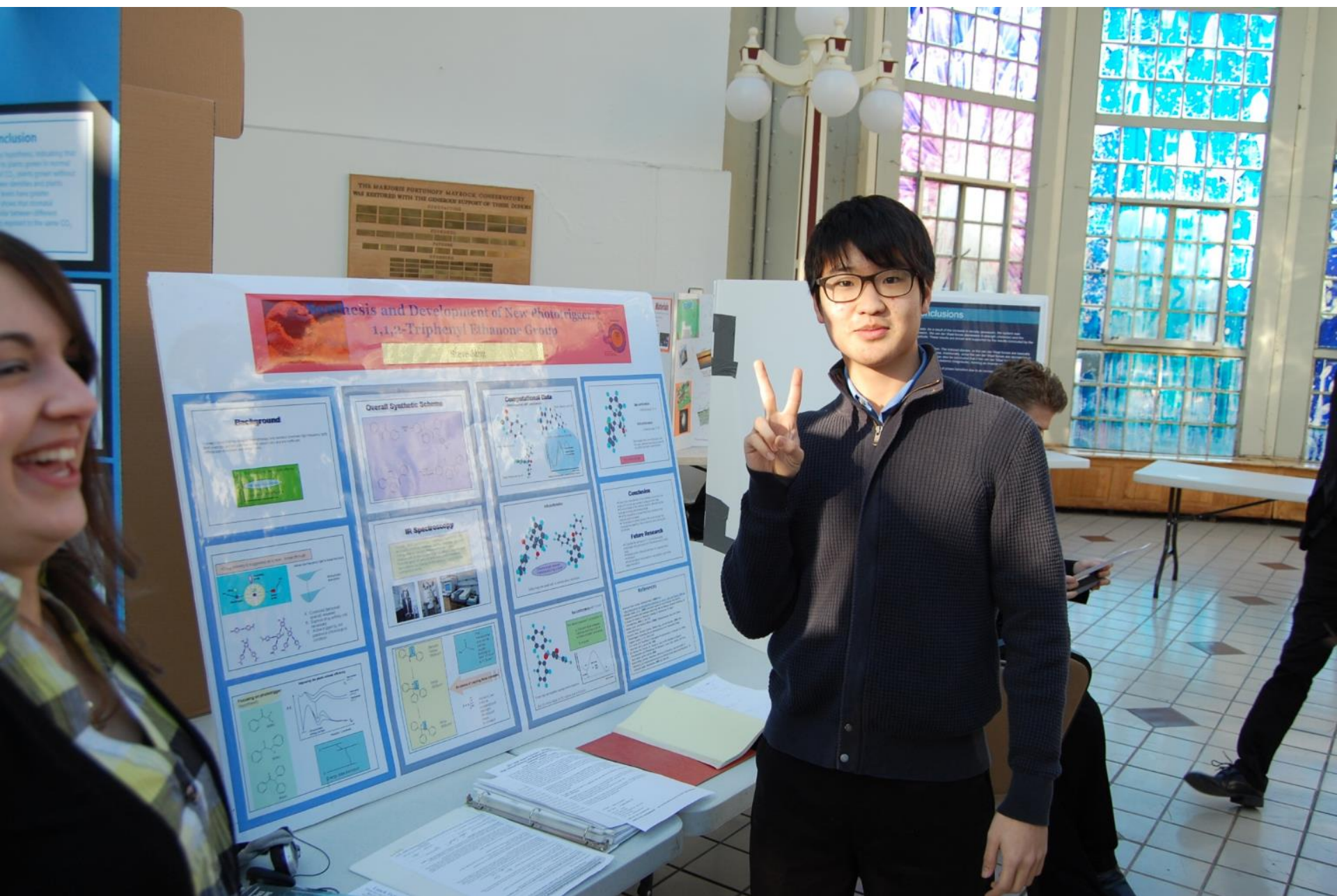
Surface area is important in CO₂ absorption.

Implications and Future Directions

Identify the other factors which affect CO₂ absorptive capacity, such as concrete strength, moisture, and environmental conditions of carbon absorption.

References

Laplace (2005). Concrete carbonation. Elsevier, Amsterdam.



Synthesis and Development of New Photo-triggered 1,1,2-Triphenyl Ethanone Groups

Seungbin

Background

Overall Synthetic Scheme

Computational Data

IR Spectroscopy

Conclusions

Future Research

References

The poster contains various chemical structures, reaction schemes, and data plots. It includes a section for 'IR Spectroscopy' with a list of peaks and a 'References' section at the bottom right. The overall layout is organized into a grid of colored boxes.

The Biomimicry Potential of the Indian Walking Stick (*Carausius morosus*)

Research Goal

Background

Methods



Figure 1



Figure 3

Implications

Blastema Formation and Epimorphic Segmental Regeneration in California Blackworms (*Lumbricus variegatus*)

Methods

Summary of Results



Conclusions

Implications

Future Research

References

Blastema Formation and Epimorphic Segmental Regeneration in California Blackworms (*Lumbricus variegatus*)

Research Question

Hypothesis

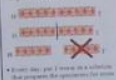
Methods

Procedure 1

Experimental (Short ARM)

- 70 adult worms collected and 40 (2 weeks) kept in a jar of water at 20°C to digest most of the tail portion.
- Worms that give 2 worms in a culture are given the opportunity for more specimens.

Results:



Conclusion: Worms regrowed and experimental results reflect the relationship between amputation and growth. (Short ARM 6)

Procedure 2

Blastema Observation

- 100 of 4 worms at 20°C to digest most of the tail portion.
- Worms that regrow the length of the amputated tail (about 1/3 of the original length) - about 2 weeks.
- Observation of blastema and tail growth around the time in which it grows back.



Results:



Conclusion: The regeneration process is affected by the amount of tail removed. (Short ARM 6)

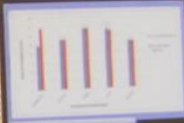
Analysis

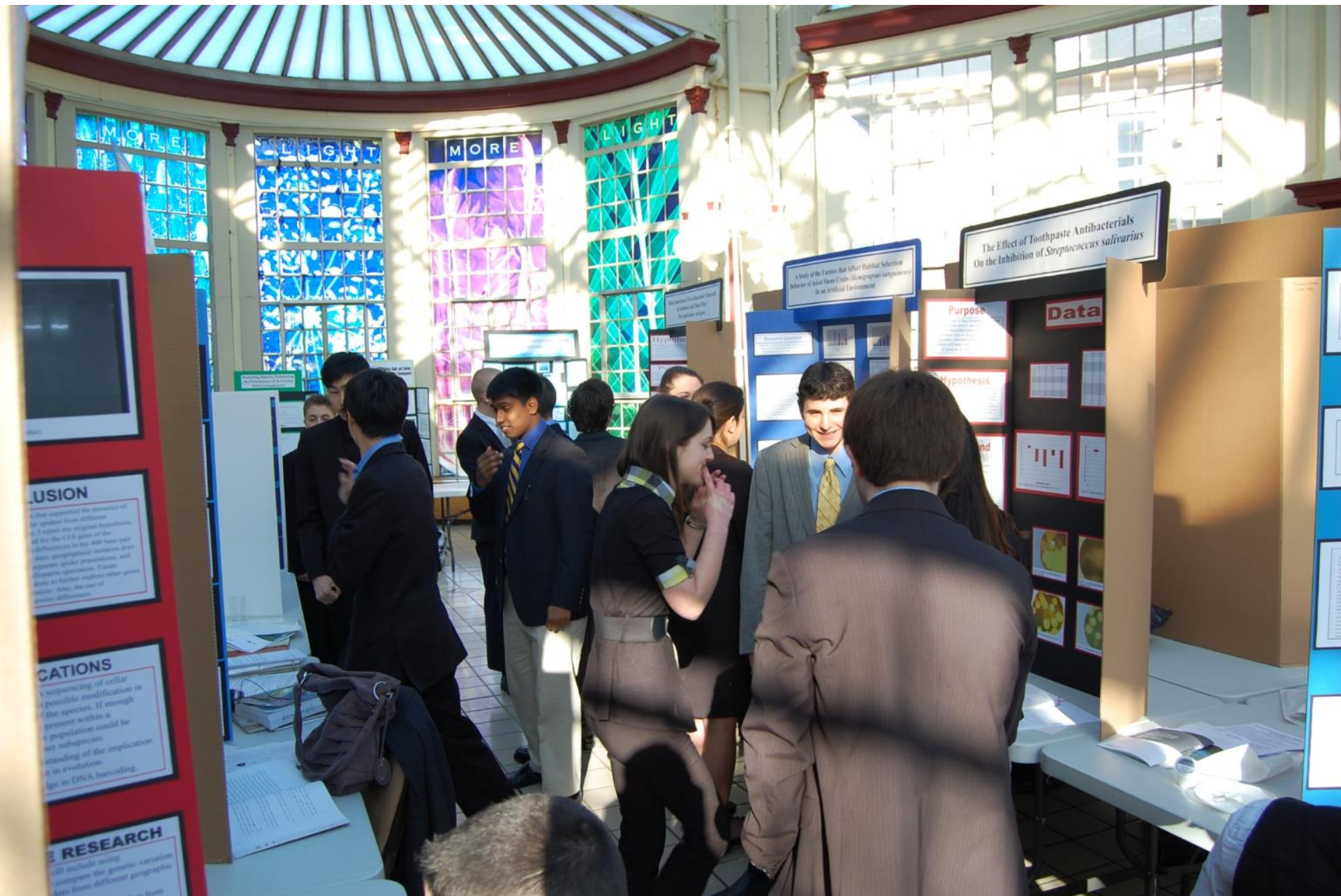
Summary of Results

- Worms that had a significant effect on the regeneration process were observed in 77 and have not yet been observed in 23. (Short ARM 6)
- Blastema in position. A healthy blastema will grow back, but it takes time compared to the original length.

Exploring the Effects of [unclear] On the Growth of [unclear]

Data/Analysis





The Effect of Toothpaste Antibacterials On the Inhibition of *Streptococcus salivarius*

Purpose

Hypothesis

Method

Data



A Study of the Factors that Affect Habitat Selection Behavior of Soap Shrub Crabs (*Hemigrapsus sanguineus*) in an Artificial Environment

Introduction

Method

Results

Conclusion



CONCLUSION

Our study supported the presence of genetic differences between populations of the species from different regions. It rejects our original hypothesis that the 15% gene of the differences in the 400 base pair region of the DNA sequence was due to genetic drift. It also suggests that differences in population size, geographical isolation, and migration may be factors in genetic divergence. Future studies should explore other genetic markers to further explore other genetic differences. Also, the use of genetic differences.

IMPLICATIONS

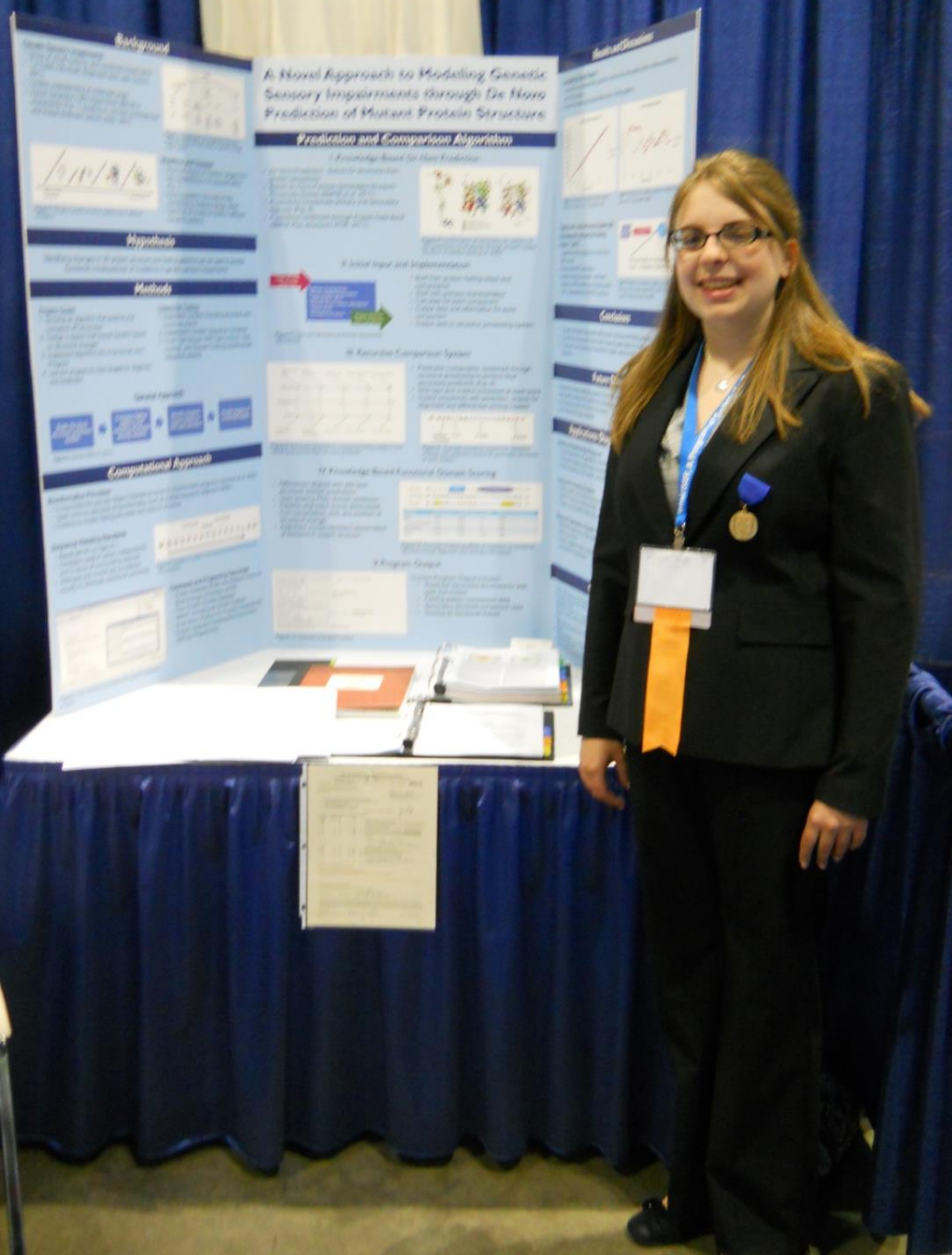
The sequencing of cellular DNA allows for the possible modification in the genetic code of the species. If enough mutations accumulate within a population, it could be considered a new species. This study has implications for understanding the implications of genetic variation in an evolutionary context. The use of DNA barcoding.

RESEARCH

Future research will include using DNA barcoding to compare the genetic variation between different geographic locations from different populations.

Intel ISEF





A Novel Approach to Modeling Genetic Sensory Impairments through De Novo Prediction of Mutant Protein Structure

Prediction and Comparison Algorithms

I Knowledge-Based De Novo Prediction

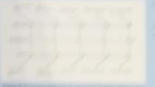
An approach to predict protein structure based on known structures and sequence information. This method uses a knowledge-based approach to predict the structure of a protein based on its sequence.



II Initial Input and Implementation



III Residue Comparison System



IV Knowledge-Based Functional Group Scoring

A scoring system based on known functional groups and their interactions. This system evaluates the predicted structure based on the presence and arrangement of functional groups.

V Program Output

The final output of the program, which includes the predicted protein structure and associated scores. The output is presented in a clear and concise format for easy interpretation.



Conclusions: The results of the study demonstrate the effectiveness of the proposed method in predicting protein structure. The method shows high accuracy and is able to handle a wide range of protein sequences.

Applications: The proposed method has several potential applications, including the identification of drug targets and the design of new drugs. It can also be used to study the effects of mutations on protein structure and function.

Background

The study of protein structure is a fundamental aspect of molecular biology. Proteins are the building blocks of life, and their structure determines their function. However, predicting the structure of a protein based on its sequence is a challenging task. This study aims to develop a novel approach to protein structure prediction that is based on a knowledge-based approach.

Hypothesis

We hypothesize that a knowledge-based approach to protein structure prediction will be more accurate than other methods. This is because a knowledge-based approach can take advantage of the vast amount of information available in the Protein Data Bank (PDB) to predict the structure of a protein.

Methods

The study was conducted using a knowledge-based approach to protein structure prediction. The method involves comparing the sequence of a protein to a set of known structures in the PDB. The most similar structure is identified, and its structure is used as a template to predict the structure of the protein.

Computational Approach

The computational approach involves the use of a knowledge-based scoring system to evaluate the predicted structure. The scoring system is based on the presence and arrangement of functional groups in the protein. The predicted structure is compared against a set of known structures, and the most similar structure is identified.



The results of the study demonstrate the effectiveness of the proposed method in predicting protein structure. The method shows high accuracy and is able to handle a wide range of protein sequences. The proposed method has several potential applications, including the identification of drug targets and the design of new drugs.

Abstract: This study presents a novel approach to protein structure prediction based on a knowledge-based approach. The method involves comparing the sequence of a protein to a set of known structures in the PDB. The most similar structure is identified, and its structure is used as a template to predict the structure of the protein. The results of the study demonstrate the effectiveness of the proposed method in predicting protein structure.

Welcome



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International
Science and
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Fair





Welcome



Science & Engineering Fair

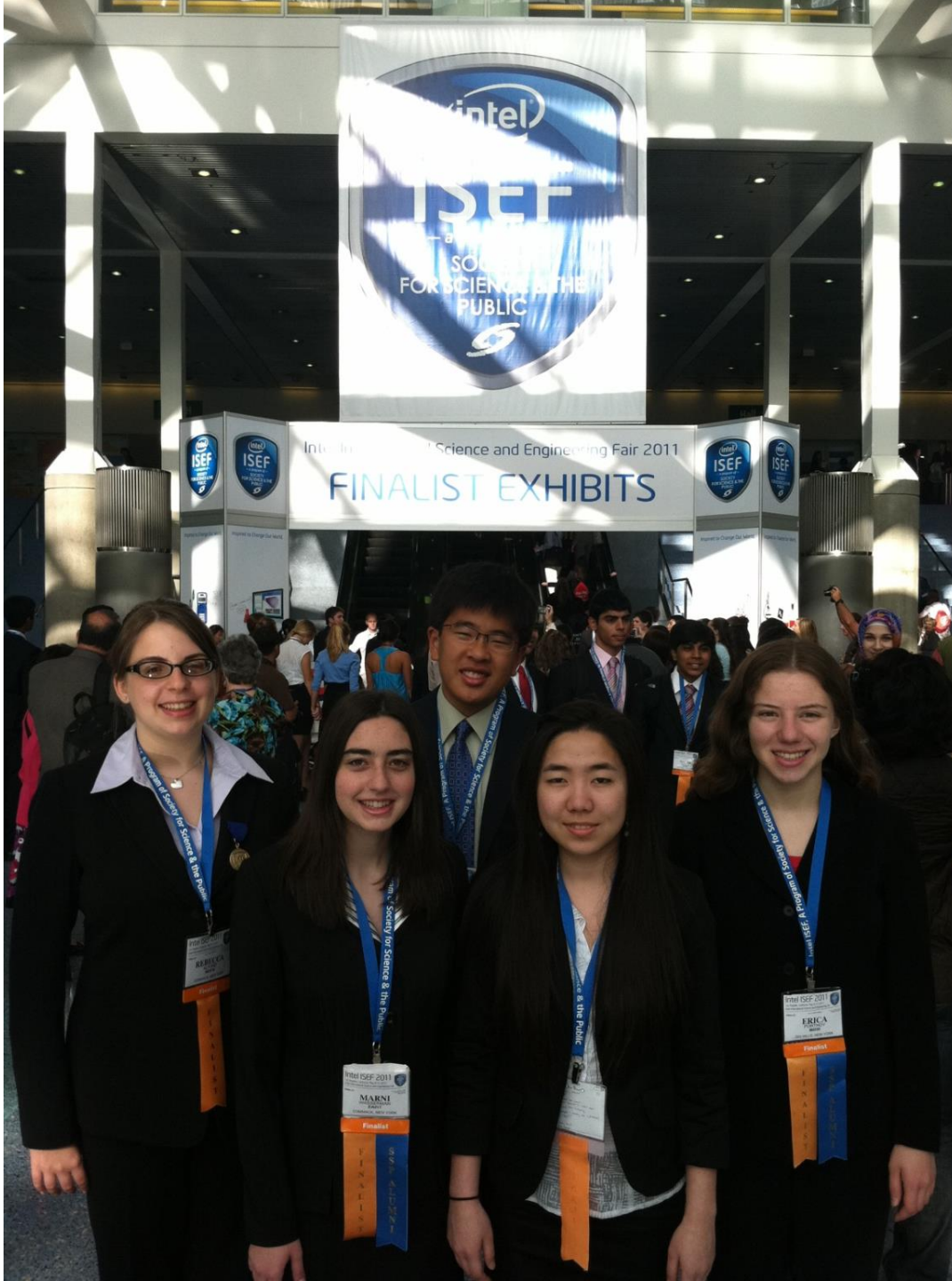
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Science & Engineering Fair



JSHS



Richard Korte
Commack High School

Ead Karach

The United States Air Force, Navy, and Air Force
honoring
Richard Korte
Commack High School

STONY BROOK UNIVERSITY
Science & Symposium



LISC



Natural Wound Healing Substances And Their Effect on California Blackworms

Rub Some Garlic On It?

Research Question

What are the effects of natural substances on the wound healing of California Blackworms?

Hypothesis

All the above substances will increase the rate of wound healing of California Blackworms. The most effective substance will be garlic. The substances that will have the least effect will be honey and aloe vera.

Background Information

Wound Healing: The process by which the body repairs the damage caused by a wound. It involves the formation of a scab, the growth of new skin cells, and the contraction of the wound.

California Blackworm: A small, segmented, aquatic invertebrate that is commonly found in freshwater environments. It is used as a model organism for studying wound healing.

Materials

California Blackworms, Petri dishes, Cotton swabs, Distilled water, Honey, Aloe vera gel, Garlic extract, Paper towels, Microscope, Magnifying glass.

Procedure

1. Prepare the worms: Place worms in a petri dish with distilled water.
2. Create the wounds: Use a sterile needle to create a 1cm x 1cm wound on the side of the worm.
3. Apply the substances: Apply a small amount of each substance to the wound.
4. Observe and record: Observe the worms over a period of 24 hours and record the rate of wound healing.

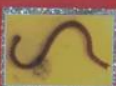
Conclusion



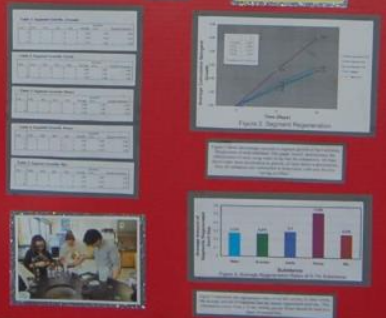
Conclusion

The results of the experiment showed that garlic extract had the most significant effect on wound healing in California Blackworms. Honey and aloe vera gel had the least effect. The control group (distilled water) showed no significant effect.

Preliminary Testing



Data



The Ef
On the In

**Natural Wound Healing Substances
And Their Effect on California Blackworms**

Research Question
What is the natural wound healing substance of California Blackworms?

Hypothesis
Natural wound healing substances will decrease the rate of the California Blackworms' rate. To the natural wound healing substance of California Blackworms. To the natural wound healing substance of California Blackworms. To the natural wound healing substance of California Blackworms.

Procedure

Preliminary Testing

Data

Background Information





**The Effect of Toothpaste Antibacterials
On the Inhibition of *Streptococcus salivarius***




Purpose
The purpose of this experiment was to determine what antibacterial toothpaste is most effective at inhibiting the growth of *Streptococcus salivarius* in a laboratory setting.

Procedure
The purpose of this experiment was to determine what antibacterial toothpaste is most effective at inhibiting the growth of *Streptococcus salivarius* in a laboratory setting.

Conclusion
The purpose of this experiment was to determine what antibacterial toothpaste is most effective at inhibiting the growth of *Streptococcus salivarius* in a laboratory setting.

Implications

Substance Used	Zone of Inhibition (mm)
Control	0
Colgate	10
Oral-B	15
Merck	20
Parodontax	25
Polident	30
Smartbrush	35
Ultra Whitening	40
Whitening Toothpaste	45

**The Effects of Antibiotics on
Of *Escherichia coli***

Procedure

Conclusion








The Effect of Toothpaste Antibacterials On the Inhibition of *Streptococcus salivarius*

The Effects of Antibiotics on the Regrowth Of *Escherichia coli*

Exploring the Effect Of Antibiotics On the Growth of Bacteria

Purpose

The purpose of this investigation was to determine which active ingredients in toothpaste plays the most important role in stopping bacterial growth: inhibiting the growth of bacteria and also, reducing the likelihood of plaque or cavity buildup.

Hypothesis

It is hypothesized that toothpaste containing hydrogen peroxide will reduce bacterial growth in an effective manner. It is also hypothesized that toothpaste containing triclosan will reduce bacterial growth in an effective manner. It is also hypothesized that toothpaste containing fluoride will reduce bacterial growth in an effective manner.

Background

Bacteria are the most common cause of tooth decay. The bacteria that cause tooth decay are called cariogenic bacteria. These bacteria feed on the sugars in food and produce acids that attack the enamel on the teeth. The acids cause the enamel to become porous and eventually break down. This process is called tooth decay. Tooth decay is a common problem and can be prevented by brushing and flossing regularly. Toothpaste containing fluoride can help prevent tooth decay by strengthening the enamel. Toothpaste containing hydrogen peroxide can help prevent tooth decay by killing the bacteria that cause tooth decay. Toothpaste containing triclosan can help prevent tooth decay by killing the bacteria that cause tooth decay.

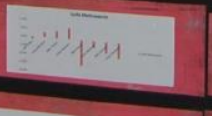
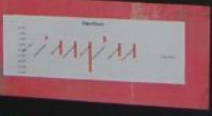
References

Purpose

The purpose of the experiment is to determine the optimal time of treatment to inhibit bacterial growth using various time lengths and two different antibiotics, an antibiogram, and one herbal method.

Hypothesis

The antibiotics and antibiogram will inhibit and reduce the size of the colonies over lengthy amounts of time, the greater the time interval, the larger the diameter in colony diameter. The herbal method will disrupt the cellular structure of the bacteria, but will not inhibit the growth of the antibiotics.



Procedure

Spreading Plates and Zone of Inhibition Study
1. Prepare plates and zones of inhibition study.
2. Prepare plates and zones of inhibition study.
3. Prepare plates and zones of inhibition study.
4. Prepare plates and zones of inhibition study.
5. Prepare plates and zones of inhibition study.
6. Prepare plates and zones of inhibition study.
7. Prepare plates and zones of inhibition study.
8. Prepare plates and zones of inhibition study.
9. Prepare plates and zones of inhibition study.
10. Prepare plates and zones of inhibition study.

Procedure

Initial Test
1. Prepare plates and zones of inhibition study.
2. Prepare plates and zones of inhibition study.
3. Prepare plates and zones of inhibition study.
4. Prepare plates and zones of inhibition study.
5. Prepare plates and zones of inhibition study.
6. Prepare plates and zones of inhibition study.
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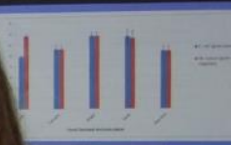
Discussion

The results of the experiment show that the antibiotics and antibiogram were effective in inhibiting bacterial growth. The herbal method was also effective in inhibiting bacterial growth. The results of the experiment show that the antibiotics and antibiogram were effective in inhibiting bacterial growth. The herbal method was also effective in inhibiting bacterial growth.

Future Research

Future research should focus on determining the optimal concentration of antibiotics and antibiogram for inhibiting bacterial growth. Future research should also focus on determining the optimal concentration of the herbal method for inhibiting bacterial growth.

Data/



Antibiotic	Time (hours)	Diameter (mm)
Penicillin	0	0
	1	1.5
	2	3.0
Ampicillin	0	0
	1	1.5
	2	3.0
Tetracycline	0	0
	1	1.5
	2	3.0
Erythromycin	0	0
	1	1.5
	2	3.0
Vancomycin	0	0
	1	1.5
	2	3.0

Antibiotic	Time (hours)	Diameter (mm)
Penicillin	0	0
	1	1.5
	2	3.0
Ampicillin	0	0
	1	1.5
	2	3.0
Tetracycline	0	0
	1	1.5
	2	3.0
Erythromycin	0	0
	1	1.5
	2	3.0
Vancomycin	0	0
	1	1.5
	2	3.0

Antibiotic	Time (hours)	Diameter (mm)
Penicillin	0	0
	1	1.5
	2	3.0
Ampicillin	0	0
	1	1.5
	2	3.0
Tetracycline	0	0
	1	1.5
	2	3.0
Erythromycin	0	0
	1	1.5
	2	3.0
Vancomycin	0	0
	1	1.5
	2	3.0

Antibiotic	Time (hours)	Diameter (mm)
Penicillin	0	0
	1	1.5
	2	3.0
Ampicillin	0	0
	1	1.5
	2	3.0
Tetracycline	0	0
	1	1.5
	2	3.0
Erythromycin	0	0
	1	1.5
	2	3.0
Vancomycin	0	0
	1	1.5
	2	3.0

Exploring the Effects of Natural Products On the Growth of Bacteria

Problem
Do natural products act as antimicrobial agents to prevent the growth of bacteria?

Introduction
Bacterial properties and growth are affected by natural products. Antimicrobial agents have the capability of limiting the growth of bacteria.

Background
Natural products have been used for centuries as antimicrobial agents. This study aims to determine the effectiveness of natural products against various bacterial strains.

Microbial Agents
The study involves the use of various bacterial strains to test the effectiveness of natural products. The agents used include *Escherichia coli*, *Staphylococcus aureus*, and *Bacillus subtilis*.

Method- Part One
The first part of the experiment involves the preparation of bacterial cultures and the application of natural products to observe their effects on growth.

Method- Part Two
The second part of the experiment involves the measurement of bacterial growth using optical density readings and the application of statistical analysis.

Method- Part Three
The final part of the experiment involves the visualization of bacterial growth on agar plates and the comparison of results with the control group.

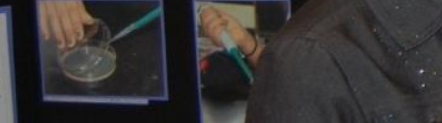
Data/Analysis



Strain	Control	Product A	Product B
<i>E. coli</i>	1.0	0.8	0.6
<i>S. aureus</i>	1.0	0.9	0.7
<i>B. subtilis</i>	1.0	0.8	0.5



Strain	Control	Product A	Product B
<i>E. coli</i>	1.0	0.8	0.6
<i>S. aureus</i>	1.0	0.9	0.7
<i>B. subtilis</i>	1.0	0.8	0.5



A Comparison of Vacuole Formation in Different Strains of *Tetrahymena thermophila*

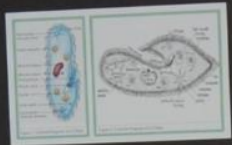
Purpose
The purpose of this investigation was to determine if there is a difference in vacuole formation in different strains of *Tetrahymena thermophila*.

Hypothesis
If different strains of *Tetrahymena* are compared in terms of vacuole formation, then there would be a difference in the number of vacuoles formed depending on the type of strain of the protozoa.

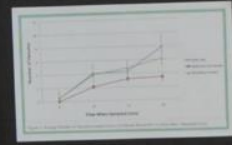
Background
Tetrahymena thermophila is a unicellular ciliated organism that is commonly used in laboratory settings. It has a large central vacuole that is essential for its survival. The number of vacuoles formed can vary between different strains of the organism. This study aims to compare the vacuole formation in different strains of *Tetrahymena thermophila*.

Procedure
1. Label the 100 mL beakers with the name of the strain of *Tetrahymena thermophila* that you are using.
2. Add 50 mL of the culture medium to each beaker.
3. Add 5 mL of the *Tetrahymena thermophila* culture to each beaker.
4. Incubate the beakers in a dark environment at 25°C for 24 hours.
5. Observe the cultures under a microscope and count the number of vacuoles in each cell.
6. Record the data in a table.

Data



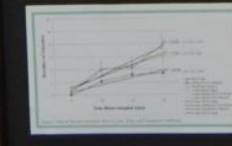
Strain	Vacuoles per cell
Strain A	1
Strain B	2
Strain C	3



Time (h)	Strain A	Strain B	Strain C
0	0	0	0
1	1	2	3
2	2	4	6
3	3	6	9
4	4	8	12
5	5	10	15



Strain	Average Vacuoles per cell
Strain A	2.5
Strain B	5.0
Strain C	7.5



Time (h)	Strain A	Strain B	Strain C
0	0	0	0
1	1	2	3
2	2	4	6
3	3	6	9
4	4	8	12
5	5	10	15

Strain	Average Vacuoles per cell
Strain A	2.5
Strain B	5.0
Strain C	7.5



Discussion of Results
The results of this investigation show that there is a significant difference in the number of vacuoles formed in different strains of *Tetrahymena thermophila*. The data indicates that Strain C forms the most vacuoles per cell, followed by Strain B, and then Strain A. This suggests that the number of vacuoles formed is a characteristic trait of different strains of this organism.

Effects of Antibiotics on the Regrowth Of *Escherichia coli*

Exploring the Effects of Natural Products On the Growth of Bacteria

A Comparison in Test

Problem

How well do natural antimicrobial agents prevent the growth of bacteria?

Hypothesis

Because of their antibacterial properties and health benefits (according to the literature), the chosen natural antimicrobial agents for the study will be capable of limiting the growth of *Escherichia coli* K12 and *Micrococcus luteus*.

Background

The first known use was in the Orient about 2300 years ago. The use of antimicrobial agents has been a part of human history since ancient times. The use of antimicrobial agents has been a part of human history since ancient times. The use of antimicrobial agents has been a part of human history since ancient times.

Antimicrobial Agents

Antimicrobial agents are substances that kill or inhibit the growth of microorganisms. They are used to treat infections and prevent the spread of disease. Antimicrobial agents are used to treat infections and prevent the spread of disease.

Part One

Part One describes the initial setup and the first observations. Part One describes the initial setup and the first observations.

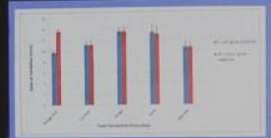
Part Two

Part Two describes the results of the first experiment. Part Two describes the results of the first experiment.

Part Three

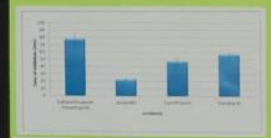
Part Three describes the results of the second experiment. Part Three describes the results of the second experiment.

Data/Analysis



Condition	E. coli K12 (OD600)	Micrococcus luteus (OD600)
Control	0.8	0.8
Antimicrobial A	0.4	0.4
Antimicrobial B	0.5	0.5
Antimicrobial C	0.6	0.6

Condition	E. coli K12 (OD600)	Micrococcus luteus (OD600)
Control	0.8	0.8
Antimicrobial A	0.4	0.4
Antimicrobial B	0.5	0.5
Antimicrobial C	0.6	0.6



Condition	E. coli K12 (OD600)	Micrococcus luteus (OD600)
Control	0.8	0.8
Antimicrobial A	0.4	0.4
Antimicrobial B	0.5	0.5
Antimicrobial C	0.6	0.6

Condition	E. coli K12 (OD600)	Micrococcus luteus (OD600)
Control	0.8	0.8
Antimicrobial A	0.4	0.4
Antimicrobial B	0.5	0.5
Antimicrobial C	0.6	0.6



Conclusion/Implication

The results of the study show that natural antimicrobial agents are effective in limiting the growth of *Escherichia coli* K12 and *Micrococcus luteus*. This suggests that natural products may be a viable alternative to synthetic antibiotics.

Future Directions

Future research should focus on identifying the specific compounds responsible for the antimicrobial activity and testing them against other bacterial species.

Purpose

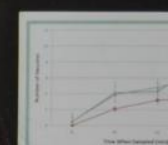
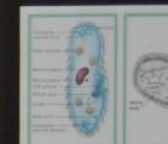
The purpose of this study was to investigate the effects of natural antimicrobial agents on the growth of *Escherichia coli* K12 and *Micrococcus luteus*.

Hypothesis

The hypothesis was that natural antimicrobial agents would significantly reduce the growth of *Escherichia coli* K12 and *Micrococcus luteus*.

Method

The study used a controlled experiment to test the effects of natural antimicrobial agents on bacterial growth.







LISEF round 1



EXIT

AUDITOR

COMMACK HIGH SCHOOL
DEDICATED 1966
BOARD OF EDUCATION
DR. JOSEPH J. DEL...
SUPERINTENDENT OF SCHOOLS
ANSEL J. LA BIANCA
HARVEY
MARY
BETTY
WYOMING

Research Goals

- Photocrosslinking to map *in vivo* protein-protein interactions during pilus biogenesis

Background

Urinary Tract Infections

- E. coli is used as a model organism because of its well understood genetics, ease of use in laboratory setting, and easier processes to many common bacteria.
- 80% of urinary tract infections are caused by Gram negative E. coli.
- A crucial step in infection is host cell recognition and attachment by adhesive organelles known as pili.
- Pili bind to receptors in the kidney, allowing E. coli to cause the disease pathogenesis.
- Characterizing the precise bacteria can be produce pili will allow open the drugs to be developed that disrupt this process, or designed to target specific antibodies that bind to pili as well as harmful bacteria.

Pilus Assembly by the Chaperone/Usher Pathway

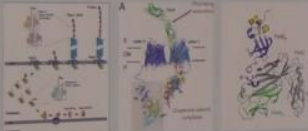


Fig. 3 Model for pilus assembly by the Chaperone/Usher pathway (L & Thomas, 2008)

Fig. 4 Model for the incorporation of the PiliC into the pilus (L & Thomas, 2008)

Fig. 5 Schematic of the structure of the PiliC (L & Thomas, 2008)

- The N-terminal domain has been shown to be involved in differential targeting of chaperone-usher complex and catalyzing substrate interactions at a conserved unidentified late stage of pilus biogenesis (Fig. 2004)
- Residues 2-33 of the N-terminus are required to bind chaperone-usher complex, although the double loop region also appears to be important for catalyzing substrate interactions during pilus assembly. No new domain is not yet known.
- By capturing the *in vivo* protein interactions, *in vivo* site-directed photocrosslinking will be used to map interactions made by the double loop region.

Photocrosslinking

- Insert
- Express
- Prepare
- Immunoblot




Fig. 6 Schematic of the photocrosslinking process (L & Thomas, 2008)

Fig. 7 Schematic of the photocrosslinking process (L & Thomas, 2008)

Fig. 8 Schematic of the photocrosslinking process (L & Thomas, 2008)

By using mutant amber suppressor (MS), the highest protein can suppress a nonsense photocrosslinking (L & Thomas, 2008)

A Novel Approach to Mapping Protein Interactions During Pilus Biogenesis by Using *in vivo* Photocrosslinking

Methods and Results

1. Construction of Amber Mutant

79
 103 CYS ACA **90A** GAT ATG **90C** AAA CYS **88** ...
 134 141 150 166 182 197 214 231 247 ...
 266
 324 332 CYS GAG AAA CTT CTT **332** TGG TGG **331** ...
 354 365 376 387 398 411 424 437 450 463 ...

- Site-directed mutagenesis was used to introduce the amber codon (TAG) at positions evenly distributed throughout the loop region of the N-terminal domain (mutated codons indicated by bold font)

2. Incorporation of Unnatural Amino Acid

A

MSA WT ... 112 Y28 347G 382 382 416 Y31 459

B

MSA WT ... 112 347 378 382 416 Y31 459

Fig. 1 A Expression of amber mutants of PiliC in the presence or absence of amber suppressor (MSA), analyzed by SDS-PAGE and immunoblotting with anti-piliC antibody. **B** Expression of amber mutants of PiliC in the presence or absence of canonical amino acid, analyzed by SDS-PAGE and immunoblotting with anti-piliC antibody.

- Stop codon prevents wild type protein expression in absence and allows expression in presence of suppressor tRNA.
- PiliC is being produced at higher levels in presence of piliP.
- Test to see if different amino acid being inserted: repeat A at higher concentration of anti-His.

3. Usher Expression, Folding, and Oligomerization

Outer Membrane Preparation: isolate outer membrane to test usher expression

Sensitization strategy: Sensitized cells by cultivation → Surface extraction → Usher-anti-Usher immunoprecipitation → SDS-PAGE gel → Western blot analysis

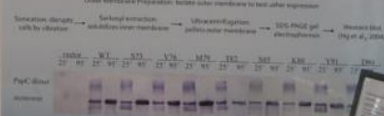


Fig. 4 Usher membrane preparation and large scale cell culture

- If properly folded, Usher is stable at 20°C and recombinant is stable at 95°C.
- Amber mutants fold and oligomerize naturally.

Conclusions

• ...

• ...

• ...



NIH

...
 ...
 ...



MODELLING HEAT TRANSPORT IN MULTIPHASE MATERIALS

Arpon Rakib

Abstract: Phase Model

- Model a system with three particles whose internal properties differ from the bulk material.
- Each microstructure, morphology, and thermal properties of these three particles.
- Study the propagation of heat waves and formation of temperature gradients in these mixed particles.
- Define internal differential ϵ for each phase for defining interaction time, τ , for particles of various phases (1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11) (12) (13) (14) (15) (16) (17) (18) (19) (20) (21) (22) (23) (24) (25) (26) (27) (28) (29) (30) (31) (32) (33) (34) (35) (36) (37) (38) (39) (40) (41) (42) (43) (44) (45) (46) (47) (48) (49) (50) (51) (52) (53) (54) (55) (56) (57) (58) (59) (60) (61) (62) (63) (64) (65) (66) (67) (68) (69) (70) (71) (72) (73) (74) (75) (76) (77) (78) (79) (80) (81) (82) (83) (84) (85) (86) (87) (88) (89) (90) (91) (92) (93) (94) (95) (96) (97) (98) (99) (100)
- Define heat capacity C for each phase.
- Study phase ϵ as a function of interaction time τ for phase ϵ .

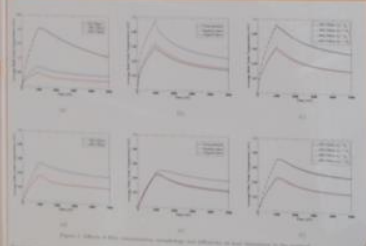
- The transfer time τ is multiplied by the ratio of heat capacities C_1/C_2 .
- Heat transfer time τ is multiplied by the heat transfer coefficient h_1 and h_2 for heat $Q_1 = Q_2$.
- Heat transfer is determined by the temperature gradient between the phases.
- Define a certain heat transfer coefficient h_{12} such that it is effective in proportion to $(h_1 h_2)^{1/2}$.

$$h_{12} = \frac{h_1 h_2}{h_1 + h_2}$$

- Define a ratio of C_1 heat capacity h_1 to phase ϵ with temperature T_1 to phase ϵ with temperature T_2 .
- According to the current law of microstructures, heat should not travel from regions of higher temperature to lower temperature.
- $h_{12} = C_1 h_1$ or $h_{12} = C_2 h_2$ is defined for each phase ϵ .

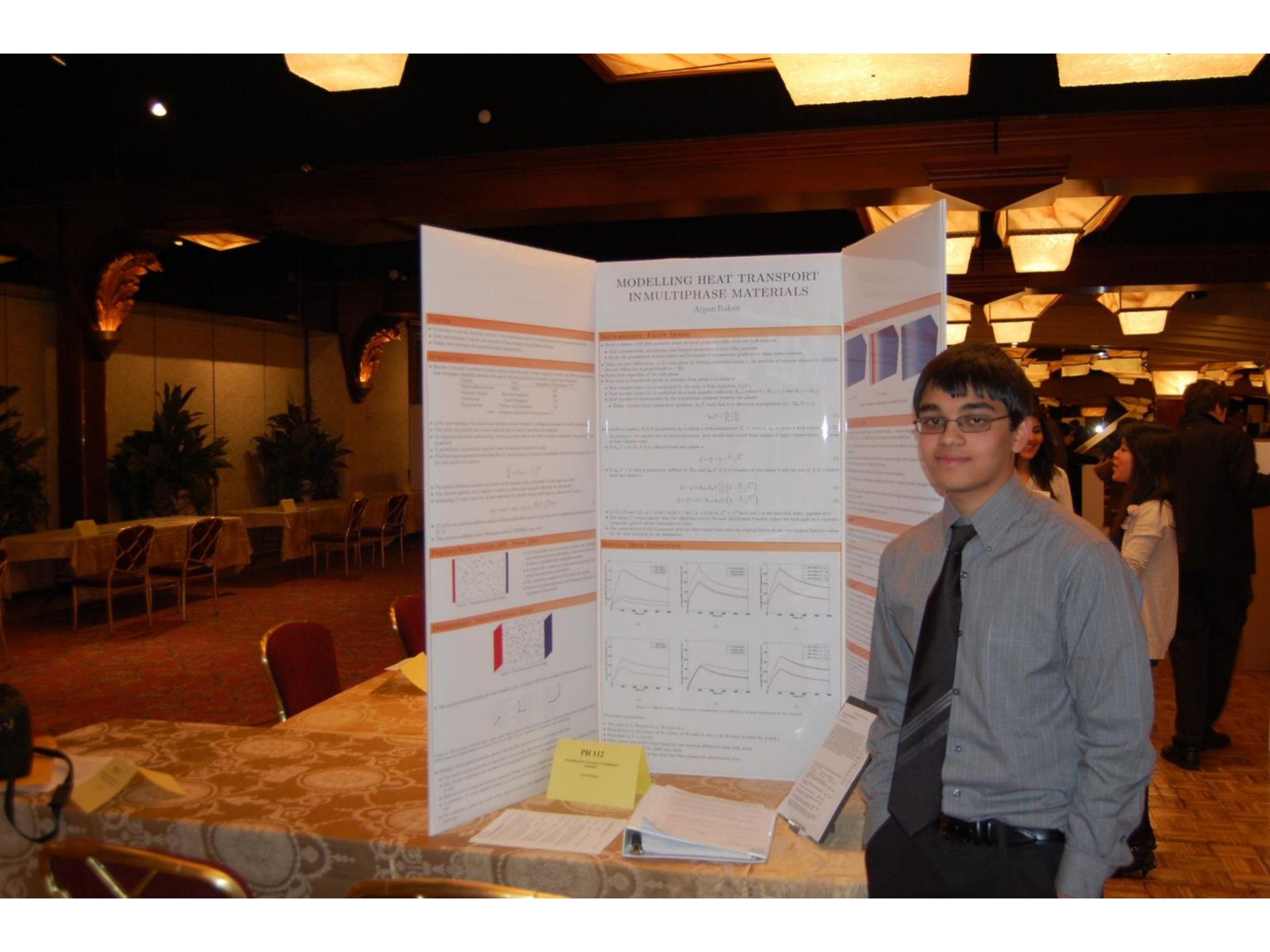
$$h_{12} = \frac{C_1 h_1 C_2 h_2}{C_1 h_1 + C_2 h_2}$$

Heat Transport



- All units are in SI units.
- The heat transfer coefficient h is defined as the rate of heat transfer per unit area and per unit temperature difference.
- The heat capacity C is defined as the amount of heat required to raise the temperature of a unit mass of a substance by one degree Celsius.
- The heat transfer time τ is defined as the time required for heat to travel a certain distance.

PH 112
Heat Transfer





A Novel Approach to Modeling Genetic Sensory Impairments through De Novo Prediction of Mutant Protein Structure

Analysis

Algorithm Design and Calculations

- Derived comparative calculations for components of structure prediction.
- Used a uniform approach to determine necessary features.

Controlling *in vivo* conditions

- Maximize α for C^{α} structural orientation
- Created template for calculations (Eq. 2)
- α is the residue or corresponding value
- β describes position relative to center (2)
- Range of α values specific to calculation

α -Helix and β -Sheet Propensity

- Range for α determined by biochemical structure
- α -Helix is $-4 \leq \alpha \leq 4$ based upon 3.6-residue requirement per turn
- β -Sheet: non-specificity (no structural requirement)
- Multiple ranges used for variability across segments

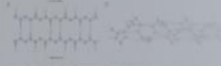


Figure 4: General Chemical Structure of α -helix and β -sheet and α and β values (14)

- System uses symbols and P values for each residue
- Final value derived from symbol-based mean and value-based mean in Eq. 3
- Final = 20% Alphasomenus + 80% Numerics (3)

Standard, Buried and Accessible Area

- Comprehensive area calculated for (Eq. 4)
- Standard: Average backbone area of α residues in the orientation of $100-300 \text{ \AA}^2$
- Buried: Average area needed upon transfer from accessible to buried state
- Accessible: Average area accessible in the structure (average area accessible in the structure)

Helix Propensity (P_{α})

- Final score propensity calculated using Eq. 7
- Final = 20% Composites + 80% Propensity (7)
- Residues with highest propensity most likely become backbone residues

Program Construction and Implementation



Figure 5: System Layout

Building a User Interface

- Easy to use
- Incorporates existing clinical information
- Created two interfaces:
 - Input wild-type variant and additional mutation for integration by the program
 - Input wild type and (suspected) mutant variants

Object and Program Design

- Program constructed in Java 8.0
- Algorithm components converted into functional objects
- Integrated Development Environment used for programming
- Flowchart of program layout describes function of the program (Fig. 5)

Results and Discussions

Modeling Structure and Patterns in Computation
Comparative analysis of modeling 'long' α residues with associated values
Comparison of α and β values and comparison to wild type
Comparison of α and β values and comparison to wild type
Comparison of α and β values and comparison to wild type

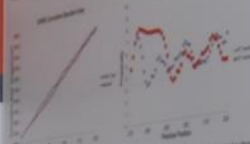


Figure 6: Residue Buried Area and Residue Accessible Area for 200k Residues

Analysis, Interface and Implementation

- Easy to use
- Comparative analysis of modeling 'long' α residues with associated values
- Comparison of α and β values and comparison to wild type
- Comparison of α and β values and comparison to wild type

Computational vs. Experimental Results

- Comparison of experimental and computational results
- Comparison of experimental and computational results

Future Directions

- Comparison of experimental and computational results
- Comparison of experimental and computational results

Applications

- Comparison of experimental and computational results
- Comparison of experimental and computational results

References

- Comparison of experimental and computational results
- Comparison of experimental and computational results

BACKGROUND INFORMATION

Colorectal cancer affects a significant number of individuals worldwide. In the US, over 160,000 new cases and 70,000 deaths are estimated for 2017.

The most common screening method is colonoscopy, which allows for detection of colorectal polyps. Polyps are precancerous growths that can turn into colorectal cancer. Polyps are often found during a colonoscopy.

Table 1: Colon cancer incidence rates by race/ethnicity

Race/Ethnicity	Incidence Rate (per 100,000)
White	27.2
Black	20.8
Hispanic	15.1
Asian	10.1

Table 2: Colon cancer mortality rates by race/ethnicity

Race/Ethnicity	Mortality Rate (per 100,000)
White	15.1
Black	11.2
Hispanic	8.4
Asian	5.4

METHODS

1. Data was collected from the Surveillance, Epidemiology, and End Results (SEER) database.

2. Data was analyzed using Stata 14.0.

3. Age-adjusted incidence and mortality rates were calculated.

4. Relative risk (RR) and 95% confidence intervals (CI) were estimated.

5. Statistical significance was determined using the chi-square test.

The Effect of Race/Ethnicity on the Age of Colorectal Cancer Diagnosis

By Matthew Kutz

STATISTICAL ANALYSES

Statistical analyses were conducted using logistic regression to assess the effect of race/ethnicity on the age of colorectal cancer diagnosis. The model included age, sex, and race/ethnicity as independent variables. The dependent variable was the age at diagnosis (in years).

RESULTS

Table 1: Effect of race/ethnicity on the age of colorectal cancer diagnosis

Race/Ethnicity	Age at Diagnosis (Mean ± SD)	p-value
White	68.5 ± 10.2	0.001
Black	65.2 ± 9.8	0.002
Hispanic	62.1 ± 9.5	0.003
Asian	60.3 ± 9.1	0.004

Logistic regression (OR=1.02) due to removal of Patient as age that was the only variable significantly associated with age at diagnosis. Non-significance, non-significance.



Correlations Between Chronic Lymphocytic Leukemia and Activation-Induced Cytidine Deaminase

Materials & Methods

1. Peripheral blood mononuclear cells (PBMCs) were isolated from CLL patients and healthy controls.

2. Total RNA was extracted and reverse-transcribed into cDNA.

3. A TaqMan real-time PCR assay was used to quantify AICDA1 expression.

4. Statistical significance was determined using the t-test.

Results

Quantitative real-time PCR analysis revealed that AICDA1 expression was significantly higher in CLL patients compared to healthy controls (p < 0.001).

Discussion

Chronic lymphocytic leukemia (CLL) is a type of cancer that affects the white blood cells. One of the characteristic features of CLL is the presence of a monoclonal population of B-lymphocytes. Activation-induced cytosine deaminase (AICDA) is an enzyme that is involved in the generation of diversity in the B-cell receptor repertoire. The expression of AICDA is upregulated in CLL, which is consistent with the increased diversity of the B-cell receptor repertoire.

Conclusions & Future Work

The results of this study suggest that AICDA expression is significantly higher in CLL patients compared to healthy controls. This finding is consistent with the increased diversity of the B-cell receptor repertoire in CLL. Future work should focus on identifying the mechanisms that regulate AICDA expression in CLL.

ME 121
The Effect of Race/Ethnicity on the Age of Colorectal Cancer Diagnosis
Matthew Kutz

ME 122
Correlations Between Chronic Lymphocytic Leukemia and Activation-Induced Cytidine Deaminase
Matthew Kutz



An Investigation of New York City Storm Surges: Atmospheric Conditions and Development of a Statistical Model for Prediction

Introduction

Storm surges are the most destructive part of a hurricane...

The City of New York estimates a loss from 100 to 200 billion dollars annually from coastal erosion, flooding, and property damage...

Measuring a storm surge is difficult because of the lack of instruments in the ocean...

The National Oceanic and Atmospheric Administration (NOAA) has been studying storm surge development...

Understanding storm surge development is important for coastal protection...

Storm surge prediction is a complex task because of the many factors involved...

The goal of this project is to investigate the relationship between atmospheric conditions and storm surge heights...

The project will use historical data to develop a statistical model for prediction...

Results

Regression ($p < 0.001$):

- $Y = \text{storm surge height}$
- $U = u\text{-wind}$ ($p = 0.004$)
- $V = v\text{-wind}$ ($p = 0.480$)
- $P = \text{sea level pressure}$ ($p < 0.001$)
- $F = \text{fetch}$ ($p = 0.001$)
- Variance = 53%
- Model works best for surge heights greater than 2 feet

Equation: $y = 0.004x + 0.5$

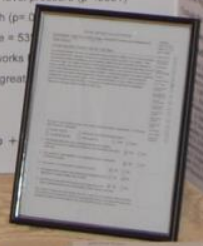
Results Continued

Year	Storm Surge	Sea Level Pressure	Wind Speed
1950	2.5	1015	10
1960	3.0	1010	15
1970	4.0	1005	20
1980	5.0	1000	25
1990	6.0	995	30
2000	7.0	990	35
2010	8.0	985	40

Storm surge prediction is a complex task because of the many factors involved...

The project will use historical data to develop a statistical model for prediction...

EA 107
An Investigation of New York City Storm Surges:
Atmospheric Conditions and Development of a
Statistical Model for Prediction
David Johnson



EA 108

Purpose

- To determine the effectiveness of using colonial era weather data to study trends in climate change over the past 300 years in the northeastern United States.
- To create a blueprint model that is easily adaptable for analyzing and comparing colonial era or other historical weather data to modern data.

Introduction

- Past temperatures can be estimated using proxies such as tree rings, ice core isotopes, coral reefs, bore holes, and lake/ocean sediment.
- Climate Change Debate
 - Human induced changes in CO₂
 - Natural causes such as interglacial period, increased solar activity, change in orbit.
- Precautionary principle - everything must be done to prevent the human induced causes of climate change in case they are the actual cause.
- Possible effects of increase in temperature - rising sea levels, glacier and polar ice melting, change in weather patterns, decrease in agricultural stability, extinction of species, and an increase of disease vectors.

Procedure



Data from 1876-1883 and 2000-2009 obtained from NOAA

January, February, July and August were isolated for comparison

Months and number of days at various temperatures determined

Relationship between temperature and atmospheric CO₂ analyzed

Student T-test performed including adjustment for Degrees of Freedom

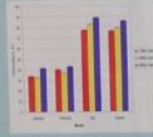
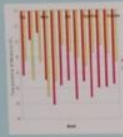
Accuracy of Postdammer's thermometer was checked and verified

Investigating Climate Change: A Comparative Analysis of Colonial and Modern Weather Data

Marni Wasserman

Results

1. Graphical Comparison of temperatures

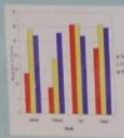
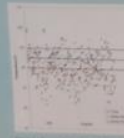


2. Student T-test Results for Comparing Temperatures

January		February		July		August		
Mean	DOF	Mean	DOF	Mean	DOF	Mean	DOF	
1700s	34.4°F	31	40.4°F	32	77.4°F	40	76.3°F	42
1800s	33.1°F	25	37.2°F	22	82.9°F	34	79.1°F	32
2000s	42.7°F	39	43.0°F	35	80.7°F	41	85.7°F	46

January		February		July		August		
p-value	significant	p-value	significant	p-value	significant	p-value	significant	
1700 v 1800	0.2281	no	0.1014	no	<0.0001	yes	0.0002	yes
1700 v 2000	<0.0001	yes	0.0002	no	<0.0001	yes	<0.0001	yes
2000 v 1800	<0.0001	yes	0.0005	yes	<0.0001	yes	<0.0001	yes

3. Additional Comparisons



Conclusion

- Temperature has increased since 1700
- The temperature did not increase evenly during this time period.
- The variation of temperature from the 1700s is now more extreme.

Improvements

- The data used in this experiment was not homogeneous.
- In the Postdammer data, there were some gaps in temperature data not recorded.
- January, June, May, and May data
- To make the results more valid






Synthesis and Development of New Phototrigger: 1,1,2-Triphenyl Ethanone Group



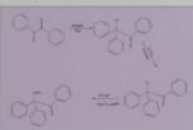
Steve Jang

Background

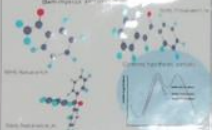
Phototrigger is a molecule that can be activated by light to initiate a chemical reaction. It is used in various applications, including drug delivery and materials science.



Overall Synthetic Scheme



Computational Photochemistry




Sublimation
 (Check page 27)

Air purification
 (Check page 27)

Most of the... and...
 (Check page 27)

Photochemical Reaction



IR Spectroscopy

IR spectroscopy is used to identify the functional groups in a molecule. The characteristic absorption bands for the 1,1,2-Triphenyl Ethanone Group are shown below.



Air purification



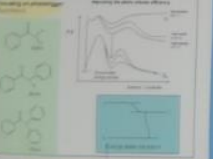
Conclusion

The synthesis and development of the new phototrigger, 1,1,2-Triphenyl Ethanone Group, was successfully completed. The results show that the molecule is highly effective in its intended applications.

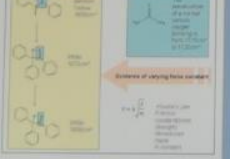
Future Research

Further studies are needed to optimize the phototrigger for various applications and to explore its potential in other fields.

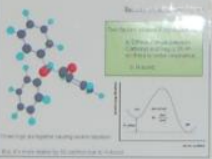
Photophysical Properties



Structure of the phototrigger



Structure of the phototrigger



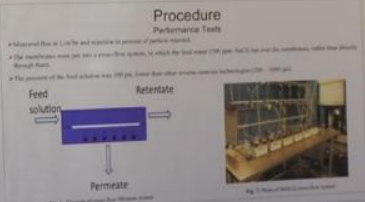
Structure of the phototrigger








Improving Pure Water Availability: Optimizing Flux in Reverse Osmosis Membranes



Results and Conclusion

Hydrogel-Axial Model - membrane flux of pure water, then water with feed solution, and finally feed solution with fouling. The model was used to represent such a single feed flow, as shown in Figure 1.

As for each of the test conditions, this test was run for the first and second to determine average values of flux. The results are shown in Table 1 and Table 2. The flux was measured for each condition. The flux was measured for each condition. The flux was measured for each condition. The flux was measured for each condition.

Table 1: Fluxes for different feed water conditions

Feed Water	Flux (L/m ² h)
Distilled Water	15.5
200 ppm TDS	14.2
500 ppm TDS	13.8
1000 ppm TDS	13.1

Table 2: Fluxes for different feed water conditions with fouling

Feed Water	Flux (L/m ² h)
Distilled Water	15.5
200 ppm TDS	14.2
500 ppm TDS	13.8
1000 ppm TDS	13.1



Results cont'd

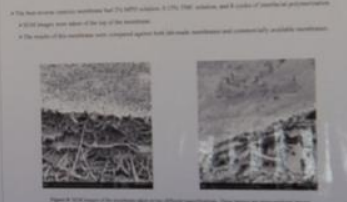


Table 3: Fluxes for different feed water conditions with fouling

Feed Water	Flux (L/m ² h)
Distilled Water	15.5
200 ppm TDS	14.2
500 ppm TDS	13.8
1000 ppm TDS	13.1

Future Work

Further studies will be conducted to investigate the effects of different feed water conditions on the performance of the membranes. The results of these studies will be reported in a future publication.

References

1. [Reference text]

2. [Reference text]

3. [Reference text]

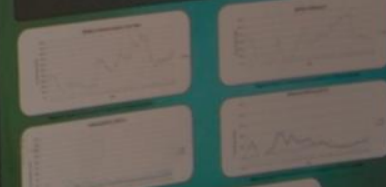
The Quantification of ANAMMOX bacteria

Methodology

Methodology

The methodology used in this study was to quantify the ANAMMOX bacteria in a wastewater treatment plant. The methodology involved the use of a flow cytometer to measure the fluorescence of the bacteria. The results of the quantification are shown in Table 1.

Performance Tests



References

1. [Reference text]

2. [Reference text]

3. [Reference text]

Galectin-7 on the Interleukin-1-Beta

Galectin-7 to Peripheral Blood (PBMC) effect the expression of Interleukin-1-Beta (IL-1 β)?

Relationship correlate to the airways in the airways of individuals with Papillomatosis?

Procedure



...phenotype...
...All...
...CD19...
...S...
...C...
...E...
...B...
...S...
...D...
...T...

Introduction

Schizophrenia is a devastating mental disorder characterized by extreme psychosis, hallucinations, and paranoia (Fenton, 1999).
Neuregulin-1 (Nrg1) is a schizophrenia-susceptibility gene (Schizophrenia et al., 2002; Li et al., 2006).
Type III Nrg1 isoform uniquely signals in two ways, each of which may contribute to schizophrenia:
• Back signaling - regulates surface expression of $\alpha 7$ nicotinic acetylcholine receptors ($\alpha 7$ nAChRs) (Figure 1A) (Pezeshki et al., 2008; Zhong et al., 2008).
• $\alpha 7$ nAChRs modulate the release of a variety of neurotransmitters (i.e. glutamate, dopamine) (Krasnoperova et al., 2009).
• ICD-dependent back signaling - Type III Nrg1 ICD translocates to nucleus and regulates gene expression (Figure 1B) (Zhou et al., 2003).
Both $\alpha 7$ nAChRs and Type III Nrg1 ICD are associated with schizophrenia (Freedman et al., 2008; Bawadi et al., 2010).
90% of schizophrenics are heavy smokers, studies suggest that smoking is a form of self-medication because nicotine may improve cognitive and sensory deficits of schizophrenia (Zhong et al., 2008).
Improvement may be a result of potentiation of alpha-7 nicotinic acetylcholine receptors ($\alpha 7$ nAChRs) (Hancock et al., 2008; Zhong et al., 2008).

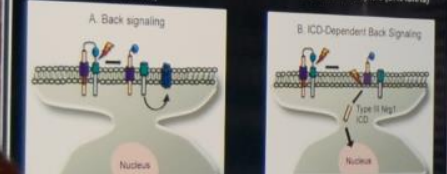
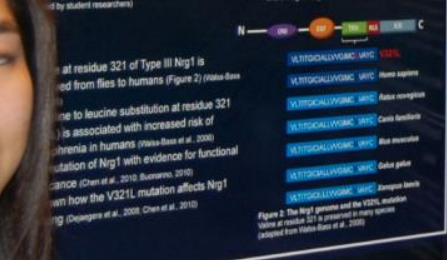


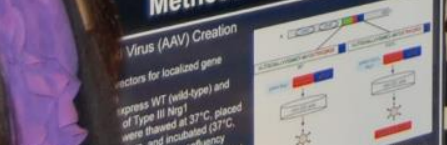
Figure 1A: Type III Nrg1 back signaling...
Figure 1B: Type III Nrg1 ICD-dependent back signaling...



Purpose

The effect of the V321L mutation on Type III Nrg1 function by investigating...
The effect of the V321L mutation on Type III Nrg1 back signaling...
The effect of the V321L mutation on Type III Nrg1 processing...
The phenotypic effects of the V321L mutation, its implications in neurodevelopment and...
...become clearer.

Methods/Results



Expression of a Schizophrenia-associated V321L-Nrg1 Protein Reduces Nrg1-ICD Nuclear Translocation and $\alpha 7$ nAChR Expression

Methods/Results Continued

Immunoprecipitation Western Blot

Methods

- HEK293 cells transfected with either AAV-WT or AAV-V321L. Cells were collected, washed and lysed using ice-cold lysis buffer, and incubated for 30 minutes. Lysates collected by centrifugation.
- Lysates were pre-cleared using irrelevant antibody (rabbit serum) at 4°C for 30 minutes and protein A beads restored to 50% slurry using PBS was added into tubes and incubated at 4°C for 30 minutes with constant mixing to reduce non-specific binding.
- Beads were pelleted by centrifugation and anti-Nrg1 antibody was added to supernatant and incubated at 4°C overnight with constant mixing.
- Protein A bead slurry used to immunoprecipitate anti-Nrg1 antibody. Protein denatured at 95°C for 5 minutes and run on an 8% SDS/polyacrylamide gel and imaged using an Odyssey infrared imaging system.

Results

Figure 4: Immunoprecipitation/Western Blot...
Lanes 1-4: Lysates (Lane 2 = No virus (Control), Lane 3 = AAV-WT, Lane 4 = AAV-V321L).
Molecular weight markers: 175kDa, 80kDa, 58kDa.
Protein A: Phospho-antibody Type III Nrg1 (~80 kDa).

HEK293 cells do not express Nrg1 naturally and AAV viruses are effective vectors for delivering Type III Nrg1 to target cells

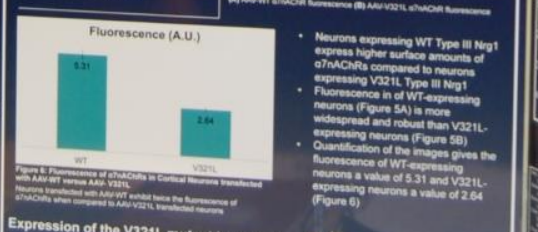
Immunofluorescence for $\alpha 7$ nAChR surface expression

Methods

- Cortical neurons were obtained from mice at E18.5 and transfected with either AAV-WT or AAV-V321L and incubated for 24 hours.
- Live cortical neurons incubated with anti- $\alpha 7$ nAChR antibody for 30 minutes.
- Cortical neurons imaged using a Olympus Fluoview FV1000 confocal microscope and fluorescence quantified using ImageJ.

Results

Figure 5: Primary cortical neurons from mice heterozygous for Nrg1 transfected with AAV-WT and AAV-V321L.
(A) AAV-WT $\alpha 7$ nAChR fluorescence (B) AAV-V321L $\alpha 7$ nAChR fluorescence



Methods/Results Continued

Immunofluorescence of Nuclear Type III Nrg1 ICD

Methods

- HEK293 cells were infected with either AAV-WT or AAV-V321L Type III Nrg1 and incubated for 48 hours (37°C, 5% CO $_2$).
- Cells were washed with 1x PBS, fixed with 4% paraformaldehyde, permeabilized with 1% Triton, and blocked in 2% normal donkey serum.
- Cells were incubated with anti-Nrg1 ICD antibody in 2% donkey serum (1:100) for 2 hours.
- Cells were incubated with secondary Nrg1 ICD antibody for 2 hours.
- Cells were counterstained with DAPI and then imaged using a Olympus Fluoview FV1000 confocal microscope.

Results

Figure 7: HEK293 cells transfected with AAV-WT and AAV-V321L Type III Nrg1. (A) AAV-WT Nrg1 ICD nuclear translocation (B) AAV-V321L Nrg1 ICD nuclear translocation.

Conclusion

V321L mutation alters $\alpha 7$ nAChR localization...
Nrg1 ICD nuclear translocation...
V321L mutation may provide a form...
Altered Type III Nrg1 ICD nuclear translocation...
Altered $\alpha 7$ nAChR surface expression...
Neurons expressing WT Type III Nrg1 express higher surface amounts of $\alpha 7$ nAChRs compared to neurons expressing V321L Type III Nrg1. Fluorescence in of WT-expressing neurons (Figure 5A) is more widespread and robust than V321L-expressing neurons (Figure 5B). Quantification of the images gives the fluorescence of WT-expressing neurons a value of 5.31 and V321L-expressing neurons a value of 2.64 (Figure 6).



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2011
Nrg1 Nrg1
CR USA

The Effect of Concrete Aggregate Size on CO2 Absorption

Background

Concrete, made from 11 billion tons of aggregate, is produced each year. About 20% of concrete volume is aggregate. Concrete aggregate is produced by crushing rocks and is used in concrete. Concrete aggregate is produced by crushing rocks and is used in concrete.



Aggregate Size (mm)	Volume (%)	Surface Area (m²)
0.075	10	100
0.15	20	200
0.3	30	300
0.6	20	200
1.2	10	100
2.4	5	50
4.8	2	20
9.6	1	10

Figure 2: The effect of aggregate size on CO2 absorption. As aggregate size increases, the surface area of the aggregate decreases, leading to a decrease in CO2 absorption.

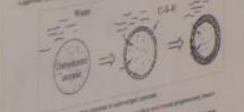
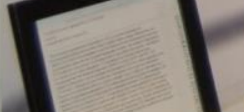
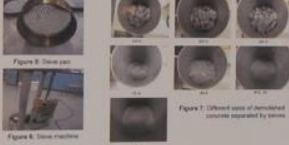


Figure 4: Carbonation process in concrete. Carbonation of concrete leads to a decrease in pH, which causes reinforcement corrosion. Carbonation is a chemical reaction between CO2 and Ca(OH)2.

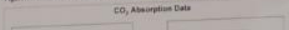


Procedure and Results

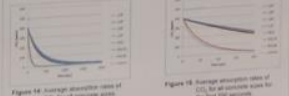
Sample Preparation (ASTM C136-06)



Experimental Setup



CO2 Absorption Data



Results (cont.)

Surface area analysis

Aggregate Size (mm)	Volume (%)	Surface Area (m²)
0.075	10	100
0.15	20	200
0.3	30	300
0.6	20	200
1.2	10	100
2.4	5	50
4.8	2	20
9.6	1	10

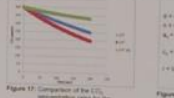


Figure 15: Comparison of the CO2 absorption rate for different aggregate sizes. The absorption rate decreases as aggregate size increases.



Figure 17: Carbonation depth over time for different aggregate sizes. Carbonation depth increases over time and is higher for smaller aggregate sizes.

Conclusions

Surface area is important in CO2 absorption. Data indicates that other factors have a substantial effect. Absorption of surface area affects CO2 absorption rate.

Implications and Future Directions

Identify the other factors which affect CO2 absorption. Investigate economic and environmental costs of carbon sequestration. Investigate the effect of carbon sequestration on the engineering properties of the resulting concrete made with recycled aggregate.

References

- 1. Concrete, made from 11 billion tons of aggregate, is produced each year. About 20% of concrete volume is aggregate. Concrete aggregate is produced by crushing rocks and is used in concrete.
- 2. The effect of aggregate size on CO2 absorption. As aggregate size increases, the surface area of the aggregate decreases, leading to a decrease in CO2 absorption.

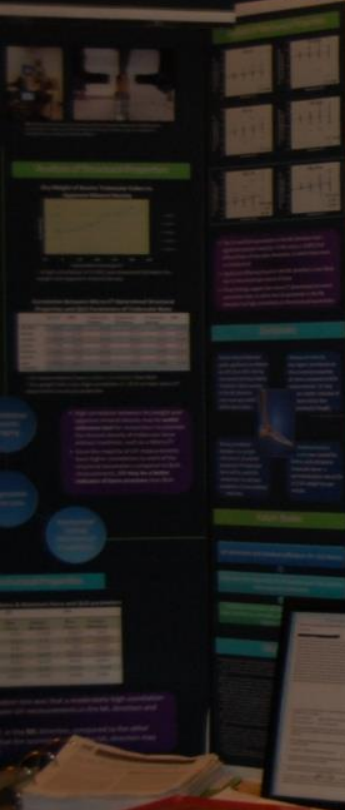


The Correlation between Mercury and the Number of Special Education Students in School Districts on Long Island

LISEF round 2 and Discovery



Optimization of Progressive Quantitative Acoustic and Mechanical Testing



Cell Migration: The effects of fiber spacing, diameter, and angle of electrospun PMMA Fibers on the migration velocity and distance of dermal fibroblasts and rat osteosarcoma cells



The Impact of System Pressure and Performance on Gradient Delay Volume in HPLC Pumps

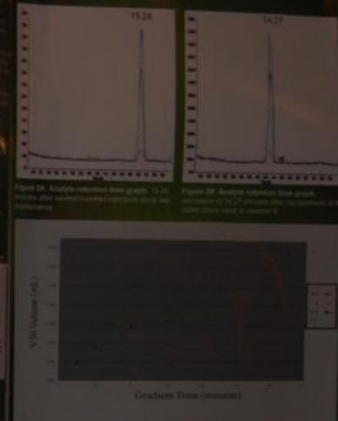


Figure 1. 100 volume versus gradient time. Volume (mL) versus Gradient Time (minutes). The graph shows a linear relationship between Volume (mL) and Gradient Time (minutes). The data points are approximately (10, 100), (20, 200), (30, 300), (40, 400), (50, 500), (60, 600), (70, 700), (80, 800), (90, 900), and (100, 1000).

Figure 2. 100 volume versus gradient time. Volume (mL) versus Gradient Time (minutes). The graph shows a linear relationship between Volume (mL) and Gradient Time (minutes). The data points are approximately (10, 100), (20, 200), (30, 300), (40, 400), (50, 500), (60, 600), (70, 700), (80, 800), (90, 900), and (100, 1000).

EN 104









NYSSEF







Exploring the Validity and Use of Historical Temperature Data From the HMS Plover (1852-1853)

General Purpose

The purpose of this project is to analyze and compare temperature data from the HMS Plover using a modern weather station and a modern weather station. The data will be used to determine the accuracy of the historical data and to identify any potential biases or errors.

Hypothesis

It is hypothesized that the data from the HMS Plover is accurate and that the modern weather station will show similar results. It is also hypothesized that the data from the HMS Plover will show a clear seasonal trend in temperature.

Goals

- 1. To collect a series of observations that is consistent in time. This information will be used to compare the data from the HMS Plover to the data from the modern weather station.
- 2. To determine the accuracy of the data from the HMS Plover by comparing it to the data from the modern weather station.
- 3. To identify any potential biases or errors in the data from the HMS Plover.
- 4. To determine if there is a clear seasonal trend in the data from the HMS Plover.

Background Information

The HMS Plover was a British Royal Navy ship that was active from 1852 to 1853. It was one of the first ships to use a modern weather station. The data from the HMS Plover is one of the earliest examples of modern weather data. The data from the HMS Plover is used to study the climate of the North Pacific Ocean and to identify any potential biases or errors in the data.



Data/Results

Table 1: Worm 1 Reaction Over a Period of 7 Days

Day	Height (cm)	Width (cm)	Area (cm ²)
1	1.5	1.5	2.25
2	1.8	1.8	3.24
3	2.1	2.1	4.41
4	2.4	2.4	5.76
5	2.7	2.7	7.29
6	3.0	3.0	9.00
7	3.3	3.3	10.89

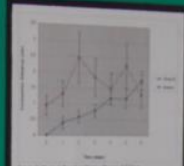


Figure 2: Worm 1 Reaction Over a Period of 7 Days

Table 2: Worm 2 Reaction Over a Period of 7 Days

Day	Height (cm)	Width (cm)	Area (cm ²)
1	1.2	1.2	1.44
2	1.5	1.5	2.25
3	1.8	1.8	3.24
4	2.1	2.1	4.41
5	2.4	2.4	5.76
6	2.7	2.7	7.29
7	3.0	3.0	9.00

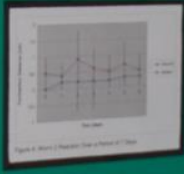


Figure 4: Worm 2 Reaction Over a Period of 7 Days

Table 3: Worm 3 Reaction Over a Period of 7 Days

Day	Height (cm)	Width (cm)	Area (cm ²)
1	1.0	1.0	1.00
2	1.2	1.2	1.44
3	1.5	1.5	2.25
4	1.8	1.8	3.24
5	2.1	2.1	4.41
6	2.4	2.4	5.76
7	2.7	2.7	7.29

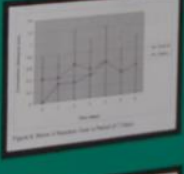


Figure 6: Worm 3 Reaction Over a Period of 7 Days

Table 4: Worm 4 Reaction Over a Period of 7 Days

Day	Height (cm)	Width (cm)	Area (cm ²)
1	0.8	0.8	0.64
2	1.0	1.0	1.00
3	1.2	1.2	1.44
4	1.5	1.5	2.25
5	1.8	1.8	3.24
6	2.1	2.1	4.41
7	2.4	2.4	5.76

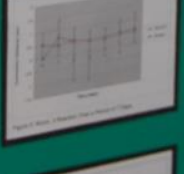


Figure 8: Worm 4 Reaction Over a Period of 7 Days

Table 5: Worm 5 Reaction Over a Period of 7 Days

Day	Height (cm)	Width (cm)	Area (cm ²)
1	0.5	0.5	0.25
2	0.7	0.7	0.49
3	1.0	1.0	1.00
4	1.3	1.3	1.69
5	1.6	1.6	2.56
6	1.9	1.9	3.61
7	2.2	2.2	4.84



Figure 10: Worm 5 Reaction Over a Period of 7 Days

Methods

1. Prepare habitat for worms (Fig. 1). Put spring soil into plastic bin, and bin is at least half full.
2. Place worms in soil. Layer worms in soil. Layer top of soil with organic superabsorbent for worms.
3. Prepare area for conditioning (Fig. 2). Place many paper towels on bottom of empty rectangular bin. Place few worms on paper towel. Choose worms with de-ionized water and there are no visible dirt clumps on the worms. Secure a small piece of paper towel with a tack to the inside of the plunger on each spring. Use zipper to indicate the paper towel with one of any habitat requirements.
4. Condition worms (Fig. 3). Determine the growth of worms by noting which end of each body when worms move and to move alone. Put plunger on both springs completely closed. Place springs with rear of worm anterior of worms and push spring down. Counting repeat step 3 with the habitat springs. Record and measure results.
5. Repeat step three 10 times with intervals of 7 minute only.
6. Repeat steps 2, 3 and 4 with worms 2, 3 and 4.
7. Record results, compare and analyze.



Figure 1: Conditioned worms

Conclusions

The experiment was able to replicate the conditions to that the worms were all measured and the conditions were not as controlled as we thought.

The experiment was replicated in using that the worms were measured in the same way. However, they did not grow at the same rate. The worms continued to be measured and the results were not as expected.

Also, it took longer than we expected for the worms to grow. The worms continued to be measured and the results were not as expected. The worms did not grow at the same rate.

Implications

This experiment could have been done with other types of worms. The experiment could have been done with other types of worms. The experiment could have been done with other types of worms.

References

1. *Worms and Their World*. (2004). New York: The American Museum of Natural History.

2. *Worms and Their World*. (2004). New York: The American Museum of Natural History.

3. *Worms and Their World*. (2004). New York: The American Museum of Natural History.

Communication of Medical Labeling Across Cultural and Language Barriers

Communication of Medical Labeling Across Cultural and Language Barriers
Cristina Chavez
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Cristina Chavez

A Comparison Between Laboratory Reared and Recently Captured Fruit Flies (*Drosophila melanogaster*) Using Phototaxis and Starvation Assays

Research Question

Do laboratory reared and recently captured fruit flies show differences in their phototaxis and starvation responses?

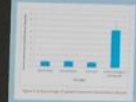
Hypothesis

It is hypothesized that recently captured fruit flies will show a higher percentage of phototaxis and a lower percentage of starvation compared to laboratory reared flies.

Data / Analysis

Upward Movement Assay

Group	1	2	3	4	5	6	7	8	9	10
Laboratory Reared	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
Recently Captured	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1



Group	1	2	3	4	5	6	7	8	9	10
Laboratory Reared	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
Recently Captured	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1

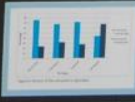
Group	1	2	3	4	5	6	7	8	9	10
Laboratory Reared	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
Recently Captured	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1

Group	1	2	3	4	5	6	7	8	9	10
Laboratory Reared	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
Recently Captured	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1

Group	1	2	3	4	5	6	7	8	9	10
Laboratory Reared	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
Recently Captured	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1

Group	1	2	3	4	5	6	7	8	9	10
Laboratory Reared	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
Recently Captured	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1

Group	1	2	3	4	5	6	7	8	9	10
Laboratory Reared	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
Recently Captured	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1



Procedure

Upward Movement Assay (Figure 1)
The upward flight assay was used to compare the upward activity. Flies from different locations were captured into a white glass jar and the jar was then inverted. A container was marked. Flies were recorded as a number of flies. Each trial contained 10 flies.

Starvation Assay (Figure 2)
The starvation assay consisted of a light and dark assay chamber. The flies were placed into the chamber and were given the choice between light and dark. Flies were recorded as a number of flies. Each trial contained 10 flies.

Starvation Assay (Figure 2)
The group of ten flies from each location was randomized. Each group was divided into a light and dark assay chamber. The flies were placed into the chamber and were given the choice between light and dark. Flies were recorded as a number of flies. Each trial contained 10 flies.

Conclusion

The results of the upward movement assay and the starvation assay show that recently captured fruit flies exhibit a higher percentage of upward movement and a lower percentage of starvation compared to laboratory reared flies. This suggests that recently captured fruit flies may have a higher survival rate in the wild.

Implications

The results of this study have implications for the study of fruit fly behavior. They suggest that recently captured fruit flies may have a higher survival rate in the wild, which could be due to a higher percentage of upward movement and a lower percentage of starvation.

Resources

1. [Drosophila melanogaster](#) - Wikipedia

2. [Phototaxis](#) - Wikipedia

3. [Starvation](#) - Wikipedia

A New Approach Möbius Function With Subtraction

Original Work
The Möbius function is a multiplicative function in number theory. It is named after August Ferdinand Möbius, a German mathematician and physicist. The Möbius function is defined for all integers n. It is 1 if n is 1, -1 if n is a prime number, and 0 if n is a composite number.



Results

$$\mu(x) = \mu(x) + 2$$

$$\mu(x) = \sum_{d|x} \mu(d)$$

$$\mu(x) = \mu(x) - \mu(x) - \mu(x)$$

Results

$$\sum_{d|x} \mu(d) = 1$$

$$\sum_{d|x} \mu(d) = 1$$

Resources

1. [Möbius function](#) - Wikipedia

2. [Number theory](#) - Wikipedia

The Effect of Alcohol on the Behavior of the Harvester Ant (*Pogonomyrmex badius*) and the Expression of Genes Related to Alcohol Expression

Question/Purpose:

What effect does alcohol consumption have on the behavior as well as the gene expression of the malic acid gene of *Pogonomyrmex badius*?

Hypothesis:

If Harvester ants consume ethanol, then a connection can be made between the behavior and malic acid gene expression change of the ant with those of humans and *Drosophila*.

Background:

- Today, an estimated 6.5% of the American adult population is currently alcoholic (Fagan, 2004).
- Affects the consumer both mentally and physically.
- There is a strong connection between alcoholism and genetics.
- Malic enzyme gene expression aids in the chemical breakdown of ethanol into acetone, carbon dioxide, and water.
- Ethanol affects the malic enzyme gene expression and production.
- Discovery made by Fagan and Robinson who discovered *Drosophila* as a model for alcohol and ethanol tolerance in the fly.
- Discovered the reaction of the fly (Robinson, 2005).
- Found that alcohol consumption can be determined by looking at the gene expression of the Malic Enzyme.
- The genes can respond how much one can tolerate alcohol.
- Discovered a change in 61 genes expression and the production of malic enzyme.

Procedures:

1. Ants ingested of Ethanol
 - a. Obtain ants from www.Casohy.com
 - b. Ants will be exposed their diet
 - c. Provide fresh water instead in a glass of paper towel in order to provide water for the ants.
 - d. Observe ants for at least 24 hours in order to insure proper drinking from ants.
 - e. With a new pipette tip on the pipette add 20 microliters of 10% ethanol solution into a small container.
 - f. With a new pipette tip on the pipette add 20 microliters of a concentration of ethanol into the same small container used to hold the solution.
 - g. Ants behavior in solution.
 - h. Ants's movement from off the new solution and get it in each of the well three dishes and observe any change in behavior in the ants given the ethanol solution.
 - i. Record all observations.
 - j. Repeat steps 4-12 as necessary.
2. Proposed DNA Expression of Malic Acid Gene
 - a. Ants Extracts of their legs
 - b. DNA extraction
 - c. Ethanol Chloroform extraction
 - d. Detection of the Malic
 - e. Repeat *Pogonomyrmex badius* (PMB) of Malic to DNA samples.



Figure 1: Observing behavior of ants while response to ethanol.



Figure 2: DNA extraction in laboratory.



Figure 3: Observing behavior of ants while response to ethanol.

Discussion of results:

- The *Pogonomyrmex badius* exposed to the ethanol displayed signs of intoxication in their behavior.
- Ants under ethanol, they exhibited uncoordinated.
- They had trouble with balance and fell.
- They had delayed responses to outside stimuli.

The Effects of Different Binders in Paint

Research Questions

- What effects do different binders have on the properties of paint?
- How do moisture, fluorescent and natural light affect the color change based on the different binders used?

Hypotheses

- If the paint samples are exposed to different light sources then the color of the samples will fade. The samples made with egg yolk will fade less than the ones made with gum arabic and egg white.
- If the paint is made with egg white or gum arabic then the consistency will be thin or watery and it will make with egg yolk.
- The drying time of the paint will be the longest with egg yolk.

Background

Composites of paint are used in many different ways. Paints are used to protect surfaces from environmental damage, to provide a decorative finish, and to provide a protective layer. The most common type of paint is water-based paint, which is made from a mixture of pigments and binders. The binder is the component of the paint that holds the pigments together and allows the paint to adhere to the surface. There are three main types of binders used in paint: oil-based, water-based, and acrylic. Each type of binder has its own unique properties and is used in different applications. This project focuses on the effects of different binders on the properties of paint, specifically on the effects of moisture, fluorescent, and natural light on the color change of the paint.



Conclusion

- The hypothesis was supported by the data, the paint samples made with Egg yolk as the binder faded less than the samples made with Gum Arabic and Egg white.
- The samples made with Egg White and Gum Arabic had a thinner consistency than the samples with Egg Yolk.
- The samples made with Egg Yolk took the longest time to dry.
- The samples that were put under the fluorescent light faded the most followed by sunlight and then incandescent light.
- This led to the conclusion that fluorescent lighting has the largest effect on the amount that paint fades.
- A source of error in my project was that when the paint samples were scanned they were exposed to a different light source for a period of time. Also environmental conditions could have effected the fading of the paint such as moisture in the air.

Future Directions

- Continue with different binders under the same light sources.
- Do environmental factors have an effect on how much the paint fades such as moisture in the air and temperature?
- Do other light sources have an effect on the fading of the paint?
- Do different amounts of the pigment or binder have an effect on the drying time, fading of color or consistency of the paint?

References

1. Smith, J. (2010). *Chemistry of Paints*. New York: McGraw-Hill.

2. Johnson, A. & Greenberg, L. (2015). *Paints: Properties and Applications*. New York: Elsevier.

3. Brown, T. (2018). *The Science of Paints: From Pigments to Polymers*. New York: Springer.

4. White, R. (2012). *Paint Chemistry and Technology*. New York: Wiley.

5. Black, S. (2016). *Paints: A Practical Approach*. New York: Taylor & Francis.

of Bryonia Laciniosa on Breast and Cervical Cancer Cells

Background

Bryonia Laciniosa is a natural product that has been shown to have anticancer activity. The purpose of this study was to investigate the effects of Bryonia Laciniosa on breast and cervical cancer cells. The study was conducted using cell culture models and the results are presented in the following sections.

Methods

The study was conducted using cell culture models of breast and cervical cancer cells. The cells were treated with Bryonia Laciniosa extract and the effects on cell viability and growth were measured. The results are presented in the following sections.

Results

The results of the study show that Bryonia Laciniosa extract has a significant effect on the viability and growth of breast and cervical cancer cells. The extract was found to inhibit cell growth and induce cell death in a dose-dependent manner. The results are presented in the following sections.

Conclusion

The study demonstrates that Bryonia Laciniosa extract has anticancer activity against breast and cervical cancer cells. The extract was found to inhibit cell growth and induce cell death in a dose-dependent manner. The results of this study suggest that Bryonia Laciniosa may be a potential natural product for the treatment of breast and cervical cancer.



SOILED TRAY RETURN AREA

Probiotic effects of rain wheat and quinoa *Lactobacillus acidophilus*

Results



Data



Methods

- Prepare substrates
 - Separately grind the whole grain wheat and quinoa until they become a fine powder
- Prepare broth
 - 100 mL tomato juice neutralized to pH 7 with NaOH, 98 mL distilled water, 5 g yeast, 10 g skim milk
- Prepare peptone water broth
 - 150 mL water, 2.25 g peptone, 3 grams substrate
- Overnight culture
 - Inoculate 0.1 mL of starter culture into tomato juice-milk-yeast broth

Methods cont.

- Starting population:
 - 0.5 mL peptone broth inoculated with 0.1 mL fresh overnight culture
 - 0.1 mL of each dilution inoculated onto MRS agar plates for starting population
 - Colonies counted on plate at 24 hours
- Grow *L. acidophilus* with substrates
 - Fresh culture inoculated into peptone/substrate broth
 - Incubated for 24 hours at 37°C
 - Inoculated onto MRS agar plates at 24 and 48 hours which were then incubated at 37°C
 - Colonies on plates compared with starting population

Analysis

- Quinoa yielded a lower number of bacteria compared to wheat and shorter sustaining time.
- Quinoa is an effective probiotic although not as effective as wheat possibly due to amount of dietary fibre

The Prevalence of Pediatric Onset Multiple Sclerosis In the Long Island, New York Area

Data

Number	Sex	Age Group
4 Female	100%	10-19
4 with mother born in U.S.A.	100%	10-19
4 with father born in U.S.A.	100%	10-19
4 by number of children	100%	10-19

Parent's Educational Background



Summary of Results

Multiple sclerosis (MS) is a chronic autoimmune disease of the central nervous system (CNS) characterized by inflammation and demyelination of nerve fibers. The prevalence of MS is increasing worldwide, and it is now considered a leading cause of disability in young adults. The purpose of this study was to determine the prevalence of pediatric onset MS in the Long Island, New York area.

Conclusions

The prevalence of pediatric onset MS in the Long Island, New York area is 1.5 per 100,000 children per year. This prevalence is significantly higher than the national prevalence of 0.5 per 100,000 children per year.

Handwritten notes on a cardboard display board, including the name "Jorff" and several logos.

Handwritten text on a cardboard display board: "Jackie Solomon Ogunsehin High School"

A Study of Tracking in Mud Snails (*Littorina littorea*)

RESEARCH QUESTION

Are mud snails attracted to their own mucus more than another snail's mucus trail?

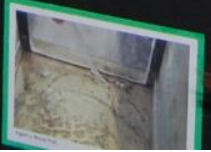
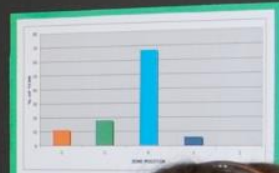
HYPOTHESIS

We think a snail will follow and be attracted to it's own mucus trail more than mucus from a different snail.

MATERIALS

- 1. 10 x 10 cm Petri dish
- 2. 10 x 10 cm Petri dish
- 3. 10 x 10 cm Petri dish
- 4. 10 x 10 cm Petri dish
- 5. 10 x 10 cm Petri dish
- 6. 10 x 10 cm Petri dish
- 7. 10 x 10 cm Petri dish
- 8. 10 x 10 cm Petri dish
- 9. 10 x 10 cm Petri dish
- 10. 10 x 10 cm Petri dish

DATA



FUTURE RESEARCH

Future research could include the use of different mucus trails to see if snails are attracted to their own mucus trail more than mucus from a different snail.

PRACTICAL IMPLICATIONS

Understanding the way in which snails track affects the behavior of the snails will help us understand the way in which snails track and how they track.

Other student projects displayed on a separate board:

- The effect of salt stress on life environmental events**
- Abstract**
- Problem**
- Hypothesis**
- Procedure**
- Graphs**
- Conclusion**



The Effect of Various Substances on the Growth Of Champion Radish Seeds (*Raphanus sativus*) Using Hydroponics

Procedures

Materials & Resources

Limitations

Results

Conclusions

Future Research

References

Table 1
Largest Radish Growth in Area, Seedling (100%)

Substance	Height (cm)	Weight (g)
Control	10.5	100
1.0% ADF	12.0	120
1.0% Pseudomonas	11.5	115
1.0% AvePphB	13.0	130
1.0% Pseudomonas + AvePphB	14.0	140



Functional ADFs Require Recognition of Pseudomonas AvePphB by Arabidopsis

Student Name
School Name
Date



Mapping and

I. Retention of Cytokinesis

1. Cytokinesis is the process of cell division that results in two daughter cells. It is the final stage of cell division and is essential for the growth and development of multicellular organisms.

2. The retention of cytokinesis is a process that allows a cell to divide and then remain attached to its daughter cells. This is a common occurrence in many types of cells, including stem cells and cancer cells.

II. Utilization of Caenorhabditis Elegans

1. *Caenorhabditis elegans* is a small, transparent nematode that is commonly used in biological research. It is a model organism for studying the genetics and development of multicellular organisms.

III. Genetics of Cell Division

1. The genetics of cell division is a field of research that focuses on the inheritance and expression of genes that control the process of cell division. This includes the study of the cell cycle, DNA replication, and chromosome segregation.

IV. Conditional Mutants

1. A conditional mutant is a mutant that only exhibits a phenotype under certain conditions. This is often used to study the function of a gene in a specific tissue or at a specific time in development.

V. Mapping

1. Mapping is the process of determining the location of a gene on a chromosome. This is often done by using genetic crosses and analyzing the resulting offspring.

Methodology. Ph

To determine whether the mutant gene of *csd-1* is a recessive mutation, I performed a test cross.

To test whether the mutant gene of *csd-1* is recessive, I performed a test cross.

To test whether the mutant gene of *csd-1* is recessive, I performed a test cross.

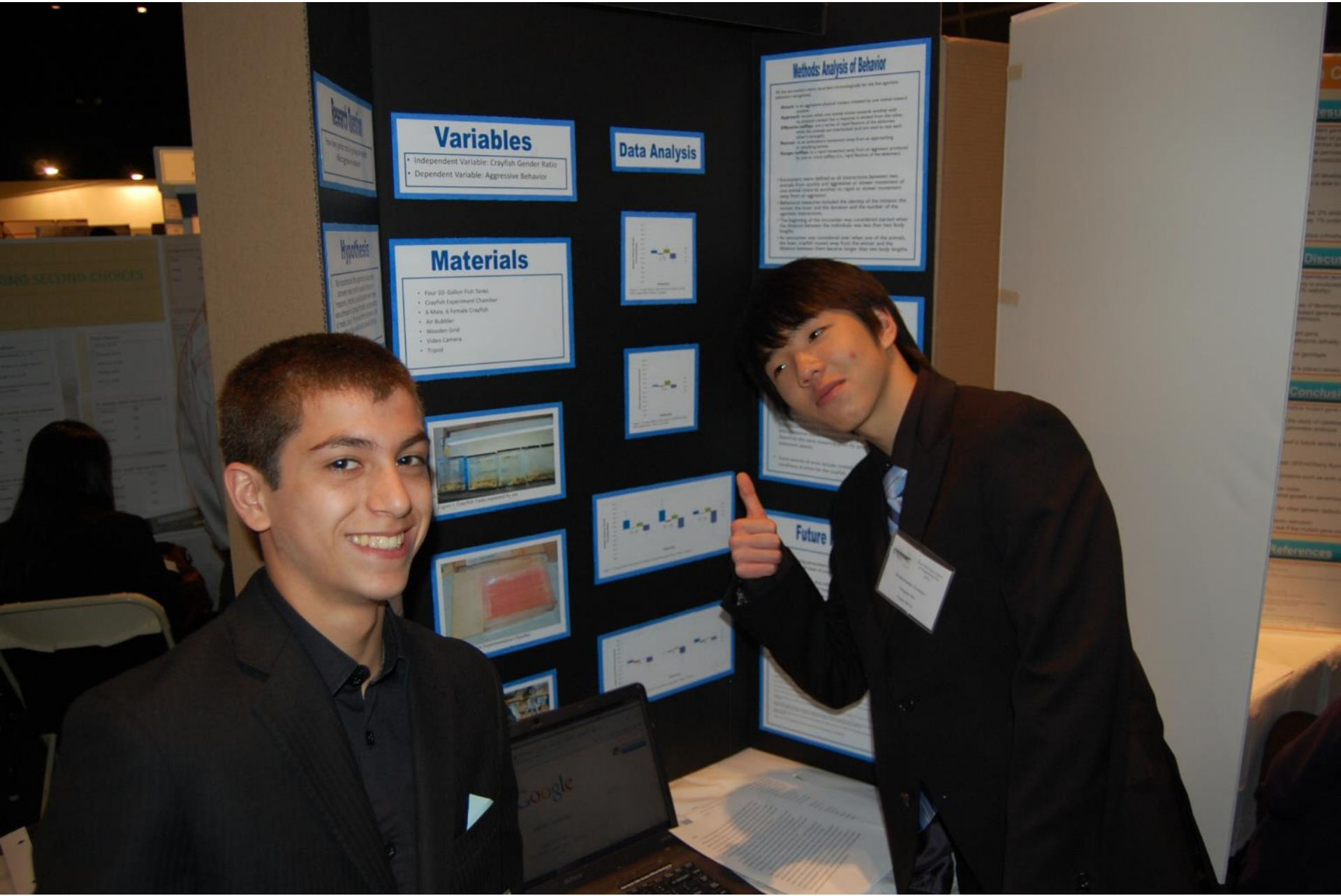
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Methodology. Ph

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To determine whether the mutant gene of *csd-1* is a recessive mutation, I performed a test cross.



Variables

- Independent Variable: Crayfish Gender Ratio
- Dependent Variable: Aggressive Behavior

Materials

- Four 10-Gallon Fish Tanks
- Crayfish Experiment Chamber
- 4 Male, 6 Female Crayfish
- Air Bubble
- Wooden Grid
- Video Camera
- Tripod

Data Analysis



Methods: Analysis of Behavior

All the procedures were recorded chronologically for the five separate sessions.

Setup: In an aquarium, physical contact occurred for one minute between two crabs.

Aggression: Crabs were observed for aggression in relation to gender ratio. In general, crabs were observed for aggression in relation to gender ratio. In general, crabs were observed for aggression in relation to gender ratio.

Observation: Crabs were observed for aggression in relation to gender ratio. In general, crabs were observed for aggression in relation to gender ratio.

Analysis: Crabs were observed for aggression in relation to gender ratio. In general, crabs were observed for aggression in relation to gender ratio.

Future

Future research could include...



Parent-Child Perceived Motivation and Participation in Karate

Research Question

What is the perceived motivation for the participation in Karate between parents and their children?

Hypotheses

If the perceived motivation between parents and their children is compared then the results will indicate that their reason for participation in Karate will not closely match.

Background

Background information regarding the study and the participants.

Methods

Methodology used for data collection and analysis.

Results

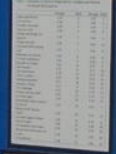
Summary of the findings from the study.

Conclusion

Final thoughts and conclusions drawn from the research.

Data Collection and Analysis

Details on how data was collected and the statistical methods used for analysis.



The Effect of Environmental Toxicity (Perfluorinated Substances) on *C. elegans*

Background Information

- Perfluorinated substances are used to separate mixtures from other substances.
- PFAS are used in firefighting foams, food packaging, and many other products.
- PFAS have been found in the environment and in humans.
- PFAS have been found in the environment and in humans.
- PFAS have been found in the environment and in humans.

Problem and Hypothesis

- Problem: The effect of environmental toxicity on *C. elegans*.
- Hypothesis: Perfluorinated substances have an effect on the mortality of *C. elegans*.

Materials and Methods

- Obtain *C. elegans* from a supplier.
- Place *C. elegans* in growth agar with each petri dish.
- Use a random number generator to assign each petri dish to a group.
- Separate four petri dishes into the groups: 1) 0.1, 0.2, 0.4, 0.8.

Results/Questions

- What effect will be observed on the mortality of *C. elegans*?
- What effect will be observed on the mortality of *C. elegans*?
- What effect will be observed on the mortality of *C. elegans*?

Materials and Methods

- Using a microtiter plate, measure the optical density of the growth agar.
- Using a random number generator, assign each petri dish to a group.
- Using a random number generator, assign each petri dish to a group.
- Using a random number generator, assign each petri dish to a group.









Research Association



Assisting People with Physical Disabilities In the Activity of Putting on Socks

Synthesis, Characterization, and Biological Evaluation of a Novel Biomaterial for Post-Lumpectomy Breast Reconstruction

Engineering Goal

Design and construct a device to assist people with physical disabilities in the activity of putting on socks.

Background

As of 2010, about 27.2 million people are physically disabled.
Aids for people with disabilities are generally classified into:
- Mobility
- Hearing
- Vision
- Communication
- Personal Care
- Transportation
- Employment
- Education
- Recreation
- Health Care
- Information
- Housing
- Transportation
- Employment
- Education
- Recreation
- Health Care
- Information
- Housing



Prototype Construction

The prototype device is constructed from wood and metal. It consists of a base with a handle and a mechanism to pull the sock up the leg. The device is designed to be used by a person with a physical disability to assist in putting on socks.

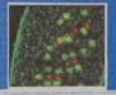
Prototype Construction

The prototype device is constructed from wood and metal. It consists of a base with a handle and a mechanism to pull the sock up the leg. The device is designed to be used by a person with a physical disability to assist in putting on socks.



Incidence of *Wohlbachia* Bacteria On Long Island, New York

Research Question
What is the presence of *Wohlbachia* bacteria in insects found on Long Island, New York?



1	2	3	4	5	6	7	8
1	2	3	4	5	6	7	8
9	10	11	12				
13	14	15	16	17	18	19	20

References

1. [Citation text]

2. [Citation text]

3. [Citation text]

4. [Citation text]

5. [Citation text]

6. [Citation text]

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14. [Citation text]

15. [Citation text]

16. [Citation text]

17. [Citation text]

18. [Citation text]

19. [Citation text]

20. [Citation text]

Results

Over 100 different root samples were tested for the presence of *Wohlbachia*. Out of the 100 samples, 100% were found to be positive for *Wohlbachia*. A single observation that the sample was positive for *Wohlbachia* was enough to determine the presence of the bacterium. The 100% of the samples were positive for the bacterium.

Conclusion

The presence of *Wohlbachia* in 100% of the root samples that were checked was surprising. Based on the results of this investigation, the presence of *Wohlbachia* in root samples is 100%.

Sources of Error

The presence of *Wohlbachia* in 100% of the root samples that were checked was surprising. Based on the results of this investigation, the presence of *Wohlbachia* in root samples is 100%.

Future Research

The presence of *Wohlbachia* in 100% of the root samples that were checked was surprising. Based on the results of this investigation, the presence of *Wohlbachia* in root samples is 100%.

A mediated VAMP

MOLOGY (CONT.)

Alignment analysis

Other Vamp protein member.

mRNA sequences of Vamp protein combinations.

its missing in some Vamp protein but present in

of Vamp 7, 8 and remaining Vamp family

ices.

oding for homologous mRNA sequences between

RESULTS

NCBI ID	Length Protein (acids)	mRNA (bp)	Species
NM_013090.2	118	2650	<i>Rattus norvegicus</i>
NM_012663.2	116	2250	<i>Rattus norvegicus</i>
NM_057097.2	103	1705	<i>Rattus norvegicus</i>
NM_053555.1	102	309	<i>Rattus norvegicus</i>
NM_053531.1	220	663	<i>Rattus norvegicus</i>
NM_031827.1	100	303	<i>Rattus norvegicus</i>

Discussion

What is the presence of *Wohlbachia* bacteria in insects found on Long Island, New York?

Future Investigations

What is the presence of *Wohlbachia* bacteria in insects found on Long Island, New York?

Targeting CpdR1 *Rhizobia* through Nitrogen-fixing *Anabaena azolae* in *Medicago sativa* Legume Symbiosis

CpdR1 Preceding Addition of Nitrogen-fixing *Anabaena azolae*

CpdR1 Subsequent Addition of Nitrogen-fixing *Anabaena azolae*



Figure A: Curled CpdR1 root hairs of *Medicago sativa* legume plants, three days after inoculation with *Rhizobium leguminosarum* 3841.

Figure C & D: Infection through root hairs in plants in presence of bacterium.

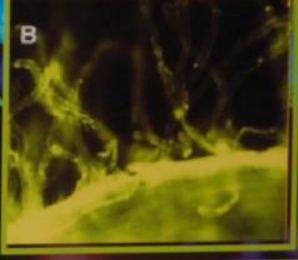
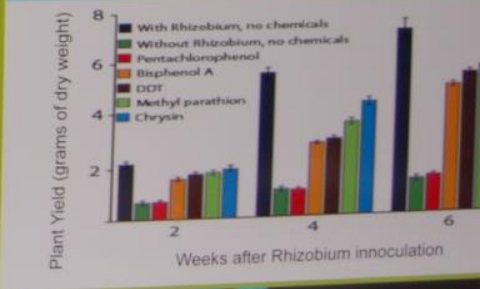


Figure B: CpdR1 without root hair curling forming nodules "blocks" to maximize CO₂ intake.

Figure F: Disorganized heterocyst culture.

Carbon dioxide Reduction of Specific Chemicals Targeting CpdR1 over Six Weeks



The Effect of Altering Food Sources On the Pigment Production Of *Streptomyces coelicolor*

Data/Results



Figure 1: The Average Yield (mg/L) Measured for Each Chicken Broth Percentage

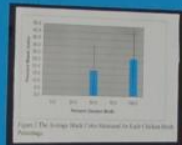


Figure 2: The Average Yield (mg/L) Measured for Each Chicken Broth Percentage

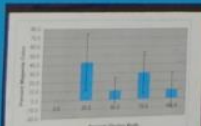


Figure 3: The Average Pigment (mg/L) Measured for Each Chicken Broth Percentage

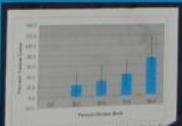


Figure 4: The Average Pigment (mg/L) Measured for Each Chicken Broth Percentage



Figure 5: The Average Pigment (mg/L) Measured for Each Chicken Broth Percentage

Percentage	Yield (mg/L)	Percentage of Yield
0%	~100	100%
25%	~150	150%
50%	~100	100%
75%	~120	120%
100%	~100	100%

Percentage	Pigment (mg/L)	Percentage of Pigment
0%	~100	100%
25%	~150	150%
50%	~100	100%
75%	~120	120%
100%	~100	100%

Conclusion

Changes in concentration in a chicken broth/agar solution did affect the pigment production of *Streptomyces coelicolor* indicated by a change in the color produced as measured by absorption. The higher the concentration of chicken broth, the darker color to be produced. The test are required to further...

Future

In the future we will test bacteria's that produce pigment I created. This will be a mutation to acquire tools...

Methodology

First, the bacterial strains were cultured and inoculated in a petri dish. The medium was changed and other variables were tested. The medium was changed to 25% chicken broth, 50% chicken broth, 75% chicken broth, and 100% chicken broth. The medium was changed to 25% chicken broth, 50% chicken broth, 75% chicken broth, and 100% chicken broth. The medium was changed to 25% chicken broth, 50% chicken broth, 75% chicken broth, and 100% chicken broth.

Methodology (continued)

The percentage of yield at 100% was set as the control. The percentage of yield at 25% was 150%. The percentage of yield at 50% was 100%. The percentage of yield at 75% was 120%. The percentage of yield at 100% was 100%.

Patrick
Fahey
Period 3

...e to Syo

...rans-Resveratrol on Short-term

Exhibition booth area with various displays and posters.

Exhibition booth area with various displays and posters.

CONFERENCE 1
BOYS TENNIS
8008
STYLOSSET H.S.

Introduction


Introduction: Schizophrenia is a complex disorder characterized by psychosis, hallucinations, and positive symptoms. The Nrg1 gene is a schizophrenia-susceptibility gene. The Nrg1 gene is located on chromosome 12p12.1 and encodes a protein that is a member of the ErbB family of tyrosine kinases. The Nrg1 protein is a ligand for the ErbB receptors and is involved in the development and function of the nervous system. The Nrg1 protein is also involved in the regulation of cell growth and differentiation. The Nrg1 protein is a member of the Nrg1 family of proteins and is involved in the regulation of cell growth and differentiation. The Nrg1 protein is a member of the Nrg1 family of proteins and is involved in the regulation of cell growth and differentiation.

Expression of a Schizophrenia-associated V321L-Nrg1 Protein Reduces Nrg1-ICD Nuclear Translocation and α 7nAChR Expression

Methods/Results Continued

Immunoprecipitation Western Blot

Results



Analysis of bornyl cinnamate (Liquidambar

Introduction

Introduction: Bornyl cinnamate is a natural anti-inflammatory compound derived from the essential oil of Liquidambar styraciflua. It has been shown to have anti-inflammatory and analgesic effects in various animal models. The purpose of this study was to evaluate the anti-inflammatory and analgesic effects of bornyl cinnamate in a rat model of inflammation. The study was conducted in a laboratory setting and involved the use of various assays to measure inflammation and pain. The results of the study showed that bornyl cinnamate significantly reduced inflammation and pain in the rat model. The study was conducted in a laboratory setting and involved the use of various assays to measure inflammation and pain. The results of the study showed that bornyl cinnamate significantly reduced inflammation and pain in the rat model.

Literature Review

Bornyl cinnamate

Bornyl cinnamate is a natural anti-inflammatory compound derived from the essential oil of Liquidambar styraciflua. It has been shown to have anti-inflammatory and analgesic effects in various animal models. The purpose of this study was to evaluate the anti-inflammatory and analgesic effects of bornyl cinnamate in a rat model of inflammation. The study was conducted in a laboratory setting and involved the use of various assays to measure inflammation and pain. The results of the study showed that bornyl cinnamate significantly reduced inflammation and pain in the rat model.

formosana Hance exudate) anti-inflammatory

Methodology/Results

Phase 1: BC Preparation

Phase 1: BC Preparation

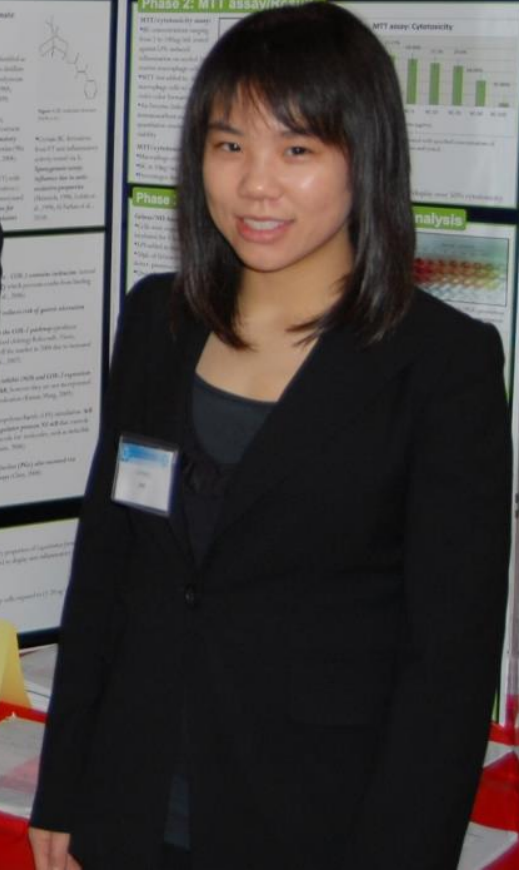
Phase 1: BC Preparation

Phase 2: MTT assay/Results

Phase 2: MTT assay/Results



The Anti-Inflammatory
Curcumin And Its
Ability To Up-Regulate



The Effect of Stimulants on the Rate of Phagocytosis in *Tetrahymena thermophila*

Purpose

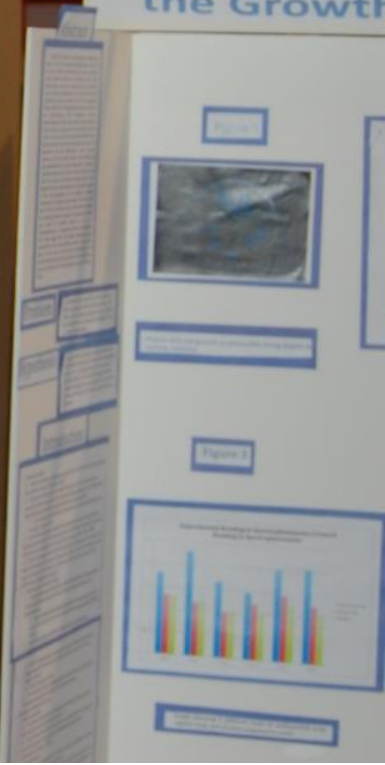
The purpose of this investigation is to determine the effect of stimulants on the rate of phagocytosis in *Tetrahymena thermophila*.

Hypothesis

If stimulants are present, it is expected that the rate of phagocytosis will be higher than the control group.

Altered Circadian Rhythms on *Melanogaster* Mating

The Effect of and Temperature on the Growth



The Comparison of the Genetic Variation In the Cellar Spider (*Pholcus phalangioides*) From Different Geographic Locations

RESEARCH QUESTION

Do the DNA sequences of the Cellar Spider (*Pholcus phalangioides*) vary among different geographic locations?

HYPOTHESIS

If the DNA sequences of the Cellar Spider (*Pholcus phalangioides*) vary among different geographic locations, then the DNA sequences of the spider from different geographic locations will be different.

BACKGROUND

The Cellar Spider (*Pholcus phalangioides*) is a common household spider. It is found in dark, undisturbed areas such as basements, attics, and crawl spaces. The spider is known for its long, thin legs and its ability to spin a spiral web. The research aims to compare the DNA sequences of the Cellar Spider from different geographic locations to determine if there is genetic variation.



Enhancing Pesticidal Properties of *Asimina triloba* with Comparisons to Rotenone-based Agricultural Pesticides





The Effect of Various Sugars on the Activation of The Dauer State in DAF-2 Mutated *Caenorhabditis elegans*

A Study of the Factors that Affect Habitat Behavior of Asian Shore Crabs (*Hemigrapsus*) In an Artificial Environment

Research
How do different concentrations of sugar affect the activation of the dauer state in DAF-2 mutated *Caenorhabditis elegans*?
Hypothesis
I hypothesize that higher concentrations of sugar will increase the number of dauer state larvae. I also expect that the activation of the dauer state will decrease.



...gators on the Activation of
...in DAF-2 Mutated
...ditis elegans

A Study of the Factors that Affect Habitat Selection Behavior of Asian Shore Crabs (*Hemigrapsus sanguineus*) In an Artificial Environment

Research Question

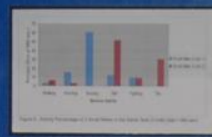
What are the factors that affect habitat selection behavior of Asian Shore Crabs (*Hemigrapsus sanguineus*) in an artificial environment?

Hypotheses

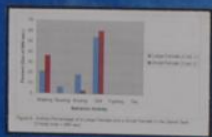
1. If the larger crabs are placed in the tank with smaller crabs, they will be more dominant and select the wetter substrate.
2. The females will try to camouflage themselves by hiding under rocks in their environment.
3. The crabs will prefer to stay in the tank with a conspecific crab, including their partners.
4. The crabs are placed in the tank, having the same tank will be more dominant.

Background

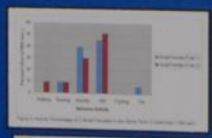
Asian Shore Crabs (*Hemigrapsus sanguineus*) are a species of crab that is found in the coastal regions of Asia and the Pacific. They are known for their ability to adapt to various environments, including artificial ones. This study aims to investigate the factors that affect their habitat selection behavior in an artificial environment.



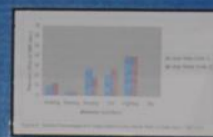
Crab Size	Wet	Dry	Sand	Rock
Small	10	15	5	2
Medium	12	10	8	3
Large	15	8	10	5



Crab Size	Wet	Dry	Sand	Rock
Small	10	15	5	2
Medium	12	10	8	3
Large	15	8	10	5



Crab Size	Wet	Dry	Sand	Rock
Small	10	15	5	2
Medium	12	10	8	3
Large	15	8	10	5



Crab Size	Wet	Dry	Sand	Rock
Small	10	15	5	2
Medium	12	10	8	3
Large	15	8	10	5



Crab Size	Wet	Dry	Sand	Rock
Small	10	15	5	2
Medium	12	10	8	3
Large	15	8	10	5



Crab Size	Wet	Dry	Sand	Rock
Small	10	15	5	2
Medium	12	10	8	3
Large	15	8	10	5



Crab Size	Wet	Dry	Sand	Rock
Small	10	15	5	2
Medium	12	10	8	3
Large	15	8	10	5

Conclusions

Crab size and gender were significant factors in habitat selection. Larger crabs selected wetter habitats, while smaller crabs selected drier habitats. Females tended to select wetter habitats than males. The results of this study suggest that crab size and gender are important factors in habitat selection in an artificial environment.

Mean Data Graphs

The Effect of Agricultural Competition

Background Information (Competition)

Many of us grow the concept of the theory through... (text continues)

Background Information (Agrobacterium)

Several studies have been done on... (text continues)

Discussion

- We may further research on the increasing number of plants to be able to finally culture the Agrobacterium.
- I have done many trials, and although they have not been as successful as expected, I have decided to go with a different approach, rather than just manipulating the plants themselves.
- The possible problems that may have caused the Agrobacterium to not "stick on" to the plants themselves was the Agri. But it may need a specific kind which will be looked further into research to come.

Cellobiase Enzyme Reaction with Common Household Organisms

Research Question

Which source of enzyme has the greatest effect on the cellobiase reaction?



Data



Hypothesis

We believe that the mushrooms will have a faster rate of reaction than the animals.



Background

1. The enzyme cellobiase, or beta-glucosidase, comes from cellulose. Cellulose is a polysaccharide that is made up of long chains of glucose units. It is the most abundant organic polymer on Earth.

2. The enzyme is found in many different organisms, most of which have long used it to break down cellulose.

3. The primary cellobiase breaks down the disaccharide lactose in the large intestine, and it breaks down the walls between the glucose molecules in the disaccharide component. The organisms that have cellobiase use it to break down the cell walls.

4. Cellobiase is used in the production of beer, a real source of energy for organisms.

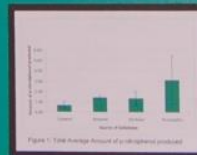
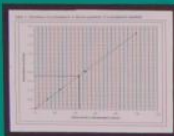
5. The substrate for cellobiase is a polysaccharide called cellobiose, which is found in the cellulose found in cotton, wood, and other plant tissues.

6. Cellobiase is also found in some animals, in the form of lactase.

7. Cellobiase is a mixture of cellulose and other enzymes in the stomach.

8. The ability to break down cellulose into simple sugars is essential for making ethanol by a microbial fermentation process.

9. When the right conditions are present, it is possible to produce ethanol from cellulose. It is a renewable resource that can be used to produce ethanol.



Organism	Time (min)	Amount of Product (g)
Mushrooms	0	0
	10	10
	20	20
	30	30
	40	40
Ham	0	0
	10	10
	20	20
	30	30
	40	40
Pig	0	0
	10	10
	20	20
	30	30
	40	40

Organism	Time (min)	Amount of Product (g)
Mushrooms	0	0
	10	10
	20	20
	30	30
	40	40
Ham	0	0
	10	10
	20	20
	30	30
	40	40
Pig	0	0
	10	10
	20	20
	30	30
	40	40

Organism	Time (min)	Amount of Product (g)
Mushrooms	0	0
	10	10
	20	20
	30	30
	40	40
Ham	0	0
	10	10
	20	20
	30	30
	40	40
Pig	0	0
	10	10
	20	20
	30	30
	40	40

Organism	Time (min)	Amount of Product (g)
Mushrooms	0	0
	10	10
	20	20
	30	30
	40	40
Ham	0	0
	10	10
	20	20
	30	30
	40	40
Pig	0	0
	10	10
	20	20
	30	30
	40	40

Materials

- 1. Cellobiose
- 2. Cellobiase
- 3. Ham
- 4. Pig
- 5. Mushrooms
- 6. Water
- 7. Beaker
- 8. Test tube
- 9. Pipette
- 10. Scale
- 11. Stopwatch
- 12. Paper towel
- 13. Paper cup
- 14. Paper plate
- 15. Paper napkin
- 16. Paper towel
- 17. Paper plate
- 18. Paper napkin
- 19. Paper towel
- 20. Paper plate
- 21. Paper napkin
- 22. Paper towel
- 23. Paper plate
- 24. Paper napkin
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- 92. Paper plate
- 93. Paper napkin
- 94. Paper towel
- 95. Paper plate
- 96. Paper napkin
- 97. Paper towel
- 98. Paper plate
- 99. Paper napkin
- 100. Paper towel

Discussion

The results of the experiment show that the mushrooms have the highest rate of reaction. This is likely due to the fact that mushrooms are a natural source of cellobiase. The ham and pig have lower rates of reaction, which is likely due to the fact that they are not natural sources of cellobiase.

Conclusion

The results of the experiment show that the mushrooms have the highest rate of reaction. This is likely due to the fact that mushrooms are a natural source of cellobiase. The ham and pig have lower rates of reaction, which is likely due to the fact that they are not natural sources of cellobiase.

References

- 1. Cellobiose
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Communication of Medical Labeling: Across Cultural and Language Barriers

Aaron Wilson & Ian Marquitt

Methodology

Implications

- To design, validate, and evaluate pictograms for labeling medicine in different cultures.
- To identify culture-specific pictograms based on the continent of labeling drugs.
- To provide practice tools to enable the use of pictograms.
- Offer the most effective method of improving health literacy among support pictograms tailored to each set of defined peoples.
- The interface will allow for the digital construction of a medication specifically intended for use by a single patient.
- The caregiver will be given the option of printing the desired label, attaching it to the patient's medication container to serve as instructional adherence.

Future Direction

- Enter code for all 26 recommended languages program (it supports languages at this time).
- Internet accessible
- Available for public use
- Patient information logs and other features that will create a complete pharmaceutical software tool.

References

Problem

- The majority of drug are
- Limited literacy and language
- Miscommunication of medication

Challenge

- To increase patient comprehension of culturally specific pictograms



Stop, Drop, and Conglobate: Isopod Reactions to Perceived Environmental Dangers

Purpose:

The purpose of this experiment was to determine if isopods would respond to perceived environmental dangers by congregating in a specific area.

Hypothesis:

I hypothesized that isopods would respond to perceived environmental dangers by congregating in a specific area.

Background:

Isopods are small, segmented, crustaceans that live in soil and are often found in the laboratory. They are used in experiments to study the effects of environmental factors on their behavior.

Procedure:

The procedure involved placing isopods in a petri dish and observing their behavior in response to perceived environmental dangers.

Results:



Time	15 Second Data	30 Second Data
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9
10	10	10
11	11	11
12	12	12
13	13	13
14	14	14
15	15	15



Discussion of Results:

The results of this experiment support the hypothesis that isopods would respond to perceived environmental dangers by congregating in a specific area.

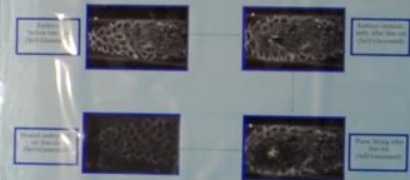
Conclusion:

The results of this experiment support the hypothesis that isopods would respond to perceived environmental dangers by congregating in a specific area.

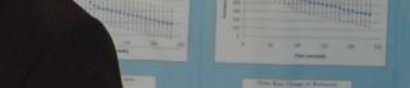
The Mechanical Properties of Wound Healing in the Amnioserosa of *Drosophila melanogaster*

Methodology

The methodology involved using a laser to create a wound in the amnioserosa of *Drosophila melanogaster* and observing the healing process over time.



A Representation of the Contractile Forces of the Pulse Spring During Dorsal Closure



Conclusion

The results of this experiment support the hypothesis that the contractile forces of the pulse spring are essential for the healing process of a wound in the amnioserosa of *Drosophila melanogaster*.

Future Research

Future research could involve studying the effects of different environmental factors on the healing process of a wound in the amnioserosa of *Drosophila melanogaster*.

Hypothesizing a Scar in the Amnioserosa

The hypothesis is that a scar in the amnioserosa of *Drosophila melanogaster* would affect the healing process of a wound.

Future Research

Future research could involve studying the effects of different environmental factors on the healing process of a wound in the amnioserosa of *Drosophila melanogaster*.

Bibliography

The bibliography lists the sources used in this experiment, including scientific journals and books.

A.C.T. Acne Curing Tests



Step	1	2	3	4
1	0	0	0	0
2	1	1	1	1
3	2	2	2	2
4	3	3	3	3

The results of the acne curing tests show that the treatment is effective in reducing the number of acne lesions.

Cooking the Rainbow

HYPOTHESIS

Vegetables are boiled, and the color and pH change. As the boiling time increases, the color and pH will also change. The color will become more yellow and the pH will become more acidic.

RESEARCH QUESTION

How does Boiling Vegetables Affect the Color and the pH?

CONCLUSION

The hypothesis was proven correct. As the boiling time increased, the color of the vegetables became more yellow and the pH became more acidic. This was expected because the longer the vegetables were boiled, the more nutrients were lost, and the pH became more acidic. The color change was also expected because the longer the vegetables were boiled, the more nutrients were lost, and the color became more yellow.

DATA / RESULTS

Table 1: Color and pH of Boiled Vegetables (Sample 1)

Boiling Time (min)	Color (1-5)	pH (1-14)
0	1	7.0
5	2	6.5
10	3	6.0
15	4	5.5
20	5	5.0

Table 2: Color and pH of Boiled Vegetables (Sample 2)

Boiling Time (min)	Color (1-5)	pH (1-14)
0	1	7.0
5	2	6.5
10	3	6.0
15	4	5.5
20	5	5.0



DISCUSSION OF RESULTS

Boiling vegetables causes a change in color and pH. The color becomes more yellow and the pH becomes more acidic. This is because the longer the vegetables are boiled, the more nutrients are lost, and the pH becomes more acidic. The color change is also expected because the longer the vegetables are boiled, the more nutrients are lost, and the color becomes more yellow.

Degradation of Poly(ϵ -caprolactone) Porcine

Background

Materials and Methods

Results

The Effect of Silver Nanoparticles on the Development of Brine Shrimp (*Artemia salina*)

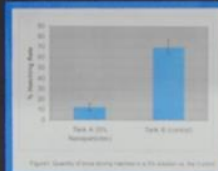
Data and Results

Research Question

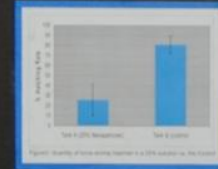
The purpose of this investigation was to determine if the brine shrimp in a given water sample could be affected by the development and hatching rate of *Artemia salina*.

Hypothesis

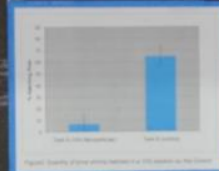
If the water sample is contaminated with silver nanoparticles, the hatching rate of *Artemia salina* will be lower than the control group.



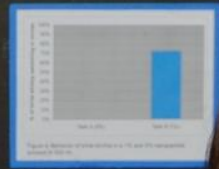
Group	Quantity of Hatching Brine Shrimp
Control	~85
20% Silver Nanoparticles	~15



Group	Quantity of Hatching Brine Shrimp
Control	~85
10% Silver Nanoparticles	~25



Group	Quantity of Hatching Brine Shrimp
Control	~85
5% Silver Nanoparticles	~45



Group	Quantity of Hatching Brine Shrimp
Control	~85
2.5% Silver Nanoparticles	~65

Discussion

The results of this investigation support the hypothesis that the hatching rate of *Artemia salina* is affected by the presence of silver nanoparticles in the water sample. The hatching rate was significantly lower in the groups exposed to silver nanoparticles compared to the control group.

Conclusion

The hatching rate of *Artemia salina* is significantly lower in the groups exposed to silver nanoparticles compared to the control group. This suggests that silver nanoparticles have a negative effect on the development and hatching rate of *Artemia salina*.

The Phylogenetic Structure of Biological Invasions

Study Group

- Biological Invasions: Study Group
- Biological Invasions: Study Group
- Biological Invasions: Study Group



Analysis of CA Asteraceae

Analysis of CA Asteraceae

Analysis of Sarcobata

Analysis of Sarcobata

Analysis of Sarcobata

Analysis of Sarcobata

Analysis of Sarcobata

Analysis of Sarcobata

The Effect of Common Non-Steroidal Anti-Inflammatory Drugs on the Movement of *Tetrahymena thermophila*

Research Question

How do common non-steroidal anti-inflammatory drugs (NSAIDs) affect the movement of *Tetrahymena thermophila*?

Methods

Control Group

The control group consisted of *Tetrahymena thermophila* cells that were not treated with any NSAIDs. They were used to compare the movement of the cells in the experimental groups.

Experimental Groups

The experimental groups consisted of *Tetrahymena thermophila* cells that were treated with different concentrations of NSAIDs: ibuprofen, aspirin, and acetaminophen.

Conclusion

The results of the experiment showed that NSAIDs significantly reduced the movement of *Tetrahymena thermophila* cells. The effect was most pronounced in the group treated with ibuprofen.

Hypothesis

It was hypothesized that NSAIDs would inhibit the movement of *Tetrahymena thermophila* cells by interfering with their internal signaling pathways.

Data/Results

NSAID	Concentration	Distance Moved (μm)
Control	0	~150
	10	~140
	20	~130
Ibuprofen	10	~100
	20	~80
	30	~60
Aspirin	10	~110
	20	~90
	30	~70
Acetaminophen	10	~120
	20	~100
	30	~80



Background Information

Tetrahymena thermophila is a single-celled organism that is commonly used in laboratory studies. It is a ciliated protozoan that moves using cilia. NSAIDs are a class of drugs that are used to reduce pain, inflammation, and fever.

ROHINI PANDEY
2027

Does iPod Usage Occur at Sound Levels Associated with Noise-Induced Hearing Loss (NIHL) In High School Students?

Equipment Schematic



1. donated first generation Apple iPod Nano
2. splitter plugged into the headphone jack of the iPod
- 3A. male jack of one Gummy stereo headphones set (frequency response = 18Hz-20000Hz & sensitivity = 108dB/mW) soldered to alligator clips and connected to female jack of splitter
- 4A. Global Specialties PRO-50 multimeter
- 3B. second set of headphones connected to another female jack of splitter.
- 4B. participant

Data Analysis

- 440 Hz reference tone inserted at end of each music clip
- splitter used to send iPod output to earbuds and voltage recording system
- measured voltage of reference tone
- voltage values matched to sound pressure level values from calibration chart (created using IEC 711 coupler connected to Hewlett-Packard model 35665 Digital Signal Analyzer)

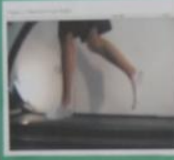


Data

Time	Location	Sound Level (dB)
1:30	Library	45
1:45	Library	50
2:00	Library	55
2:15	Library	60
2:30	Library	65
2:45	Library	70
3:00	Library	75
3:15	Library	80
3:30	Library	85
3:45	Library	90
4:00	Library	95
4:15	Library	100
4:30	Library	105
4:45	Library	110
5:00	Library	115
5:15	Library	120
5:30	Library	125
5:45	Library	130
6:00	Library	135
6:15	Library	140
6:30	Library	145
6:45	Library	150
7:00	Library	155
7:15	Library	160
7:30	Library	165
7:45	Library	170
8:00	Library	175
8:15	Library	180
8:30	Library	185
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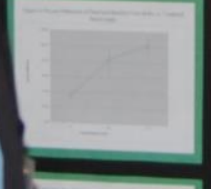
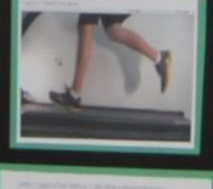
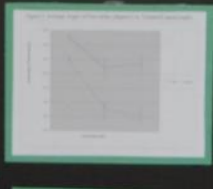
A Study in the Differences in Foot Strike Patterns Between Barefoot and Shod Runners

Data and Results:



Run Type	Striking Foot	Striking Location	Striking Angle	Striking Velocity	Striking Acceleration
Barefoot	Left	Midfoot	15°	1.2 m/s	1.5 g
	Right	Midfoot	18°	1.3 m/s	1.6 g
	Average	Midfoot	16.5°	1.25 m/s	1.55 g
Shod	Left	Forefoot	25°	1.1 m/s	1.4 g
	Right	Forefoot	28°	1.0 m/s	1.3 g
	Average	Forefoot	26.5°	1.05 m/s	1.35 g

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Methods:

The study was conducted in a laboratory setting. Participants were asked to run on a treadmill at a self-selected pace. The force plates were placed on the treadmill to capture the foot strike data. The data was then analyzed using statistical software to determine the differences between barefoot and shod runners.

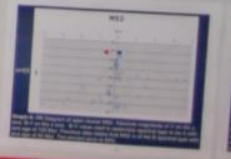
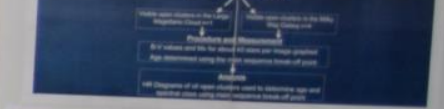
Conclusion:

The study found that barefoot runners have a different foot strike pattern compared to shod runners. Barefoot runners tend to strike the ground with their midfoot, while shod runners tend to strike with their forefoot. This difference in strike pattern may be due to the presence of a shoe, which provides additional support and cushioning.

Future Research:

Future research should focus on the long-term effects of different shoe designs on foot strike patterns. It would also be interesting to explore the relationship between foot strike patterns and injury risk in runners.

Finding the Spectral Class and Age of Open Clusters in the Milky Way Galaxy and the Large Magellanic Cloud using the B-V Break-Off Point



MAXIMUM OCCUPANCY

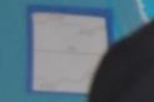
Surface Gravity Waves

Definition of waves

Classification and distribution



Wave propagation



Wave energy



Wave interaction



2011
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Center Group

The Design and Construction of a Model Indoor Home Garden Using Recycled Materials And Augmented Soil

Hypothesis

The addition of organic matter will result in an improvement in the growth rate of the plants. The plants grown in the augmented soil will grow faster than those in the control soil.

Research Goal

To Design and Construct an Indoor Home Garden using Recycled Materials and Augmented Soil.



Future Directions

In the future, we could test the effect of different types of recycled materials on the growth of the plants. We could also test the effect of different types of augmented soil on the growth of the plants. We could also test the effect of different types of plants on the growth of the plants.

Implications

- The project can be used to show if recycled materials are effective in growing indoor plants and gardens.
- The project can be used to show the amount of garbage in the world.
- It can be used to show how to recycle.
- It can be used to show how to save water.
- It can be used to show how to save energy.
- It can be used to show how to save money.

Background

Indoor gardening is a popular hobby for many people. It allows people to grow plants indoors, even in winter. However, indoor gardening can be challenging because the plants do not get natural light and the soil can dry out quickly. This project aims to solve these problems by using recycled materials and augmented soil to create a model indoor home garden.

Procedure

1. Collect recycled materials such as cardboard boxes, plastic bottles, and old newspapers.

2. Clean and cut the materials into the desired shape and size for the garden.

3. Fill the garden with augmented soil, which is a mixture of recycled soil and organic matter.

4. Plant the seeds in the garden.

5. Water the plants regularly and provide them with natural light.

6. Monitor the growth of the plants over time.

Flexor Tendonitis, the Result of Repeated Text Messaging?

Purpose

The purpose of this study is to determine if there is a correlation between the amount of text messaging and the occurrence of flexor tendonitis.

Hypothesis

It is hypothesized that there is a positive correlation between the amount of text messaging and the occurrence of flexor tendonitis.

Procedure

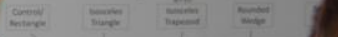
1. A survey was distributed to a group of 100 people, asking them to report the number of text messages they send per day and whether or not they have experienced flexor tendonitis.

2. The data was analyzed using a scatter plot and a correlation coefficient.

Conclusions

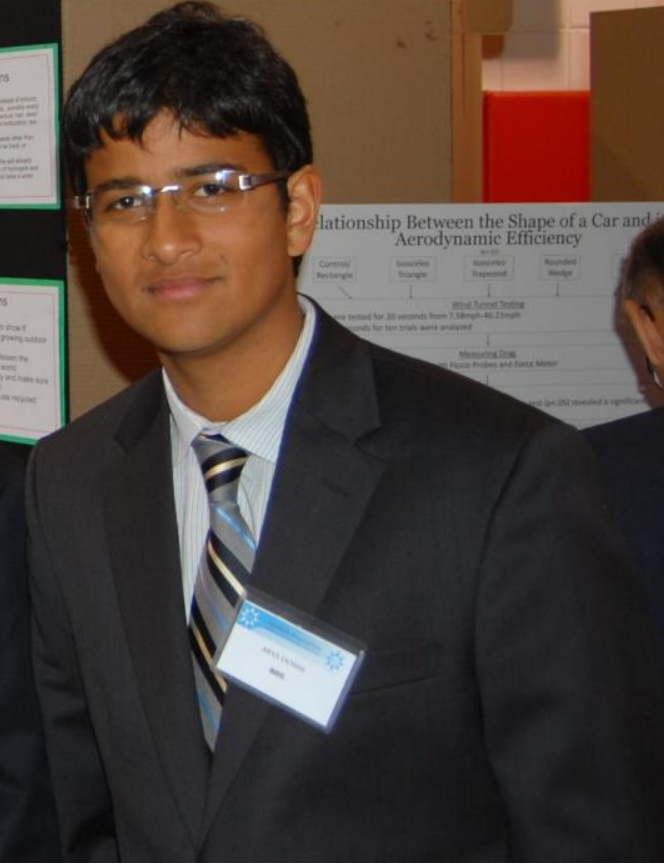
The results of the study show a strong positive correlation between the amount of text messaging and the occurrence of flexor tendonitis. This suggests that repeated text messaging may be a contributing factor to the development of flexor tendonitis.

Relationship Between the Shape of a Car and Aerodynamic Efficiency



Wind Tunnel Testing
The cars were tested for 30 seconds from 7.5 mph to 45.2 mph. The results for ten trials were analyzed.

MEASUREMENTS
The cars were tested for 30 seconds from 7.5 mph to 45.2 mph. The results for ten trials were analyzed.





YES



↑
UP

↑
UP

L10B

