

A photograph of two stuffed animals sitting in airplane seats. The animal on the left is a green dinosaur with an orange belly and a wide-open mouth, wearing a black seatbelt. The animal on the right is a brown bear wearing a red and white striped hat and a red sweater with a white maple leaf, also wearing a brown seatbelt. The seats are dark green with a textured pattern.

Science Research
2012-2013





EXIT

CONGRATULATIONS
COUGAR

ng Isla
Car



EXIT

CONGRATULATION
COUGARETTES

DANIEL J. LAURINCA
HARVEY V.
SUPERINTENDENT OF SCHOOLS
JOSEPH J. DEL ROSSO
HIGH SCHOOL NORTH

COUGARETTES



Phagic
Isopods

Touch Screen Constituents and Folic Acid:
Their Effects on Autism Using *Caenorhabditis elegans*
As a Model Organism

A Comparison of
Unopened and

Touch Screen Constituents and Folic Acid:
Their Effects on Autism Using *Caenorhabditis elegans*
As a Model Organism

A Comparison of Pitcher Plant Fluid in
Unopened and Opened Pitchers

A S
Drosophila

The Effect of Wind on Different Growth Factors
Of Wisconsin Fast Plants (*Brassica rapa*)

The Effect of α -Lipoic Acid, N-Acetyl Cysteine, and Resveratrol
on Metabolic Oocytes in Age-Dependent Anovulatory or
Caenorhabditis elegans Females

A Comparison of Pitcher Plant Fluid in
Unopened and Opened Pitchers

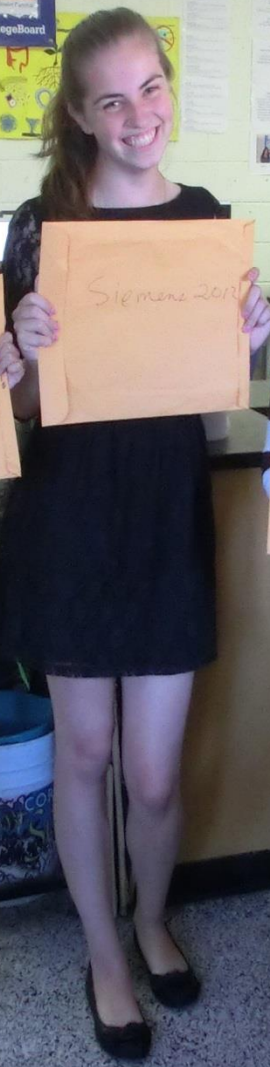
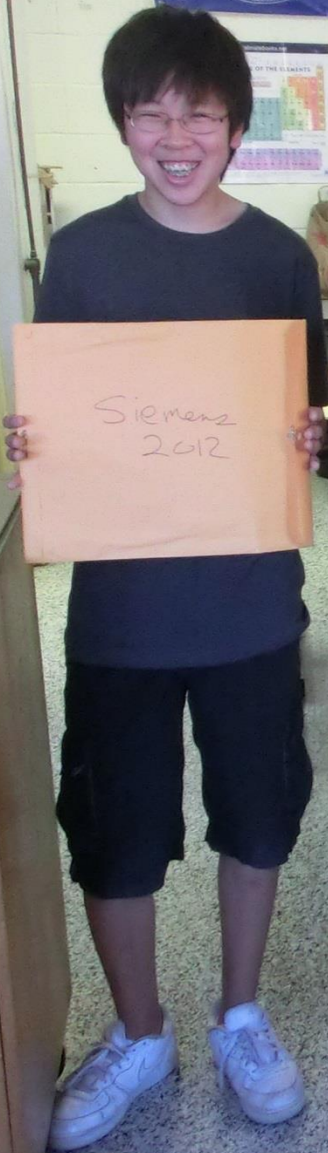
A Study of the Effects of Curcumin on the
Neurophysiological Capabilities of
Drosophila melanogaster Models of Alzheimer's Disease

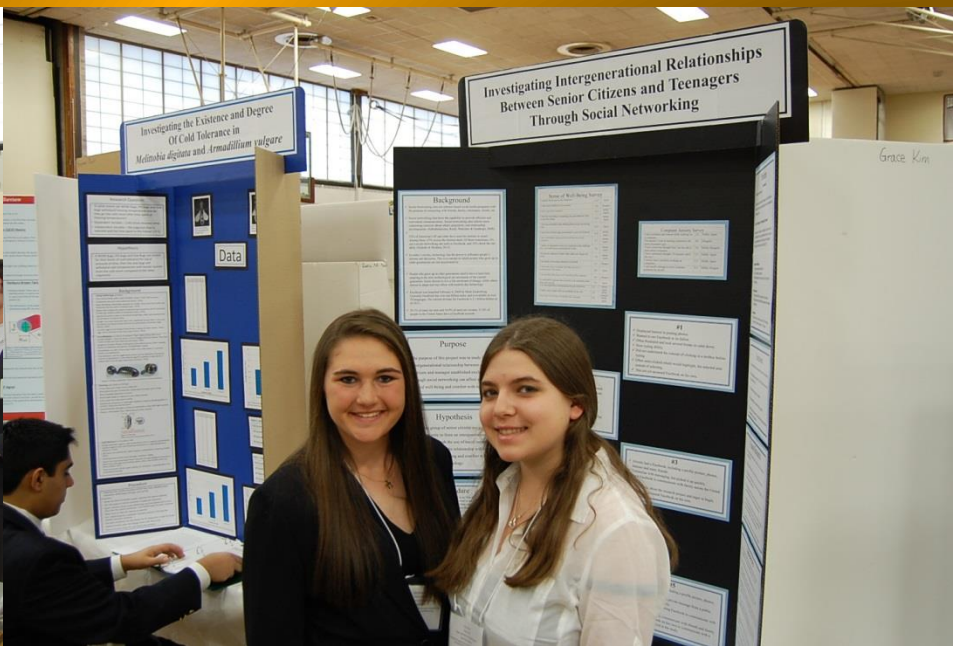
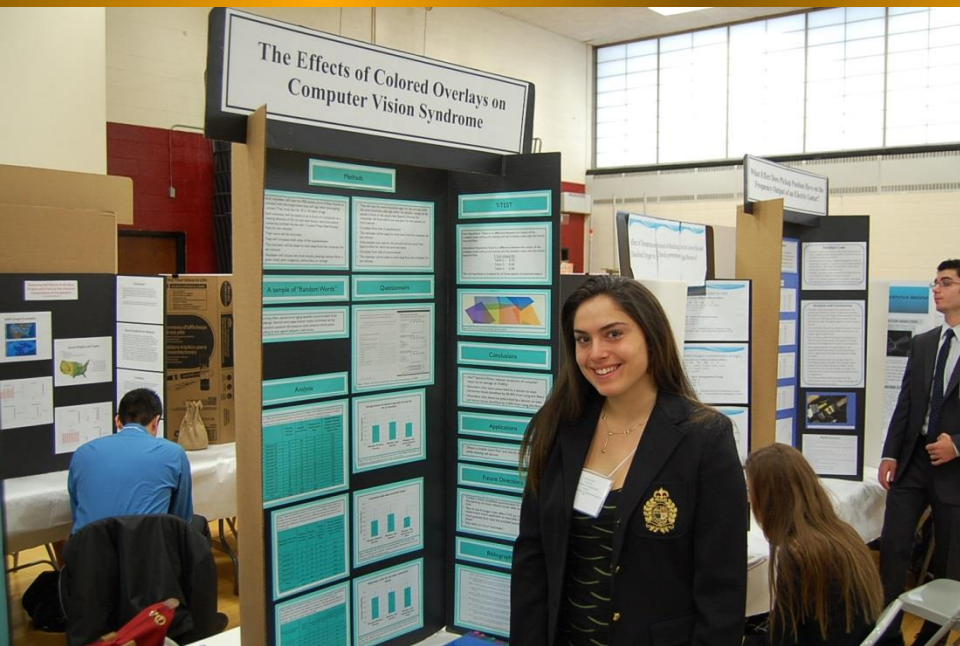
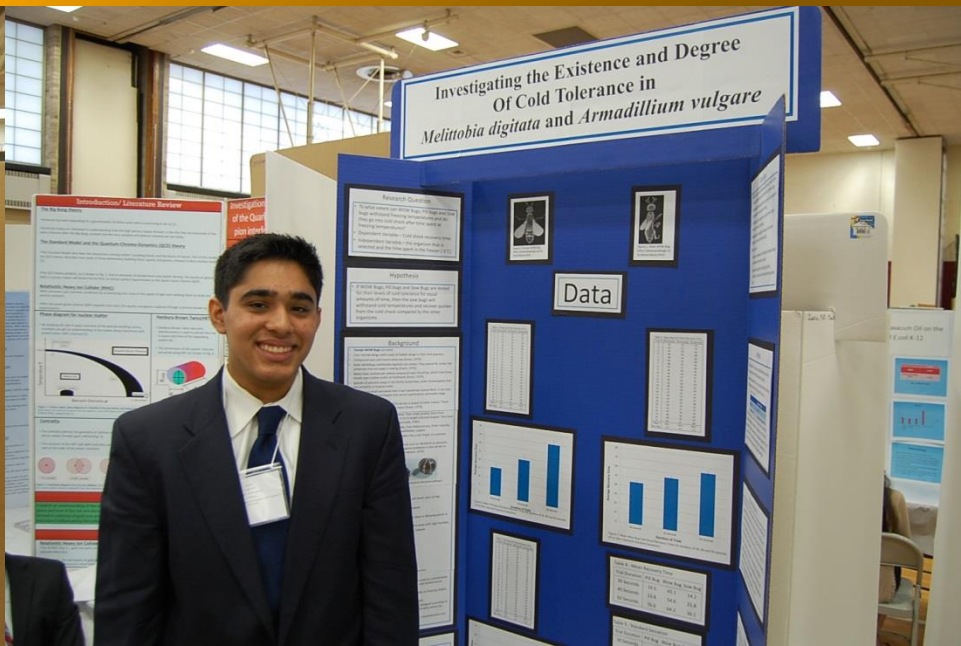
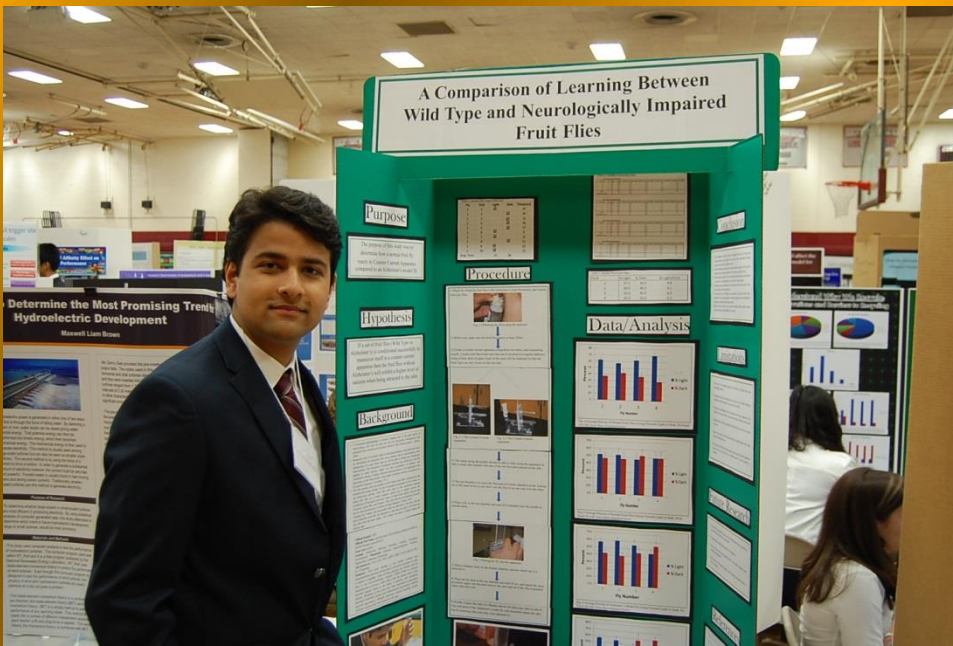






Science Research Wall of Fame
Our Esteemed Graduates







Proud School of a
2009-10
Siemens Competition
Math : Science : Technology
Semifinalist
www.siemensfoundation.org
CollegeBoard

CHEMISTRY
The Road to a Better World

BBB
The Million Degree Solar Cooker

The Million Degree Solar Cooker

NO CHEMICAL DISPOSAL PERMITTED DOWN THE DRAIN

How Do Wild Type Fruit Flies (*Drosophila melanogaster*) Condition as a Single Male Compared to Alzheimer's Model Flies?

Data/Analysis

Graphs and charts showing experimental results.

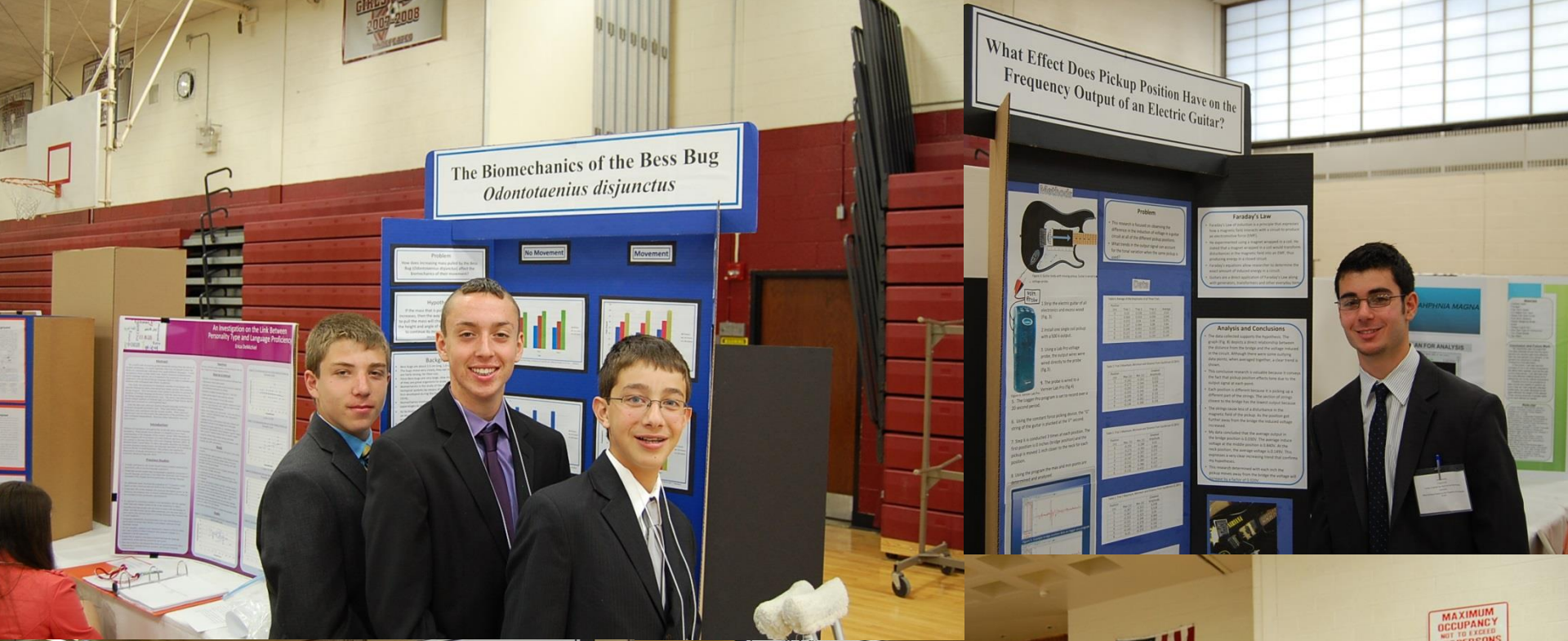
The Process of Coffee Beans

Graphs and charts showing the process of coffee beans.

NO CHEMICAL DISPOSAL PERMITTED DOWN THE DRAIN

WATER





The Biomechanics of the Bess Bug *Odontotaenius disjunctus*

Problem
The Bess Bug (*Odontotaenius disjunctus*) is a species of beetle that is known for its ability to move its head in a way that is not possible for most other insects. This is due to the unique structure of its head and neck, which allows it to move in a way that is not possible for most other insects.

Methodology
The experiment was designed to measure the force of the head movement of the Bess Bug. The force was measured using a force sensor that was attached to the head of the bug. The force was measured at different angles of the head movement.

Results
The results of the experiment show that the force of the head movement of the Bess Bug is significantly higher than that of other insects. This is due to the unique structure of its head and neck, which allows it to move in a way that is not possible for most other insects.

Conclusion
The results of the experiment show that the Bess Bug has a unique ability to move its head in a way that is not possible for most other insects. This is due to the unique structure of its head and neck, which allows it to move in a way that is not possible for most other insects.

What Effect Does Pickup Position Have on the Frequency Output of an Electric Guitar?

Problem
The purpose of this experiment is to determine the effect of pickup position on the frequency output of an electric guitar. The experiment was designed to measure the frequency output of a guitar at different pickup positions.

Methodology
The experiment was designed to measure the frequency output of a guitar at different pickup positions. The frequency was measured using a frequency analyzer that was connected to the output of the guitar.

Results
The results of the experiment show that the frequency output of the guitar is significantly higher at the bridge pickup position than at the neck pickup position. This is due to the unique structure of the bridge pickup, which allows it to produce a higher frequency output than the neck pickup.

Conclusion
The results of the experiment show that the bridge pickup position produces a higher frequency output than the neck pickup position. This is due to the unique structure of the bridge pickup, which allows it to produce a higher frequency output than the neck pickup.



A Survey Study of School Nurses' Knowledge On the Primary Care of Students with Diabetes

Specific Aims
The purpose of this study is to determine the knowledge of school nurses on the primary care of students with diabetes. The study was designed to measure the knowledge of school nurses on the primary care of students with diabetes.

Background
Diabetes is a chronic disease that affects millions of people worldwide. It is a leading cause of blindness, kidney failure, and heart disease. School nurses play a crucial role in the primary care of students with diabetes.

Methodology
The study was designed to measure the knowledge of school nurses on the primary care of students with diabetes. The knowledge was measured using a survey that was distributed to school nurses.

Results
The results of the study show that school nurses have a limited knowledge of the primary care of students with diabetes. This is due to a lack of training and resources for school nurses.

Conclusion
The results of the study show that school nurses need more training and resources to provide the best primary care for students with diabetes.

Correlations Between Systemic Problems, Age, and Gender to the Severity of Periodontal Disease

Problem
The purpose of this study is to determine the correlations between systemic problems, age, and gender to the severity of periodontal disease. The study was designed to measure the severity of periodontal disease in different groups of people.

Methodology
The study was designed to measure the severity of periodontal disease in different groups of people. The severity was measured using a periodontal index that was applied to the teeth of the participants.

Results
The results of the study show that there are significant correlations between systemic problems, age, and gender to the severity of periodontal disease. This is due to the unique structure of the teeth and the way that they are affected by systemic problems, age, and gender.

Conclusion
The results of the study show that systemic problems, age, and gender are all significant factors in the severity of periodontal disease. This is due to the unique structure of the teeth and the way that they are affected by systemic problems, age, and gender.

Notification System Program Methodology

Data Acquisition



Figure 8. Raw Data Acquired from Sound Card

Notification

Fourier Analysis

Conclusion

- The goal of this investigation was achieved: A notification system was successfully developed to identify sudden ionospheric disturbances
- Overall, the program achieves the desired goal, but could be improved by adding the functionality to compare if a solar flare is seen through out all the VLF stations.

Real Life Applications

Power plant solar flare early detection system

Personal solar flare notification application

Mathematically

Limitations

Limitations

The program needs to be alerted for a VLF flare used

The interpretation of the data pieces can only be made once a flare spikes and drops back down

reverse of...
ed to...
es...
each VLF...
station...
using the...
the data...
up-down, the...
realities such as...
lighting or a











NO CHEMICAL DISPOSAL PERMITTED DOWN THE DRAIN

Challenge your mind. Connect to the future.



SIEMENS

Math : Science : Technology

Semifinalist

Matthew Kim



CollegeBoard

www.siemensfoundation.org



EMERGENCY SHOWER

SAFETY SHOWER



A wall covered with various posters, notices, and documents. A large yellow poster with colorful illustrations is prominent. There are also several white notices pinned to the wall, some with text and some with photos.



Alzheimer's Disease in *Caenorhabditis elegans*

Experiment 1
Comparing Normal (N2) to Alzheimer's Mutant (AD100)

Experiment 2
Compare Mutant and Normal (N2)

Experiment 3
Compare Mutant and Normal (N2)

Graphs showing data for each experiment.



The Effect of the Anti-Diabetic Drug Metformin on the Gene Expression of LKBI in *Drosophila melanogaster*

Research Questions

Purpose

Hypothesis

Methods

Results

Conclusions

Future Research

Applications



The Effect of Compad Fit Genetically

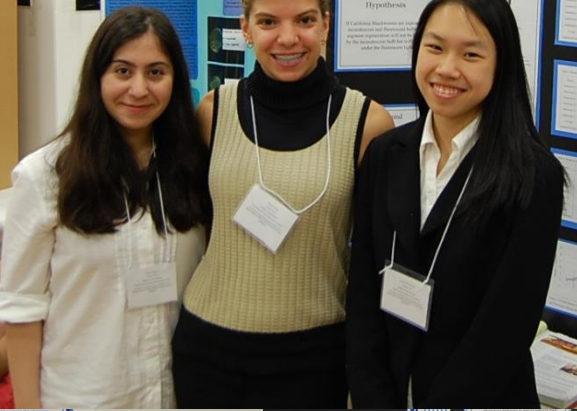
Problem

Hypothesis

Methods

Results

Conclusions



The Design and Construction of a Novel Rotating Rain Gauge

Design and Construction of Prototypes

Renovations

Photographs of the rain gauge prototypes and construction process.



An Antidepressant on the Shrimp (*Artemia salina*)

Background

Methods

Results

Conclusions



The Effect of a More Acidic Environment on Mussel Shells and Mussel Bioremediation

Background

Methods

Results

Conclusions

Andromeda → Forms + Permission } FRI!!
NYSSEF → " " }

Jan 17, 2013 - per 8 - odd → Middle school - LAB closed
Water Drop Group Ast 2:35 - 4:00 pm
-Kayla + Trinity



EXIT



COMMACK HIGH SCHOOL

DEDICATED 1988

OF EDUCATION

SON BETTY M. POLLY

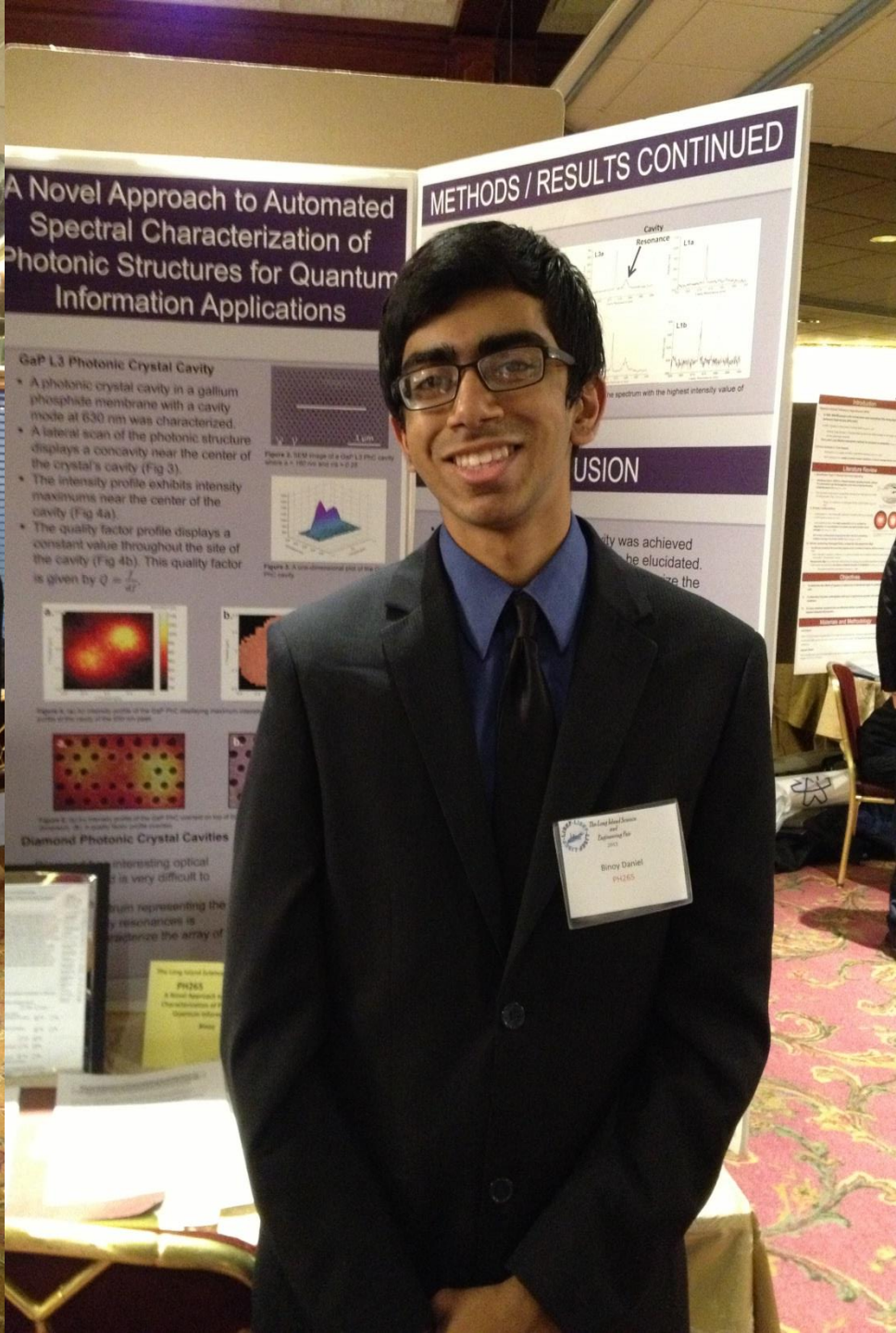
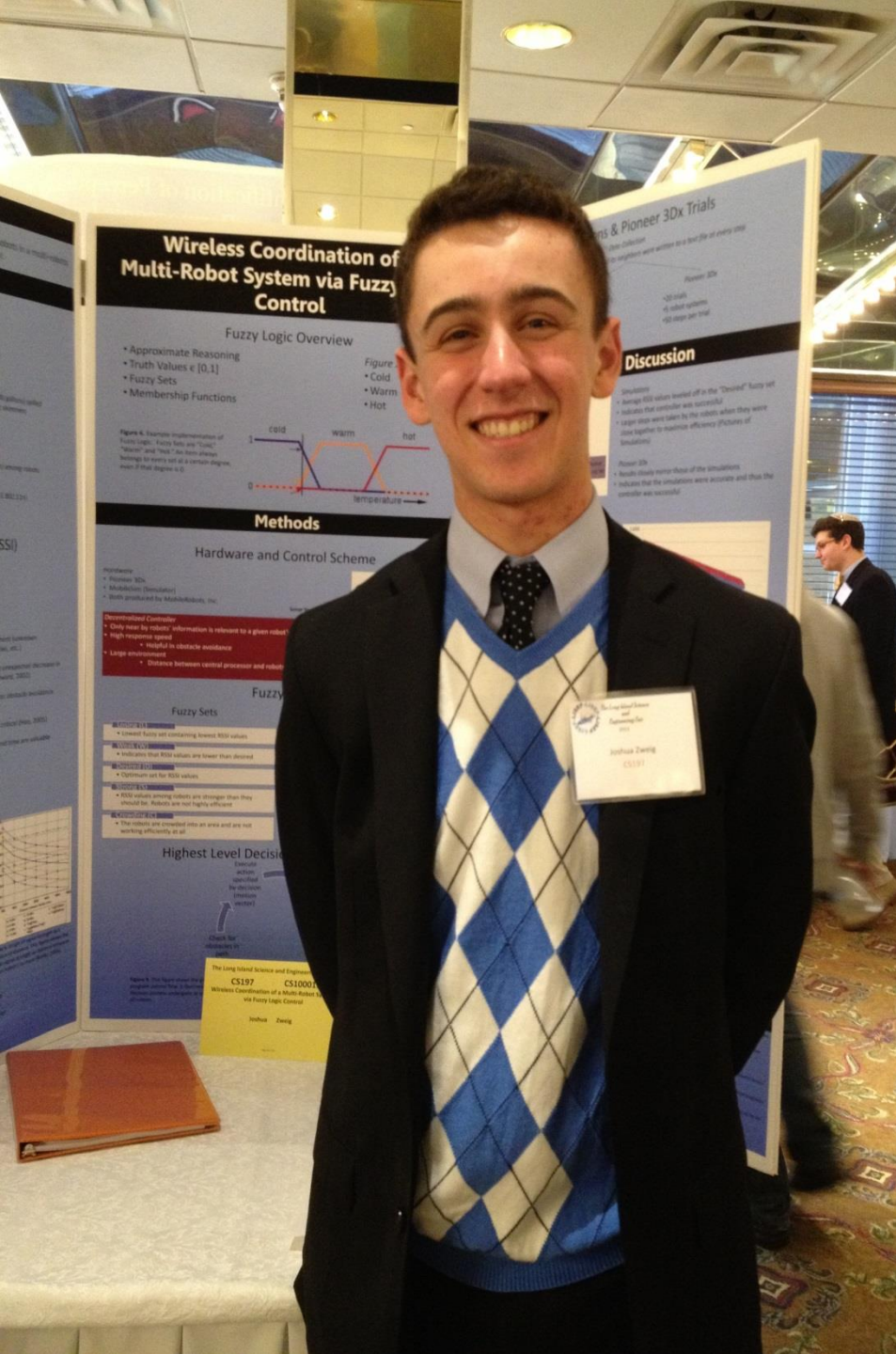
MARY M. SC...

HANCA HARVEY V...

ENDENT OF SCHOOL

JOSEPH I. DEL ROSSO

LOGICAL M...



The Effect of Bisphenol A on the Fecundity of *Drosophila melanogaster*



Methods



Summary of Results

• WT produced 100 eggs per vial on average.
• WT produced 100 eggs per vial on average.
• WT produced 100 eggs per vial on average.
• WT produced 100 eggs per vial on average.
• WT produced 100 eggs per vial on average.

Conclusions

• BPA has a significant effect on *Drosophila* fecundity.
• BPA has a significant effect on *Drosophila* fecundity.
• BPA has a significant effect on *Drosophila* fecundity.
• BPA has a significant effect on *Drosophila* fecundity.

Applications

• BPA is used in the manufacturing of polycarbonate plastic.
• BPA is used in the manufacturing of polycarbonate plastic.
• BPA is used in the manufacturing of polycarbonate plastic.
• BPA is used in the manufacturing of polycarbonate plastic.

Future Research

• In the future, I would like to research the effects of BPA on other organisms.
• In the future, I would like to research the effects of BPA on other organisms.
• In the future, I would like to research the effects of BPA on other organisms.
• In the future, I would like to research the effects of BPA on other organisms.

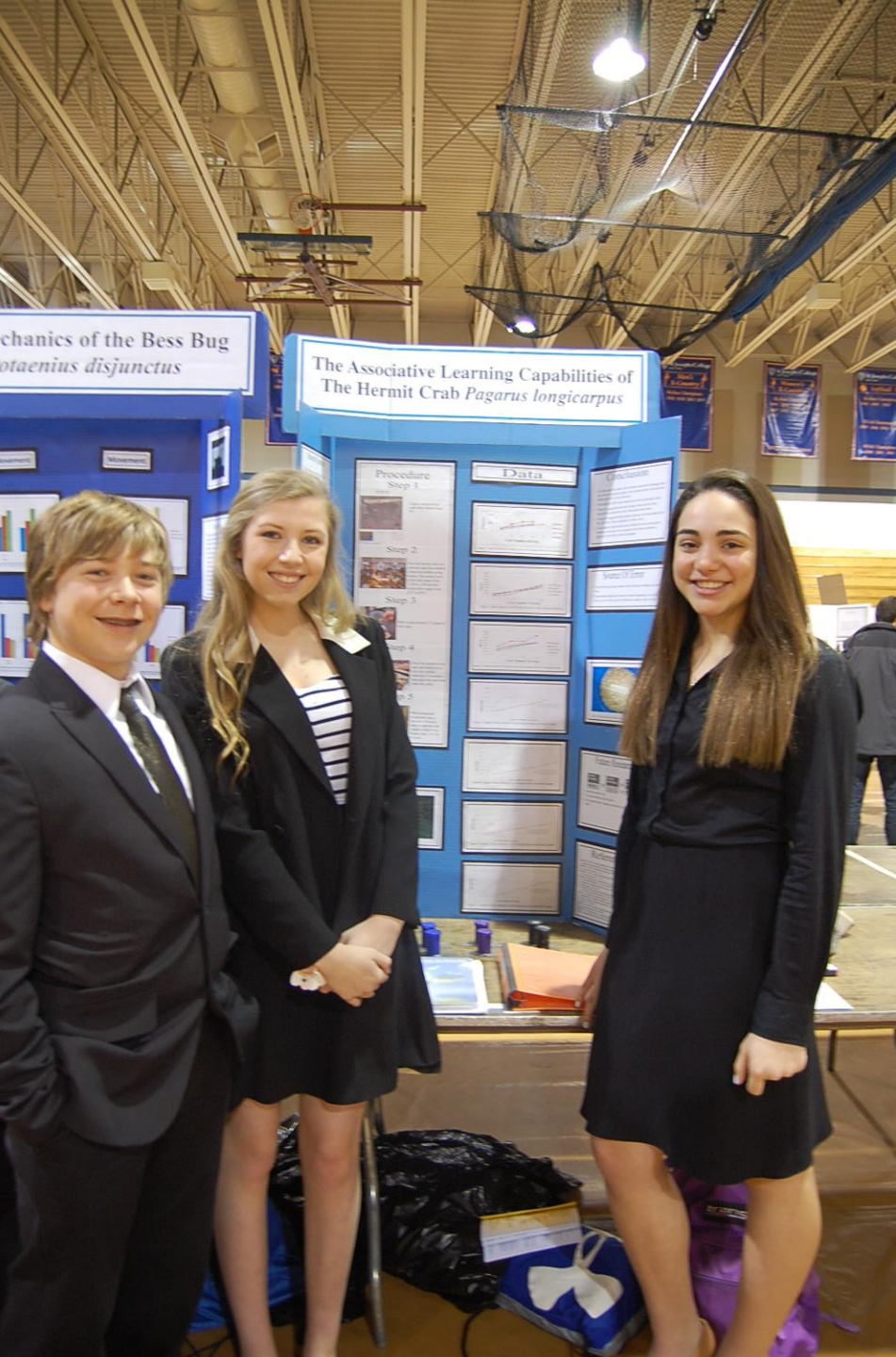
References

• [Reference 1]
• [Reference 2]
• [Reference 3]

Nitrate Deprivation
in *Chlorella vulgaris*.
Fiacco

Conclusion
It is determined that there is
content in
when they
nitrate
hypothesis





Touch Screen Constituents and Folic Acid: Their Effects on Autism Using *Caenorhabditis elegans* As a Model Organism

Research Questions

1. Do current or future touch screen materials lead to an increase in autism related occurrences in *Caenorhabditis elegans*, as gauged by gene expression?
2. Can folic acid, supplied to the environment of *C. elegans*, result in a reduction in the prevalence of autistic conditions in a *C. elegans* population, as determined by gene expression?

Hypotheses

- It was hypothesized that:
1. Indium tin oxide, a current component of touch screens, would lead to the onset of autism in *C. elegans*.
 2. Graphene and copper would be the safest potential touch screen materials and would not lead to the onset of autism in *C. elegans*.
 3. Folic acid would decrease rates of autistic conditions in *C. elegans*.

Background

Autism

- Neurological disorder that impacts normal development of skills used for socializing, communicating, and memory processing (Doolittle et al., 2012)
- Currently affects about one child in every eighty-eight born (Lindgren et al., 2012)
- No definite cause known (Doolittle et al., 2012)
- Rise in autism cases coincides with time period of rise in touch screen use

Mutations & Model Organism

- Human gene *MECP2* mutations found in autistic patients (Thompson et al., 2003)
- *Caenorhabditis elegans*
 - Growth cycle of around three days (Markaki & Tavernarakis, 2005)
 - Many genes found homologous to those of humans
 - *MECP2* gene is homologous to human *MECP2*
 - Decrease in expression could lead to onset of autistic symptoms due to improper synaptic coordination (Hawter et al., 2006)

Touch Screen Materials

- Indium Tin Oxide**
High levels of indium tin oxide can lead to polynuropathy (Thakker et al., 2012)
- Graphene**
Exposure may lead to neurological damage (Li et al., 2012)
- Copper**
Excess can lead to metabolic process imbalances and cause neurological disorders in certain neurological subjects (Gardle & Chow, 2003)
- Silver**
Particles may bind to proteins, cause cellular damage, and lead to neurological disorders (Mehrotra et al., 2011)

Counteracting Substance

- Folic Acid
 - Low folate metabolism in pregnant mothers may lead to autism in progeny (Wood et al., 2002)

Study Overview

- Effectiveness of materials on *MECP2* expression

Data



Sample	Mean CT	CT Value Standard Error
Control	10.76	0.16
Indium tin oxide	26.37	2.31
Graphene	12.22	0.23
Copper	11.86	0.16
Silver	10.28	0.23
Folic Acid (FA)	10.99	0.40
FA & Indium tin oxide	10.22	0.40
FA & Graphene	14.42	0.36
FA & Copper	12.38	0.79
FA & Silver	10.15	0.36

Sample	Relative Expression
Control	1.0
Indium tin oxide	~1.5
Graphene	~1.0
Copper	~1.0
Silver	~1.0
Folic Acid (FA)	~1.0
FA & Indium tin oxide	~1.0
FA & Graphene	~1.0
FA & Copper	~1.0
FA & Silver	~1.0

Methods

Transfer colony of *Escherichia coli* (Strain OP50) into a tube with 3 mL LB broth and keep in an incubator at 37°C overnight. Store tubes at 4°C until ready to spread onto experimental plates.

Transfer two to four *Caenorhabditis elegans* organisms from a previously cultured plate onto each of the newly created agar plates. Incubate the 10 plates at room temperature for 3 days. Make observations about worm behavior and movement during this time.

Extract the RNA from the *C. elegans* using the Qiagen RNeasy Protocol. Measure the concentration and purity of RNA samples using a nanodrop. Dilute the samples in the same concentration.

Create master and organ...

Transfer...

Extract the RNA...

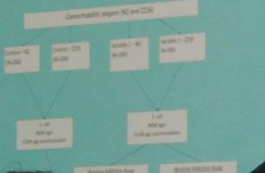
Results

Indium tin oxide & graphene samples had the lowest gene expression levels. Copper & silver samples exhibited overexpression of the gene. Folic acid alone did not have a major impact on gene expression. Folic acid did not stabilize the gene expression levels.

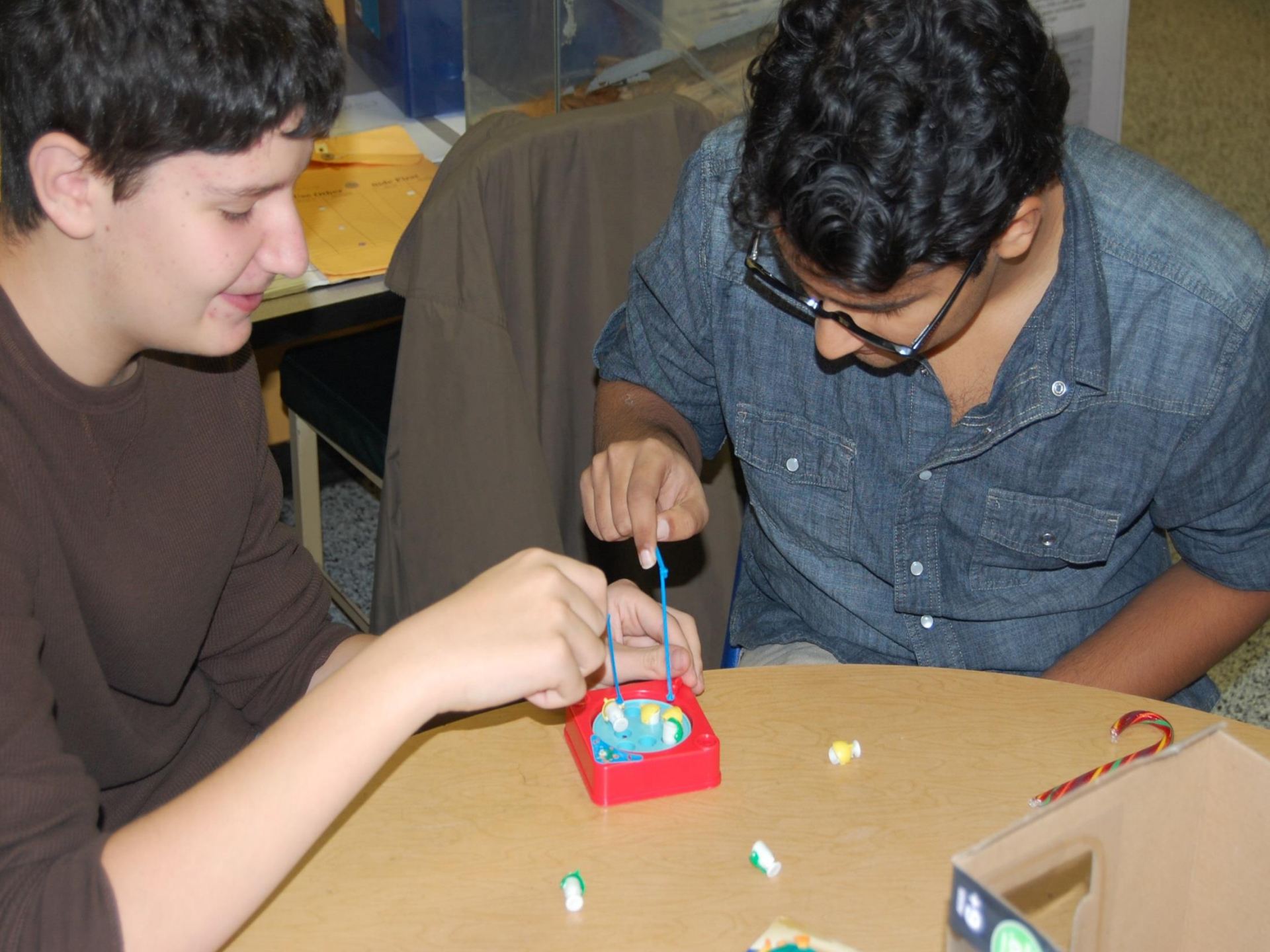
Conclusions

Graphene may lead to autism. Indium tin oxide may increase *MECP2* expression. Folic acid potentially counteracts adverse effects. This study does not provide conclusive proof of the effectiveness of folic acid as a treatment to autism. This study is not conclusive that...

The Effect of Nicotine Withdrawal on Locomotion and Population in *Caenorhabditis elegans*



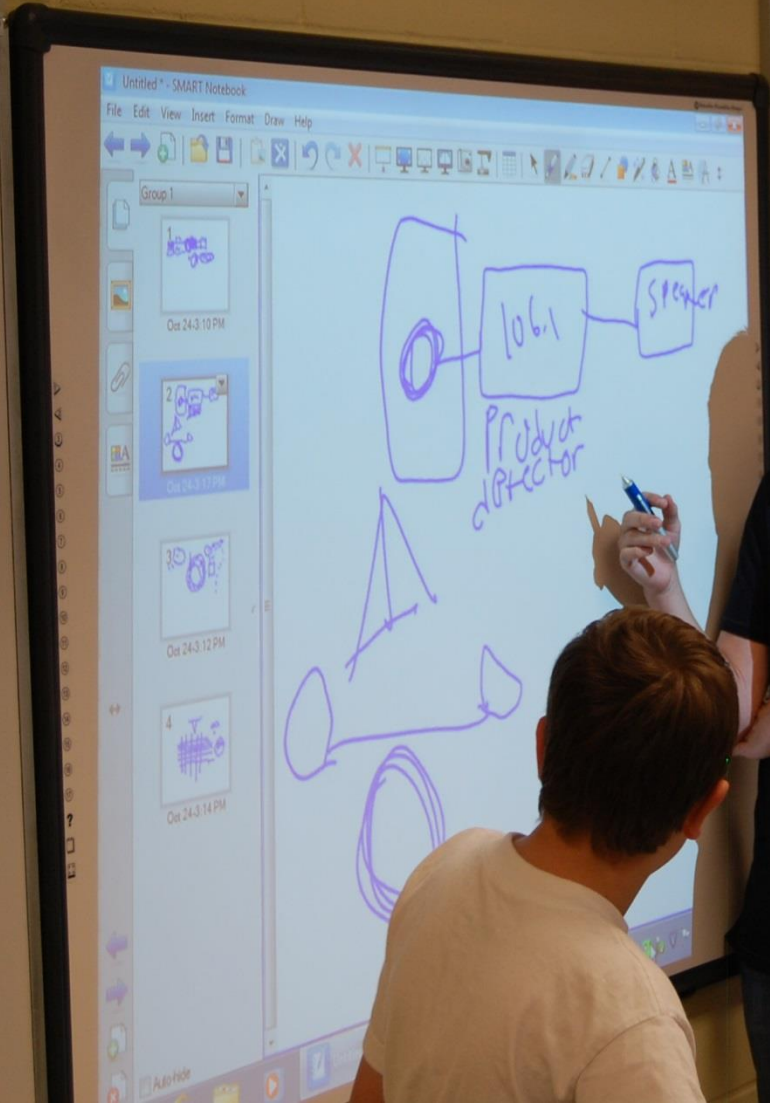
Abstract: This study investigates the effects of nicotine withdrawal on the locomotion and population of *Caenorhabditis elegans*. The experiment was conducted using three groups: Control (N2, C228), Nicotine (N2, C228), and Nicotine + Folic Acid (N2, C228). The results show that nicotine withdrawal significantly affected locomotion and population in all groups. Folic acid treatment did not significantly affect the results compared to the nicotine group.



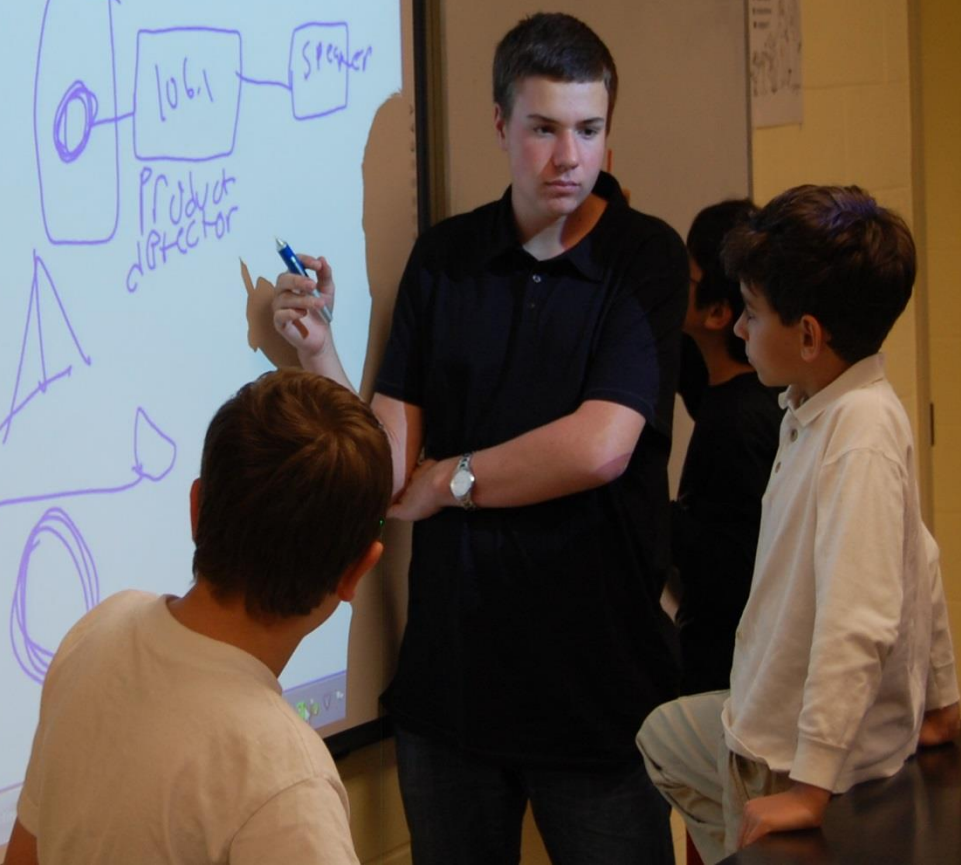


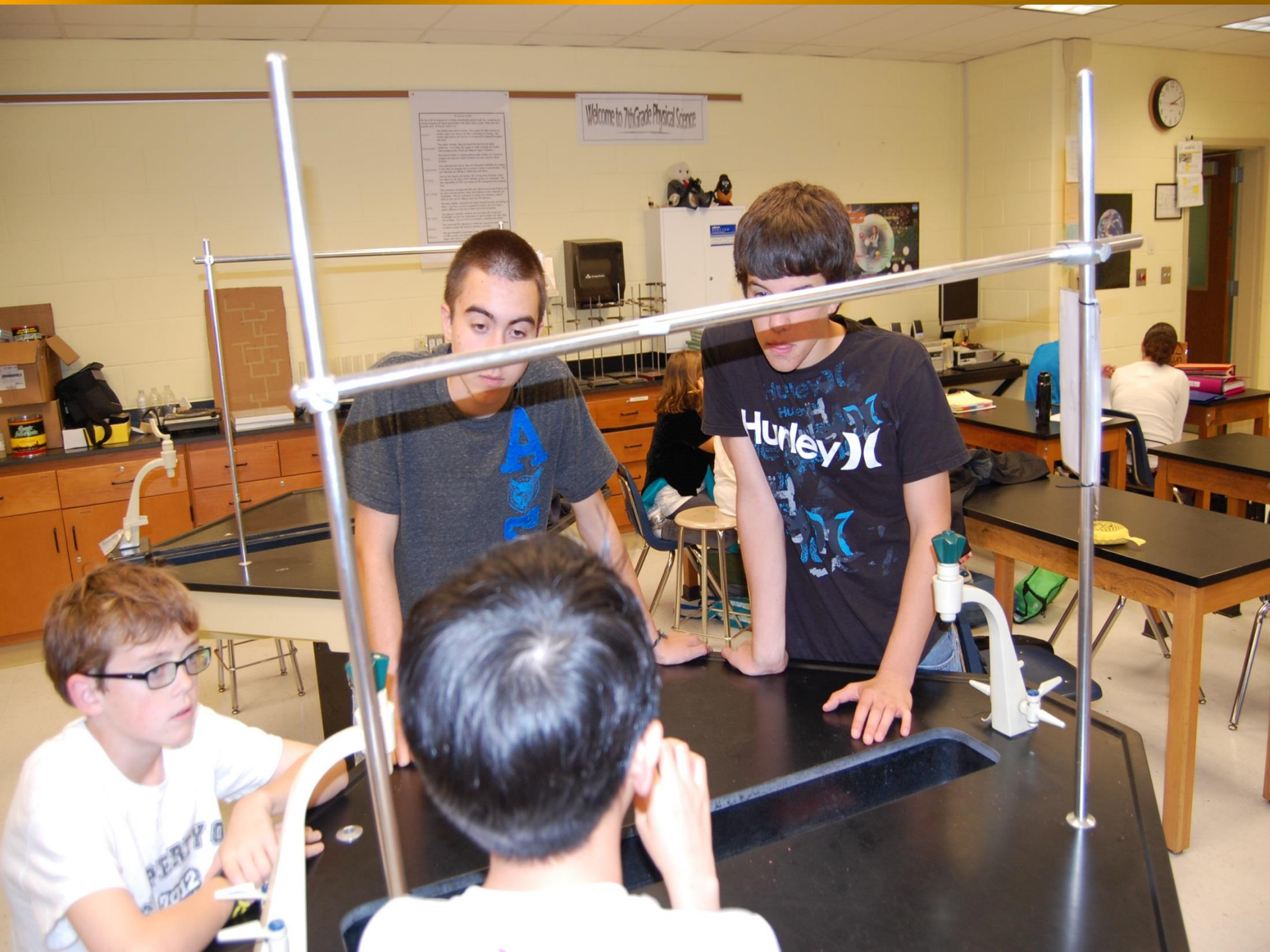
SIEMENS Foundation
Proud Sponsor of a
2010-11
Siemens Competition
Math Science Technology
Semifinalist
www.siemens-foundation.org

00280
AL
CE



School





Welcome to 7th Grade Physical Science

Hurley

PROPERTY OF
2012

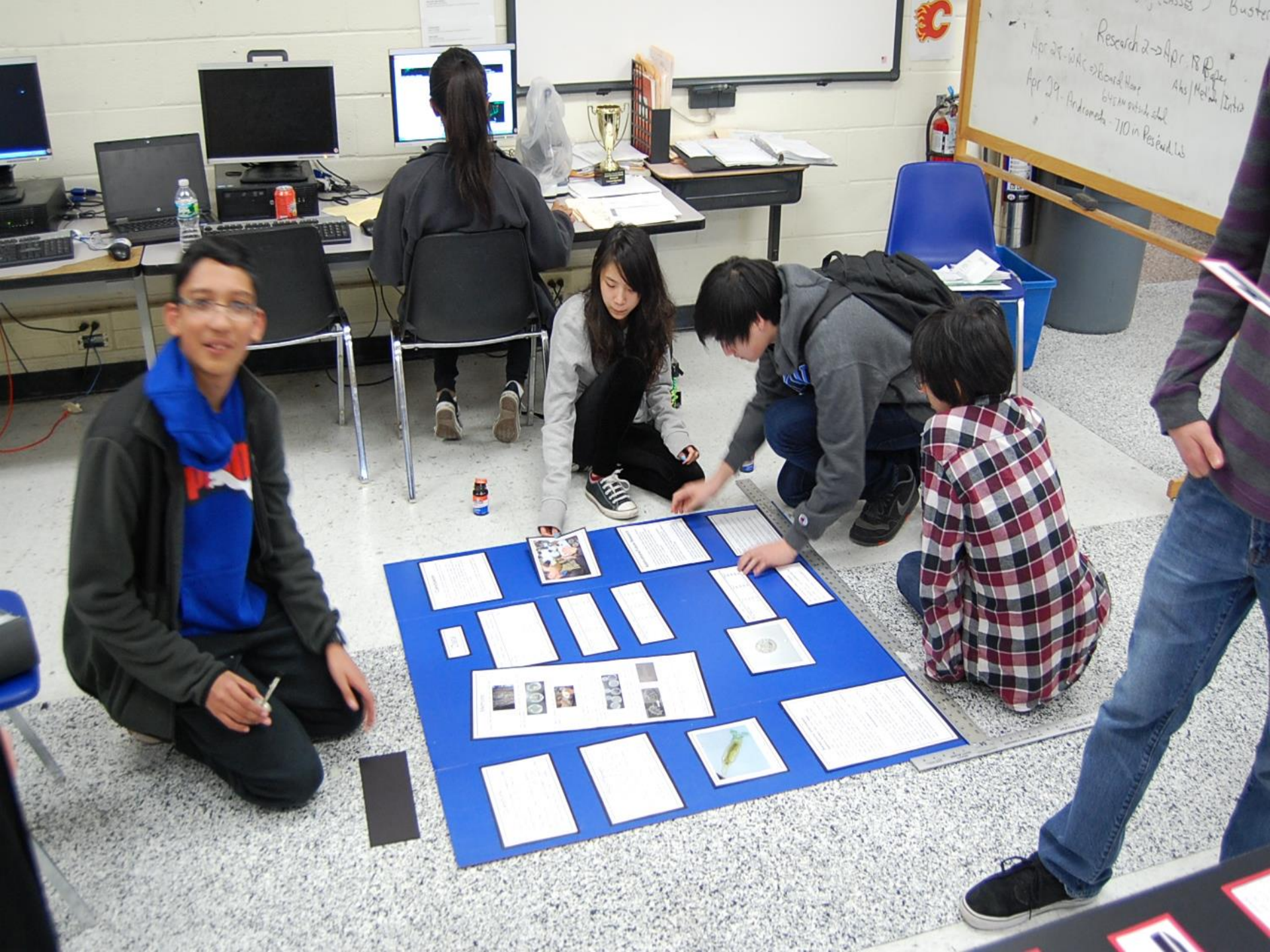


Scott
Tyvek

라미언
De RT
Tyvek

라미언
De RT
Tyvek

Tyvek
Ja He Park



Research 2 -> Apr. 18 Poster
Apr 22 - 24 -> Board Hall Abs/Media/Intro
Apr 29 - Antromeda - 710 in Reseud. Lab

A large blue project board is laid out on the floor, featuring several sections of text, images, and diagrams. The board is organized into a grid-like structure with various rectangular sections. One section in the center contains a photograph of a group of people. Another section in the bottom right features a photograph of a green fish. The board is surrounded by students who are kneeling and looking at the content. A ruler is placed along the right edge of the board.



Thrip (*Artemia salina*)



ING
S CENTER

EXIT

CONGRATULATIONS
COUGARETTES











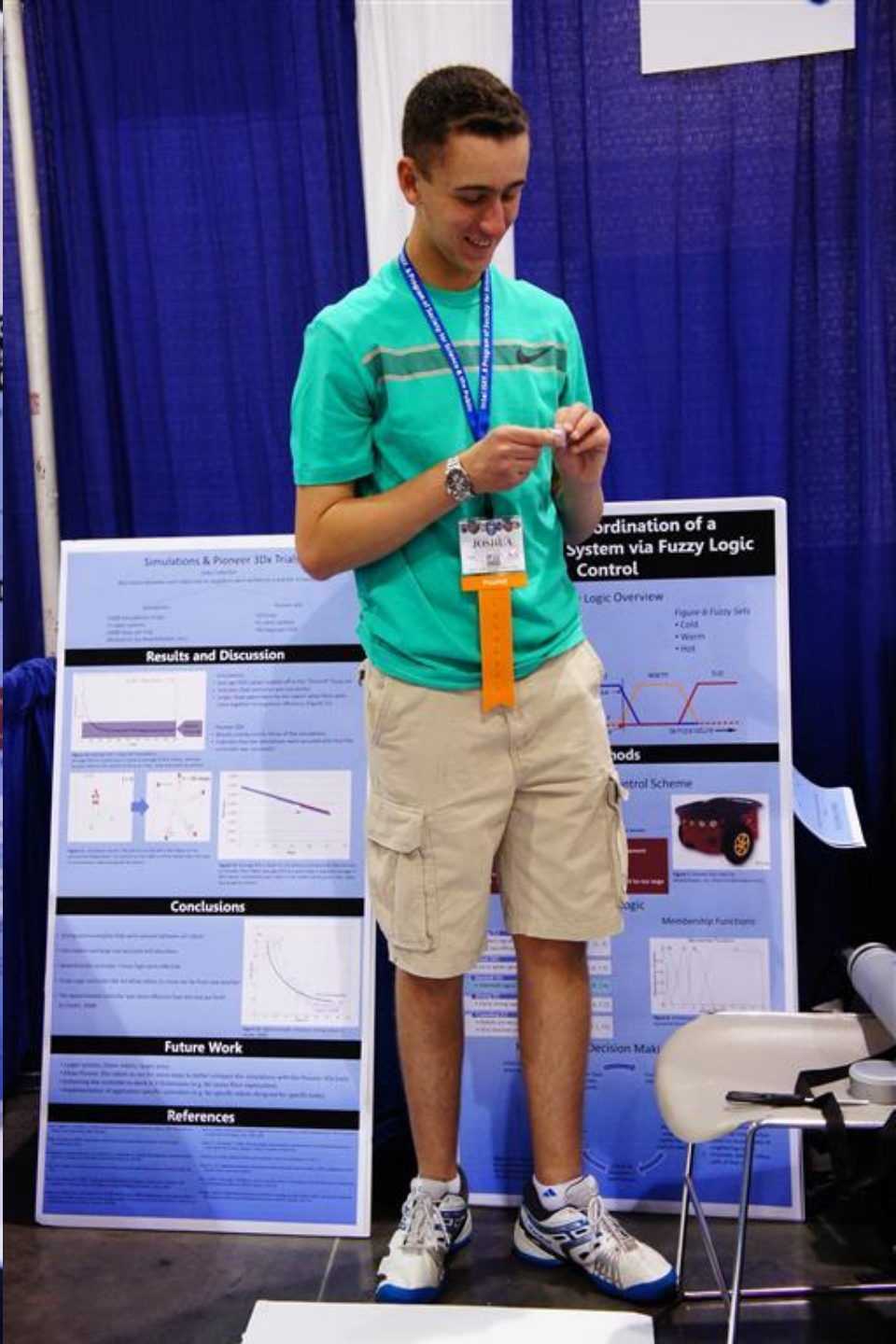
Lab
Table #5

A&F
1892



CONGRATULATIONS
COUGARETTES





CONGRATULATIONS COUGARETTES



DANIEL J. ... HARVEY V. GAIN
SUPERINTENDENT OF SCHOOLS
DR. ... J. DEL ROSSO

A U



NO SMOKING















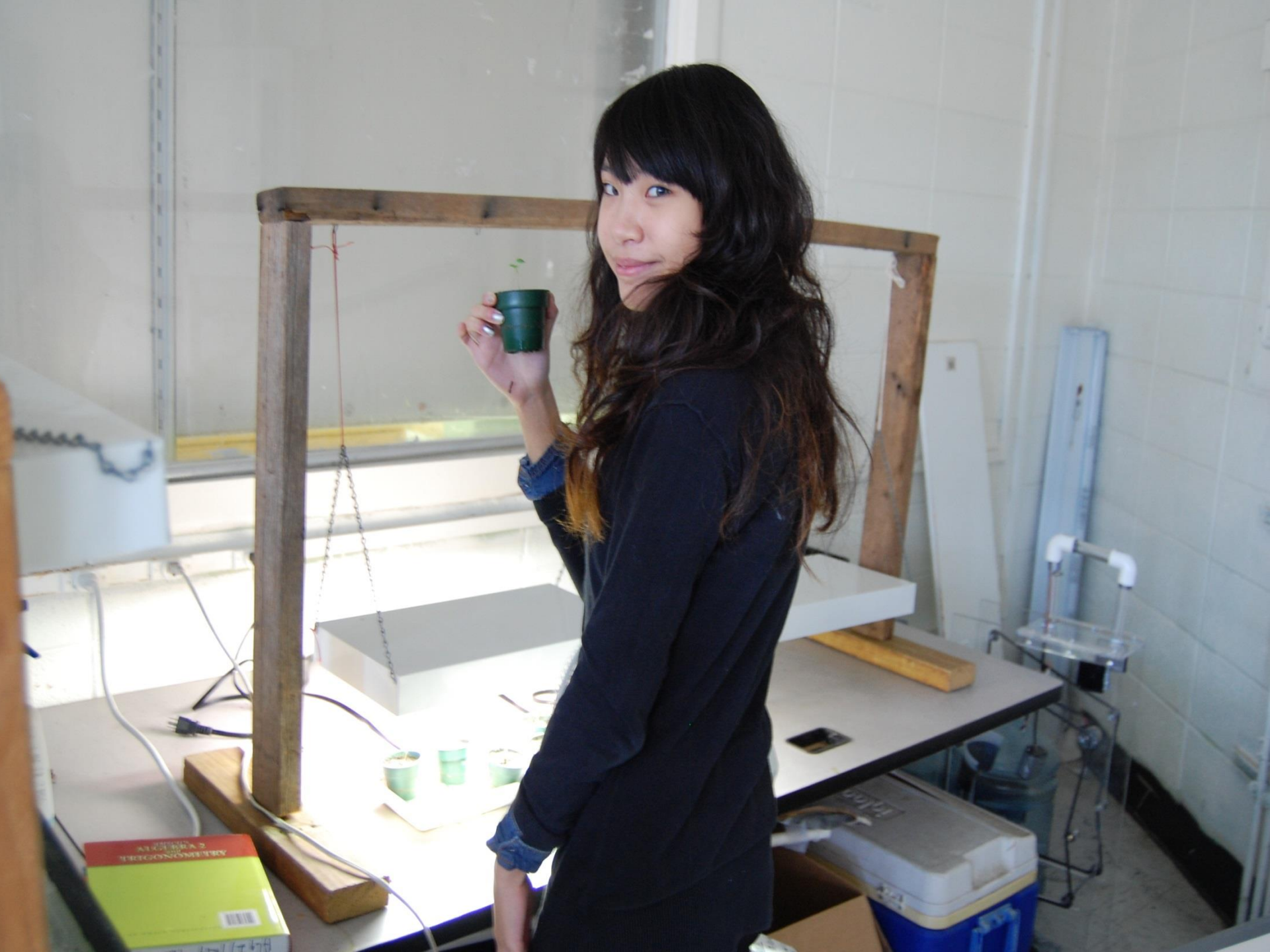
Proud School of a
2010-11
Siemens Competition
Math : Science : Technology
Semifinalist
www.siemens-foundation.org



SUN 41

#####







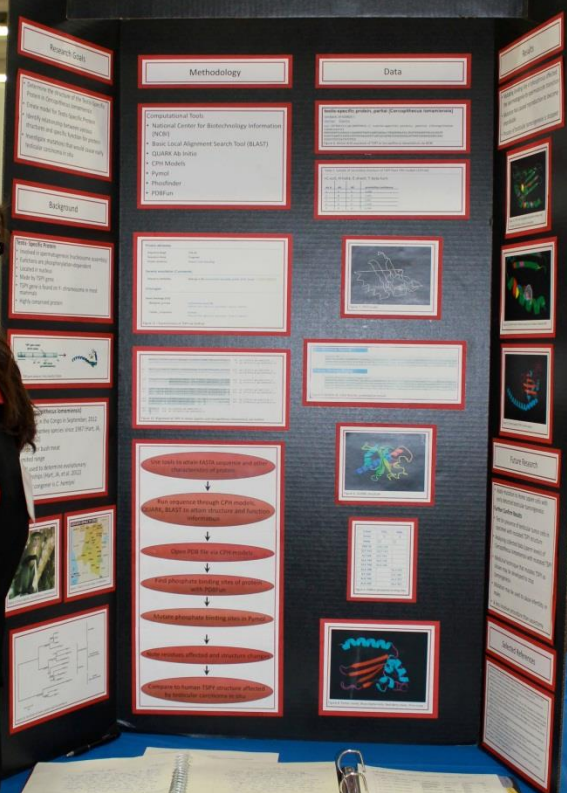
Congrats to Kayla(Layla) Neville Co-author

Any old comp
500...

JET FLO
CORNER FILTER



An Investigation of the Testis-Specific Protein in *Cercopithecus lomamiensis*



3003
An Investigation of the Testis-Specific Protein in *Cercopithecus lomamiensis*
Daniella Rosary

A Comparative Analysis of the Over Expression of Genes Using Serial Analysis of Gene Expression



3004
A Comparative Analysis of the Over Expression of Genes Using Serial Analysis of Gene Expression
Daniel Rosary



Welcome to 7th Grade Physical Science

Lab
Table #2



PROPERTY OF
CAMP
2012
FLORIDA



2010-11
Siemens Competition
Math : Science : Technology
Semifinalist
www.siemens-foundation.org
CollegeBoard

CAROLINA

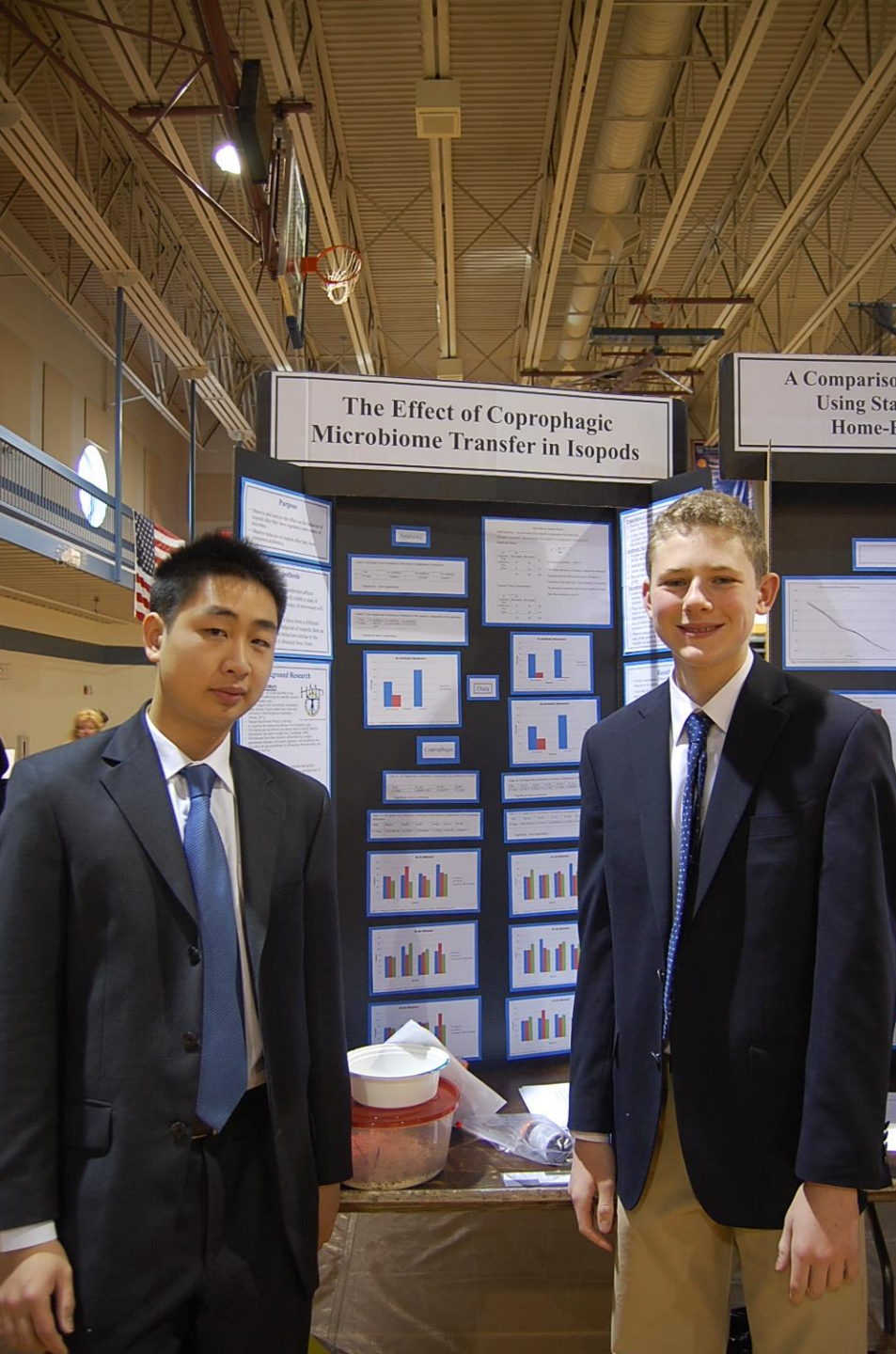
OHIO STATE

NIKE

Hot Burger Buffet
DRIVE THRU

A Study of the Effect of Curricula on the Neurophysiological Capabilities of Dyslexic and Non-dyslexic Models of Children's Brain







nature
chemistry
www.nature.com/naturechemistry

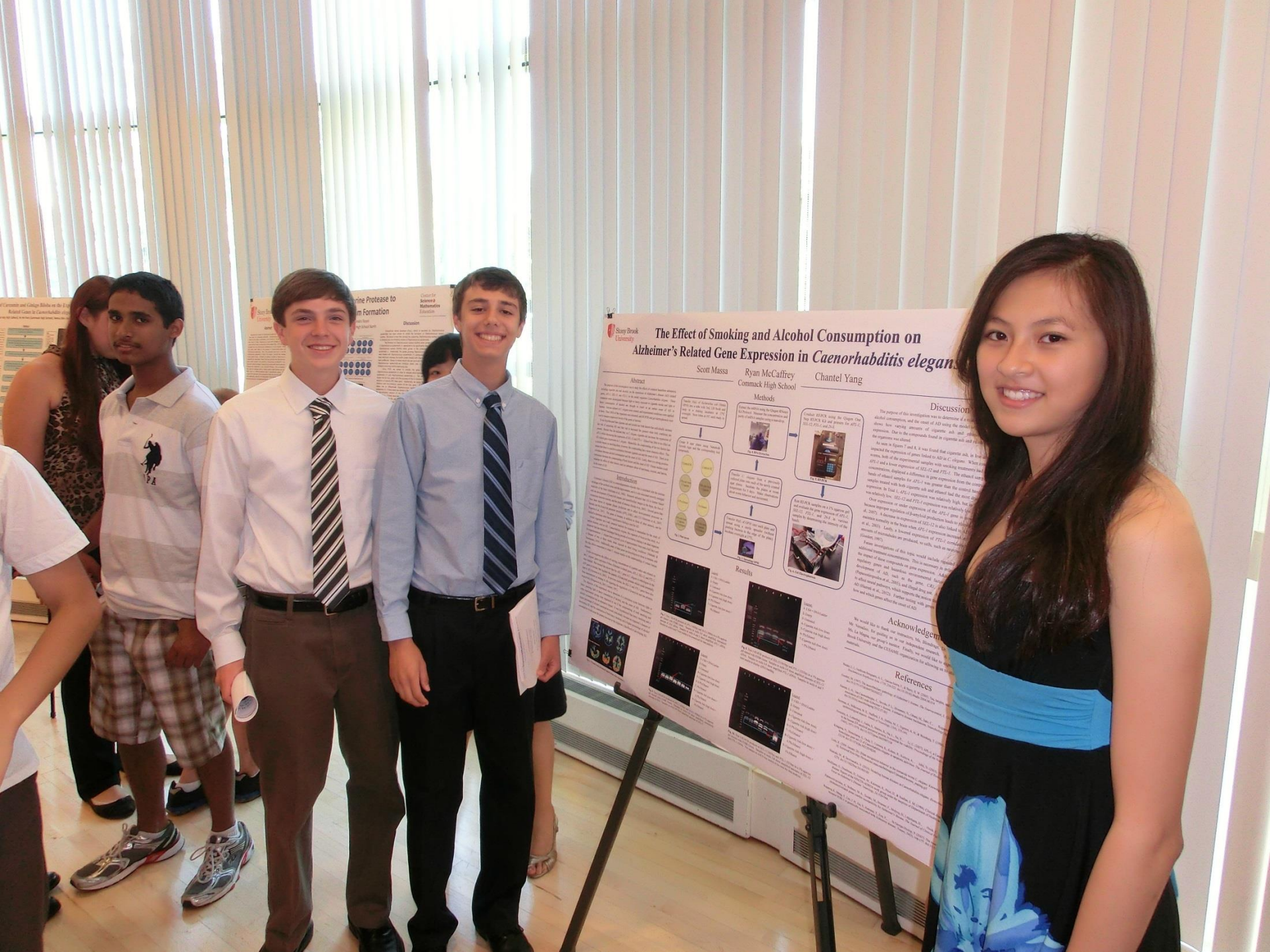
N₂ line #4

Lu
Merg
Zhang
1/18

Zhi







The Effect of Smoking and Alcohol Consumption on Alzheimer's Related Gene Expression in *Caenorhabditis elegans*

Scott Massa Ryan McCaffrey Chantel Yang
Commack High School

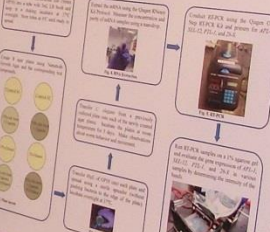
Abstract

Alzheimer's disease is a neurodegenerative disorder characterized by the accumulation of amyloid-beta (Aβ) and tau protein in the brain. The pathogenesis of Alzheimer's disease is not fully understood, but it is believed that environmental factors such as smoking and alcohol consumption may play a role. In this study, we investigated the effect of smoking and alcohol consumption on the expression of Alzheimer's related genes in *Caenorhabditis elegans*.

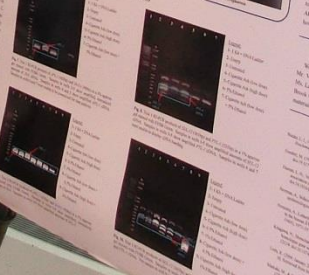
Introduction

Alzheimer's disease is a neurodegenerative disorder characterized by the accumulation of amyloid-beta (Aβ) and tau protein in the brain. The pathogenesis of Alzheimer's disease is not fully understood, but it is believed that environmental factors such as smoking and alcohol consumption may play a role. In this study, we investigated the effect of smoking and alcohol consumption on the expression of Alzheimer's related genes in *Caenorhabditis elegans*.

Methods



Results



Discussion

The purpose of this investigation was to determine if smoking and alcohol consumption, and the onset of AD, using the model organism *C. elegans*. Our results showed that smoking and alcohol consumption had a significant effect on the expression of Alzheimer's related genes in *C. elegans*. We found that smoking and alcohol consumption had a significant effect on the expression of Aβ and tau protein in *C. elegans*. This suggests that smoking and alcohol consumption may play a role in the pathogenesis of Alzheimer's disease.

Acknowledgements

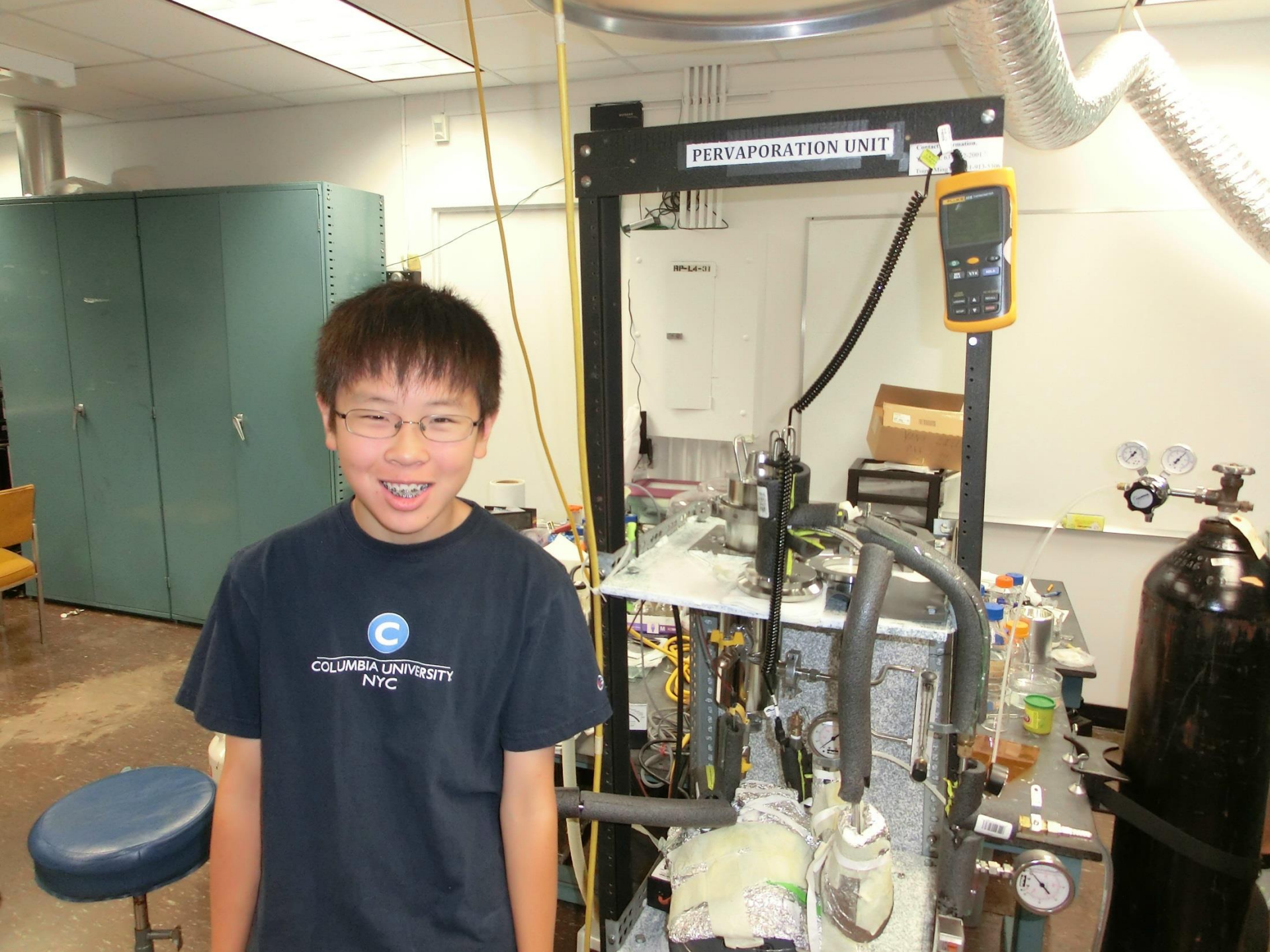
We would like to thank our advisor, Dr. [Name], for her guidance and support. We also thank the members of the [Lab Name] for their assistance and the [Organization] for providing the [Equipment].

References

Alzheimer, A. (1907) Über die eigenartige Erkrankung des menschlichen Gehirns als "Alzheimer'sche Krankheit". *Zeitschrift für die Gesamte Neurologie und Psychiatrie*, 12, 144-152.

McGeer, D.L., McGeer, P.L. (1988) Alzheimer's disease: a review of the pathology and pathogenesis. *Neuroscience and Biobehavioral Reviews*, 12, 1-10.

Scott, M., McCaffrey, R., Yang, C. (2010) The Effect of Smoking and Alcohol Consumption on Alzheimer's Related Gene Expression in *Caenorhabditis elegans*. *Stony Brook University*.



PERVAPORATION UNIT


COLUMBIA UNIVERSITY
NYC

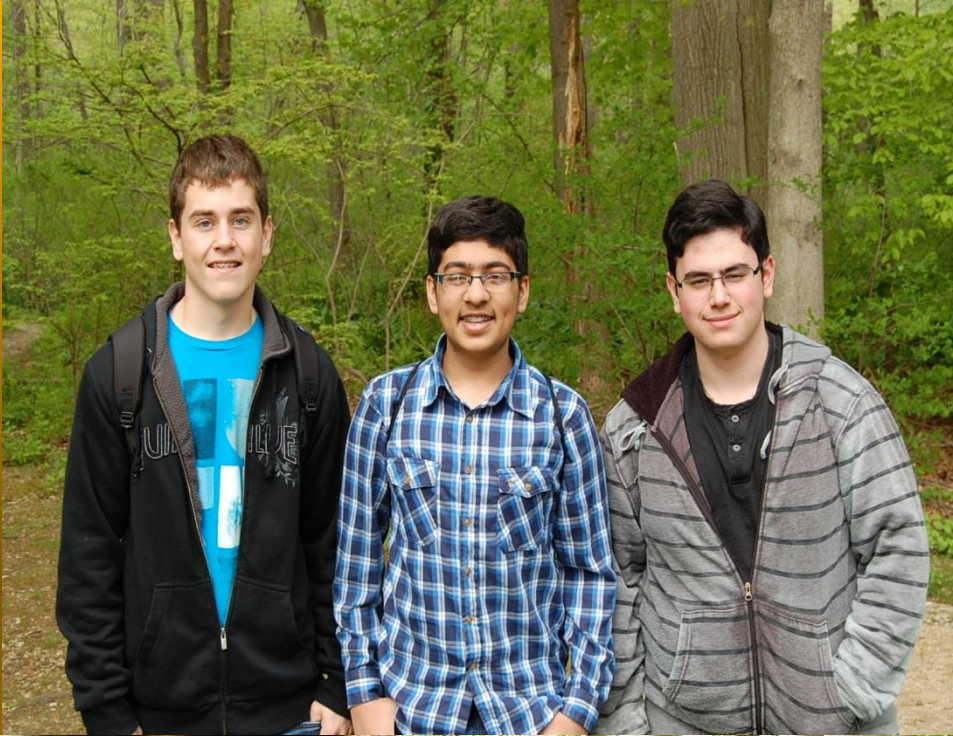
Contact Information
Tel: 212-875-2001
Tel: 212-875-5300

BP-L4-01

Pressure gauges

Pressure gauge







Scott
Tywin

라지언
RT. M.
Tywin

라지언
RT. M.
Tywin

라지언
RT. M.
Tywin

TEM



What is a zebrafish?
 Zebrafish (Danio rerio) is a small, colorful fish that is widely used in scientific research. It is a member of the Cyprinidae family and is native to the Ganges and Brahmaputra river systems in South Asia.

Why is it used in research?
 Zebrafish are easy to breed, have a short life cycle, and are transparent, allowing researchers to observe internal organs and processes in real-time. They are also genetically tractable and have a large number of sequenced genomes.

Applications:
 - Developmental biology
 - Genetics
 - Neurobiology
 - Immunology
 - Toxicology
 - Regenerative medicine

Key features:
 - Small size (up to 2.5 cm)
 - Short life cycle (reaches maturity in 2-4 weeks)
 - High fecundity (up to 200 eggs per day)
 - Transparent body
 - Large number of sequenced genomes

Genetically tractable:
 - Forward genetics (mutagenesis screens)
 - Reverse genetics (CRISPR/Cas9 gene editing)

Key genes:
 - *Wnt3* (Wnt signaling)
 - *Shc* (cell signaling)
 - *Notch1* (cell signaling)
 - *Sox2* (stem cell maintenance)

Key proteins:
 - *Notch1* (cell signaling)
 - *Sox2* (stem cell maintenance)

Key tissues:
 - Brain
 - Heart
 - Liver
 - Kidney
 - Intestine
 - Muscle
 - Skin

Key diseases:
 - Cancer
 - Diabetes
 - Alzheimer's disease
 - Parkinson's disease
 - Huntington's disease
 - Sickle cell anemia
 - Cystic fibrosis
 - Tay-Sachs disease
 - Phenylketonuria
 - Sickle cell anemia
 - Cystic fibrosis
 - Tay-Sachs disease
 - Phenylketonuria

Using a similar technique but different promoters and gene products – one red, one blue and one green – researchers can tell when promoters, and thus genes, are active during organism development.

General Theory of Evolution of Transgenic Fish

What if a *GloFish* is eaten by another animal?
 Eating a fluorescent (glowing) animal is not as scary as it sounds. We're eating any other animal. GFP is just another protein. You don't have green when you eat broccoli, do you?

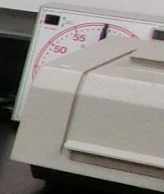
What if a *GloFish* escapes?
 If it could mate with another zebrafish the offspring would inherit the gene for fluorescence. But the fish are sterile so they cannot mate, and it turns out zebrafish don't find *GloFish* very attractive. Even *GloFish* prefer regular zebrafish.

WHY THOSE NAMES?
 Some is shy as I named for the serotonin receptor. Some research polymorphisms in this gene to risk-aversion. Dora is bolder; she is named for the dopamine receptor. Polymorphisms may correlate with thrill-seeking. BUT Behavioral Genetics is a new field and the data is controversial. combine training in psychology, population genetics (like Hardy-Weinberg). For more information go to: The Human Genome Web site at http://www.ornl.gov/sci/techresources/Human_Genome/ols/Databases/

Open book with text and diagrams.

Open book with text and diagrams.

Lab equipment including a pipette, a scale, and various containers.





The Correlations Between Systemic Problems, Age, and Gender to the Severity of Periodontal Disease

Purpose: The purpose of this study is to determine the correlation between systemic problems, age, and gender to the severity of periodontal disease.

Methodology: A cross-sectional study was conducted using data from a large dental clinic. The study included patients of various ages and genders who had been diagnosed with periodontal disease. The severity of the disease was measured using the Periodontal Disease Severity Index (PDSI). The study also collected data on various systemic conditions, including diabetes, hypertension, and cardiovascular disease.

Results: The study found a significant positive correlation between age and the severity of periodontal disease. Additionally, there was a significant positive correlation between the presence of systemic conditions and the severity of periodontal disease. Gender was found to have a less significant impact on the severity of the disease.

Conclusions: The study concludes that age and the presence of systemic conditions are key factors in determining the severity of periodontal disease. These findings suggest that dental professionals should consider a patient's overall health and age when assessing and treating periodontal disease.

Further Research: Future research should focus on identifying the underlying mechanisms that link systemic conditions to periodontal disease. Additionally, studies should explore the effectiveness of integrated treatment approaches that address both dental and systemic health.

Example Patient 1: A 45-year-old male with a history of hypertension and diabetes. He presented with moderate to severe periodontal disease. Treatment included scaling and root planing, antibiotics, and lifestyle modifications to manage his systemic conditions.

Example Patient 2: A 65-year-old female with a history of cardiovascular disease. She presented with severe periodontal disease. Treatment included scaling and root planing, antibiotics, and close monitoring of her cardiovascular health.

Patient Score: A table showing the PDSI scores for various patients, categorized by age group and gender.

Age Group	Gender	Patient Score (PDSI)
18-30	Male	1.5
18-30	Female	1.2
31-45	Male	2.0
31-45	Female	1.8
46-60	Male	2.5
46-60	Female	2.2
61-75	Male	3.0
61-75	Female	2.8

Data Analysis (Change ANOVA and T-test Result)

- Null Hypothesis: There is no statistical difference among the selected attributes for the patient score.
- Alternative Hypothesis: There is a statistical difference among the selected attributes for the patient score.
- Used a single-factor, Two-Way Analysis of Variance Test (ANOVA).
- Used an unpaired student's t-test to test if the probability is less than 0.05 (5%) means that the probability of selecting the null alternative hypothesis when the null alternative hypothesis should really be rejected is very low (less than 5%). This indicates that there is a statistically significant difference among the groups.

Conclusions:

- According to ANOVA and T-Test, there is a significant difference.
- There is a significant difference among the groups.
- There is a significant difference among the groups.
- There is a significant difference among the groups.
- There is a significant difference among the groups.
- There is a significant difference among the groups.

Further Research:

- Ultrasounds should be used to identify the underlying mechanisms that link systemic conditions to periodontal disease.
- Large numbers of data should be collected to increase the accuracy of the study.
- There is a need for further research.

Conclusion: The study concludes that age and the presence of systemic conditions are key factors in determining the severity of periodontal disease. These findings suggest that dental professionals should consider a patient's overall health and age when assessing and treating periodontal disease.

Conclusion: The study concludes that age and the presence of systemic conditions are key factors in determining the severity of periodontal disease. These findings suggest that dental professionals should consider a patient's overall health and age when assessing and treating periodontal disease.



MAXIMUM OCCUPANCY NOT TO EXCEED 975 PERSONS


EXIT





Background

- Solar flares are the sudden release of high energy particles from the sun caused by the buildup of magnetic energy in the sun's atmosphere (Hagstraves 1992).
- The solar cycle is an 11 year periodic change in the sun's activity and appearance (Matsushita 1999).
- Solar flares induce geomagnetic currents that can be picked up by earth's changing magnetic field, thus causing large currents in transmission grids.
- Changes in ionospheric propagation conditions can disrupt telecommunications (Fig. 2).



Using Fractal Dimensions to Discover Mathematical Significance of Fractals in

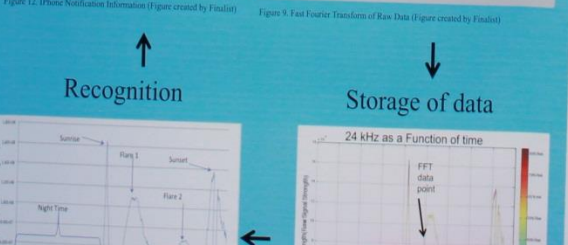
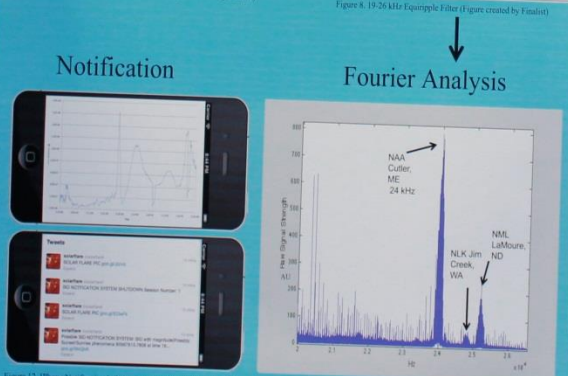
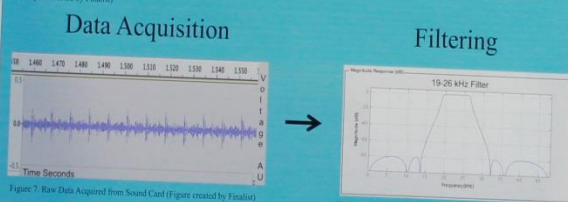
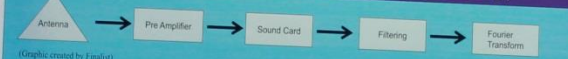
As early solar flare detection systems as a warning to solar driven power plants and sensitive electrical lines

Solar flare prediction methodologies

VLF Stations (19-26 kHz)

A Practical Notification System to Identify Incoming Sudden Ionospheric Disturbances

Notification System Program Methodology



Conclusion

- The goal of this investigation was achieved: A notification system was developed that can identify sudden ionospheric disturbances.
- Overall, the program achieves the desired goal, but could be improved by adding more data to compare if a solar flare is seen through out all the VLF stations.

Real Life Applications

- Power plant solar flare early detection system
- Personal solar flare notification application
- Mathematically finding the peaks in any piece of data

Limitations

- To make the software work correctly a functioning antenna and radio frequency front end must be used.
- The program needs to be calibrated for each VLF station used.
- The interpretation of the data pieces can only be made once a flare spikes and drops back down.

Future Research

- Solar storm detection
- Solar storm prediction
- VLF wave sound circuit
- Noise in data
- Sunspot/Solar phenomena
- Night time data research
- Optimal antenna
- Enhance VLF wave analysis

Selected References

Introduction/Literature Review

The Big Bang theory

Introduction of the Big Bang theory (14 billion years ago) is continuing to be so...

...the Big Bang theory has the high density matter located in the first few microseconds of the ...

...the very compact and dense matter which we know as ...

...the Big Bang theory ...

Investigation of the pion

The Accelerator

On collision, the kinetic energy of the particles is converted into the energy of the particles which were collected.

*Events were selected from the vertex and from 0-92 ...

30077



Impact of the Location of a Solar Cell in Relationship to the Focal Length of a Fresnel Lens on Power Production

Data Collection

Collected:
 Voltage difference across 120Ω resistor
 7 days' data, different weather conditions
 From 6:00AM to 6:00PM EST sampled at 2 minute intervals

Example of Cloudy Day Data (Day 2: 3/11/2012)

Conclusion

Focal Length (cm)	Power (W)
1.47	0.67
1.27	1.27
1.47	1.67
1.87	1.87
4.02	3.11
1.25	0.96
0.99	0.93

Energy production generally increased by Fresnel Lens
 Greatest energy production: 3P → 14.52% more increase
 Least energy production: 1P → a decrease of 6.76% decrease

1.4P significantly greater power at middle of day (100% increase), but decreases power production at other times
 3P almost constant increase over entire day but power increase less than that of 1.4P at middle of day

Explanation: (See diagram below) During morning and afternoon, when sun at low angle, the concentrated light can only reach solar panel when it is at 3P

Applications

- Commercial: Greater energy production per area covered → lower energy prices → saves utility money to use other resources
- Residential: Higher output per area → saves money on energy bills → solar energy can be used for home power break

Future Research

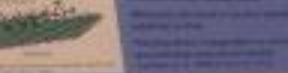


Purpose

Investigate the effect of substrate stiffness on cell morphology and proliferation.

Background

Molecular self-assembly



Substrate stiffness



Cell morphology



Cell proliferation

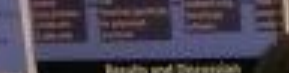


Imaging Self-Assembled Monolayers using Scanning Tunneling Microscopy

Background

Method

Results and Discussion



Conclusion

References

Appendix

Table 1

Table 2

Table 3

Table 4

Table 5

Table 6

Table 7

Table 8

Table 9

Table 10

Purpose

To study the effect of substrate stiffness on cell morphology and proliferation.

Background

Method

Results and Discussion

Conclusion

References

Appendix

Table 1

Table 2

Table 3

Table 4

Table 5

Table 6

Table 7

Table 8

Table 9

Table 10

Breast Cancer Detection and Treatment: Membrane Mechanics and Receptor-Mediated Endocytosis of Platinum Folate Nanoparticles

Background

Method

Results/Data

Conclusion

References

Appendix

Table 1

Table 2

Table 3

Table 4

Table 5

Table 6

Table 7

Table 8

Table 9

Table 10

Results/Data Continued

Background

Method

Results/Data

Conclusion

References

Appendix

Table 1

Table 2

Table 3

Table 4

Table 5

Table 6

Table 7

Table 8

Table 9

Table 10













00 Clean all cages
• Tomt Brian poop plates

Senior
Pizza Bash

2006
Science
Competition

Member Wall of Fame
for Science Graduates

2006
National JSHS



RESEARCH GOALS

- Modify a GFP reporter system to assess changes in gene expression in bacterial cells
- Calculate the temperature at which most chaperone/usher (CU) genes are induced
- Assess the effects of a CU pathway knockout mutant on mouse cells in relation to host cells (adhesion & infection effects)

INTRODUCTION

Yersinia pestis

- Among three species of Yersinia known to be pathogenic to humans
- Cause of signs of the plague (bubonic, septicemic, and pneumonic)
- Responsible for human-to-human transmission
- Highly contagious
- Highly virulent
- Highly infectious
- Highly resistant to environmental conditions



Pili and Chaperone/Usher (CU) Pathways



METHODS AND MATERIALS

Adhesion and Infection

Monitoring the Expression and Virulence Roles of Chaperone/Usher Pathways in Yersinia pestis

A) ADHESION AND INFECTION ASSAYS

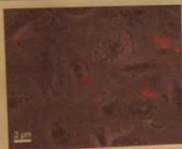


Fig. 3: Fluorescent micrograph sample of a pathway KO mutant strain (A549 cell adhesion assay)

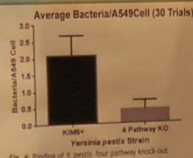


Fig. 4: Binding of Y. pestis four pathway knock-out mutants to A549 cells

Pathway	Δy0348	Δy1858	Δy1869	Δy4060	Adhesion %	Experimental MIC
% Decrease in Adhesion	80.3	33.3	5.9	12.8	82.3	81.2

- Protocol: A549 cells were infected with *Y. pestis* wild type or deletion mutants. Results (bacteria/cell) were calculated and analyzed with ANOVA ($p < .001$).
- Based on the results, of the single deletion mutant assays, a four pathway knock-out strain ($\Delta y0348$, $\Delta y1858$, $\Delta y1869$, and $\Delta y4060$) was tested to determine if pathways work in conjunction with one another.
- Pathways have an additive effect on one another.

B) REPORTER SYSTEM TO MONITOR GENE EXPRESSION

Modifying a GFP Reporter System

- Goal: Using restriction enzymes SspI and XmaI, the promoter regions of chaperone/usher pathways replaced the lac promoter region. Using these novel constructs, chaperone/usher pathways were assessed for optimal induction conditions.
- The *caf* pathway was utilized.

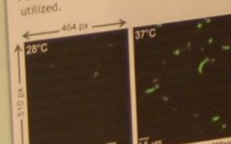


Fig. 7: Sample Micrographs of the *caf-gfp* construct (1:10 dilution) at 28°C and 37°C. Percentages of green fluorescence (fluorescent cells) over the entire micrograph image were calculated through Photoshop.

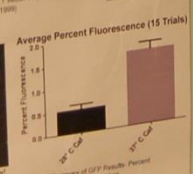


Fig. 8: Summary of GFP Results: Percent Fluorescence vs. Temperature. Error bars = Standard Error.

DISCUSSION AND CONCLUSIONS

- Adhesion and Infection Assays
 - Adhesion assays utilizing the quadruple pathway knock-out mutant provide insight to the roles of pili in binding to host cells as compared to the single knock-out strains.
 - The quadruple knockout strain led to increased deficiency when binding to host cells compared to the single knock-out strains indicating that the pathways have additive effects on one another.
- Reporter System to Monitor Gene Expression
 - Novel gene constructs consisting of pGFPmut3.1 with inserts of the *caf* chaperone/usher pathway promoter region has been developed to assess optimal induction conditions.
 - The *caf* pathway was found to be induced at 37°C: *caf* pathway aids against phagocytosis, which often occurs in the human body as an immune response.

IMPLICATIONS OF FINDINGS

- Y. pestis* - Category A agent of potential bioterrorism
- Understanding pilus biogenesis will explicate the mechanisms of bacterial pathogenesis and provide insight into cellular organelle construction.
- Understanding expression and function of pili could elucidate the mechanisms of pathogenesis and lead to vaccination development.
- Methods can be used in studies regarding other species of pathogenic bacteria more prevalent in today's society such as *Escherichia coli*, *Francisella tularensis*, and species of *Salmonella*, *Shigella*, and *Vibrio*.



Fig. 9: Yersinia pestis Infection Cycle - Modern Day (Colony)

FUTURE DIRECTIONS

- Apply methodology to additional pathogenic bacterial strains
- Create constructs consisting of pGFPmut3.1 and novel promoters
- Determine the conditions (temperature, pH, media type) chaperone/usher pathways are expressed
- Utilize the KIM6+ strain (quadruple KO strain) for mouse studies

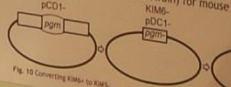


Fig. 10: Converting KIM6+ to KIM6-

SELECTED REFERENCES

Wang, L. J., & ... (2003). ...
 ... (2004). ...
 ... (2005). ...
 ... (2006). ...
 ... (2007). ...
 ... (2008). ...
 ... (2009). ...
 ... (2010). ...
 ... (2011). ...
 ... (2012). ...
 ... (2013). ...
 ... (2014). ...
 ... (2015). ...
 ... (2016). ...
 ... (2017). ...
 ... (2018). ...
 ... (2019). ...
 ... (2020). ...

Measuring DNA damage in Acropora formosa using phosphorylated H2A

Methods

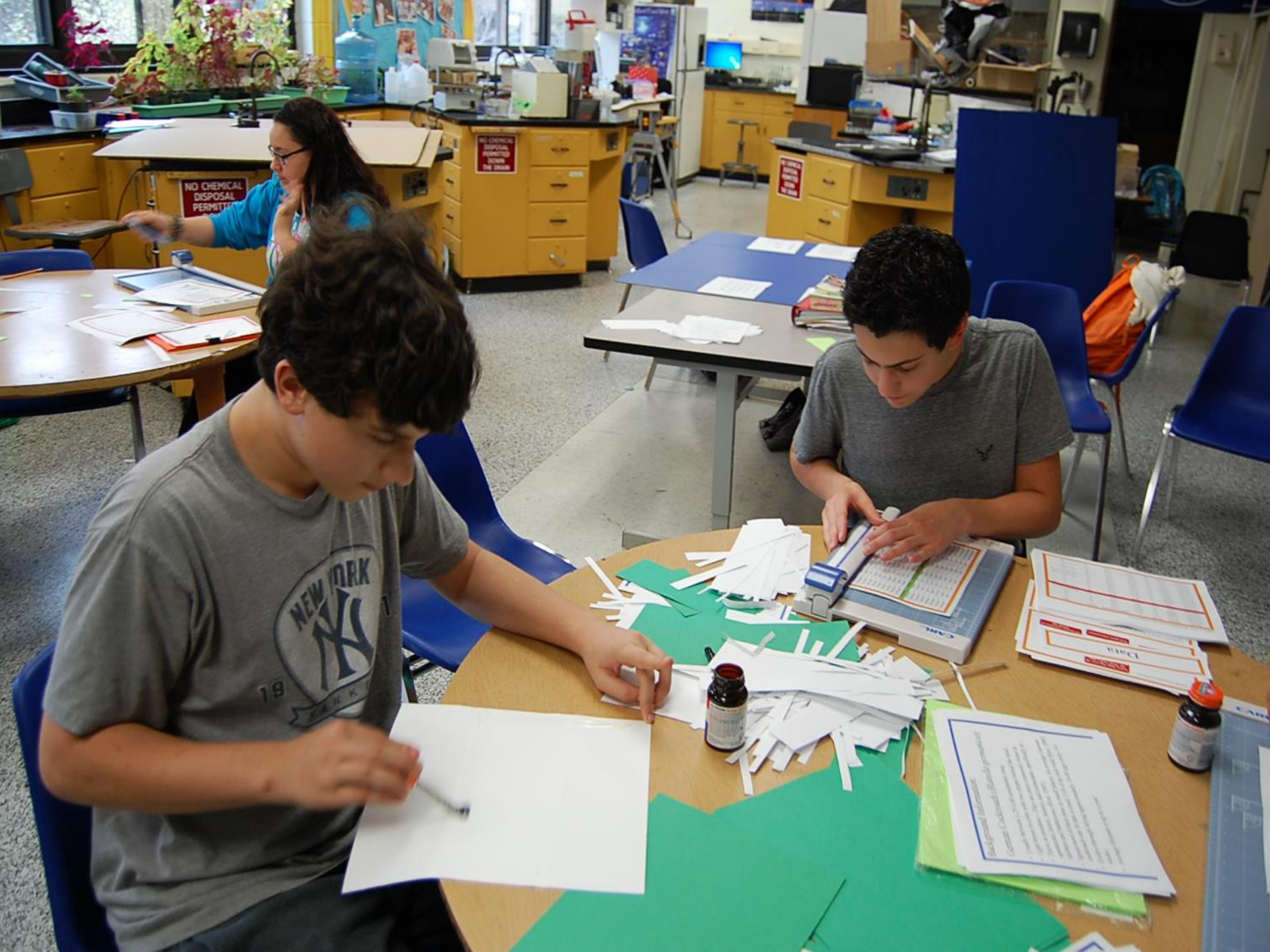
Acropora formosa were used for a 24-hour acute heat stress experiment. ...

Results

Heat stress caused a significant increase in phosphorylated H2A levels in Acropora formosa. ...



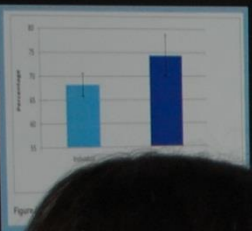




its

Conclusion

- As a result of the information collected through experimentation, memories can be better and more accurately recalled from collaborations than individually.
- Certain types of questions posed challenges in the ability to recall accurate details more than others did. There was a difference in accuracy of answers between some questions more than in others. For example, question number 2 was answered much less accurately than question number 3, as well as others.
- This change in accuracy could be due to a number of reasons. Some hypothesized explanations are how the questions were ordered, the wording of the question, or the intensity of the question (main details or more meticulous details in the scene).
- It was observed that questions that were more blunt were easier to answer, such as "What activity was the girl participating in?". Every individual answered that question correctly.
- However, questions that were not straight forward, or were asking more meticulous details, such as "How many ponytails did the girl have her hair in?" and "How many lights were on?".
- The period of time during the video focused on the girl's activity was greater than the amount of time focused on the background lights.
- The majority of all individuals got the following question wrong: "Were the girl's pants tucked into or out of her boots?" When the majority of the individuals in each group had answered this question, as well as other questions right, the collaborative answer was correct.
- However, when the majority of the individuals in each group answered it wrong, more often than not, the collaborative answer was wrong. This supports the idea that collaboration has an influence on each individual's opinion and recollections, which is shown in the graph.



Implications

This study can be applied to forensics and crime scenes. By testing how the results are influenced by collaborations, the ability to recall details from a real crime scene can be positively increased when allowed to collaborate with other witnesses.

This can also be applied to classroom education. Observations that recollections became more vivid and accurate after collaboration suggests that the method of group work in school can benefit the learning experience of students.

Future Research

To continue this research by increasing the number of participants should be tested. By testing children, teenagers, and young adults, we can determine if the accuracy of recollections is based on age.

This study can be further expanded by testing different types of questions.

In the future, it would be interesting to see if this would be applicable in their own lives. The results of this way.

Interfere with Healthy Sleep Habits Among Adolescents



Me
Participant

- Everyone who attended a focus group...
- Participants were asked to participate...
- All participants were given...
- Results were...

Mater

- 27...
- Each...
- 100%
- 100%
- 100%







Data

Cougar Science Commack Science Research Cougar Curiosity
"Students Taking Their Interest In New Directions"



A woman with long dark hair and glasses, wearing a black sleeveless top and a long necklace, is standing and talking to the students.

A student with long dark hair, wearing a grey sweatshirt, is looking down at the displays on the table.

A student with long blonde hair, wearing a black and yellow tank top with "COMMACK" and a cougar logo, is looking down at the displays on the table.

A student with dark hair, wearing a light blue and white striped polo shirt and grey pants, is standing and looking towards the displays on the table.



Two students are sitting at the table, looking down at the displays. One is wearing a dark hoodie and glasses, and the other is wearing a dark shirt and glasses.

