

Science Research 2013-2014





EXIT

AUDITORY

AUDITORIUM

WELCOME
TO
COMMACK
HIGH
SCHOOL

CONGRATULATIONS
FROM





AUDITORIUM

EXIT

COMBACE HIGH SCHOOL



Folding Thirds: A Device Designed to Help People With Disabilities in the Workplace

Pack Buddy: A Device to Improve the Usefulness of Ice Packs

Layers: A Device to Create Multilayered Cupcakes

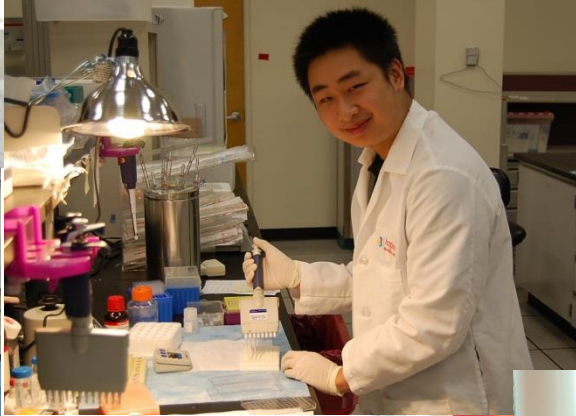
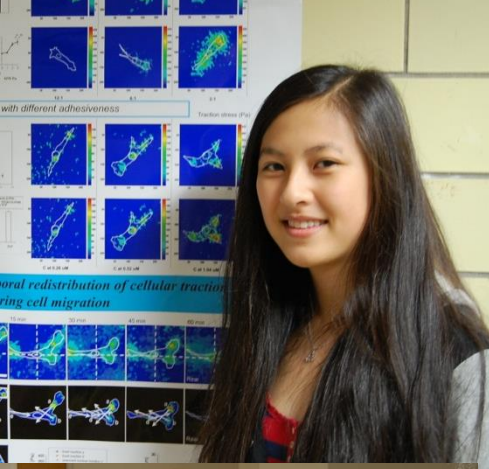
The Design and Construction Of an Adjustable Footstool

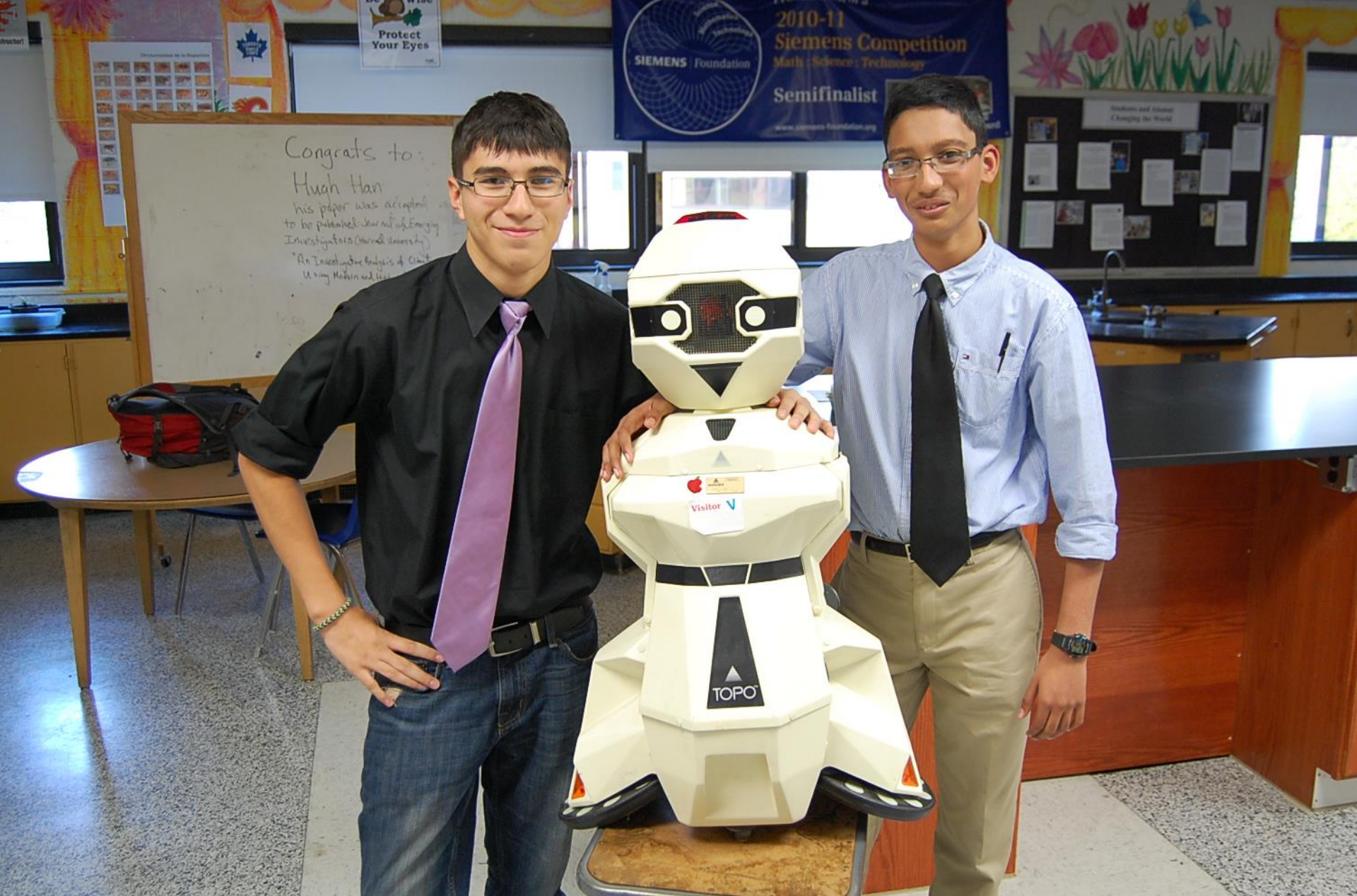
CONGRATULATIONS & WELCOME HOME
FROM NATIONALS! GREAT JOB GIRLS



JOHN CORBIN HIGH SCHOOL, 1911
HONORABLE FERRIS
PRESIDENT
VICE PRESIDENT
TREASURER
SECRETARY
CHIEF OF CHASERS
CHIEF OF THE JURY
CHIEF OF THE COURT
CHIEF OF THE GARD
CHIEF OF THE POLICE
CHIEF OF THE FIRE
CHIEF OF THE ARMY
CHIEF OF THE NAVY
CHIEF OF THE AIR FORCE
CHIEF OF THE SPACE FORCE
CHIEF OF THE COAST GUARD
CHIEF OF THE MARINE CORPS
CHIEF OF THE ARMY RESERVE
CHIEF OF THE NAVY RESERVE
CHIEF OF THE AIR FORCE RESERVE
CHIEF OF THE SPACE FORCE RESERVE
CHIEF OF THE COAST GUARD RESERVE
CHIEF OF THE MARINE CORPS RESERVE
CHIEF OF THE ARMY NATIONAL GUARD
CHIEF OF THE NAVY NATIONAL GUARD
CHIEF OF THE AIR FORCE NATIONAL GUARD
CHIEF OF THE SPACE FORCE NATIONAL GUARD
CHIEF OF THE COAST GUARD NATIONAL GUARD
CHIEF OF THE MARINE CORPS NATIONAL GUARD
CHIEF OF THE ARMY NATIONAL GUARD
CHIEF OF THE NAVY NATIONAL GUARD
CHIEF OF THE AIR FORCE NATIONAL GUARD
CHIEF OF THE SPACE FORCE NATIONAL GUARD
CHIEF OF THE COAST GUARD NATIONAL GUARD
CHIEF OF THE MARINE CORPS NATIONAL GUARD

AU





Congrats to:
Hugh Han
his paper was accepted
to be published Journal of Energy
Investigators (Oxford University)
"An Investigation of the Analysis of Circuit
Using Mathcad and Visi"

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

Visitor V

TOPO

A Comparison of Typing Mechanics With and Without the Use of Typing Aids In Relation to Carpal Tunnel Syndrome



PROBLEM

How does fungus effectively degrade cellulose to glucose for ethanol production?

HYPOTHESIS

My hypothesis is that the polyper will degrade the filter paper to glucose most effectively because polyperes contain an enzyme that is known to break down cellulose in many different organisms.

VARIABLES

- Independent variable:** Type of fungus
- Dependent variables:** Amount of degraded cellulose paper, Color reaction to Benedict's Solution
- Controlled variables:** Test tube, Amount of fungus, Time, Temperature, Size of filter paper, Amount of fertilizer

Fungus Into Fuel



MATERIALS

- Miracle-Gro All-Purpose Fertilizer: 20-20-20 formula (20% nitrogen, 20% phosphate, 20% potassium)
- 16 test tubes, 16 X 150mm
- 16 test-tube stoppers
- 3 test-tube racks
- 16 strips of 1 X 8 cm high-grade cellulose filter paper
- Metric ruler
- Dropper
- Four varieties of fungi: Shitake, Polypore, Banna Shitake, Trametes Royale
- Benedict's Solution
- Hot water bath

PROCEDURE

- Mix 6 tsp plant fertilizer with 2 quarts of tap water. Use 20-20-20 formula (20% nitrogen, 20% phosphate, 20% potassium)
- Cut 16 strips of cellulose filter paper into 1 cm X 8 cm strips.
- Place 16 test tubes upright in test-tube racks.
- Add 5 ml of fertilizer solution to each of the 16 test tubes.
- Add one strip of cut cellulose filter paper to each of the 16 test tubes.
- Add 1 pre-stored piece of fungus to a test tube. Each type of fungus should have 3 test tubes of that kind. The remaining three test tubes will be used as controls and will contain no fungus.
- Cover each test tube with a stopper.
- Place all test tubes in a similar environment and check on the test tubes regularly. Leave for two weeks.
- Create a hot water bath of boiling water for the test tubes and put 5 drops of Benedict's Solution in each test tube.
- Put all of the test tubes in the hot water bath for 7 minutes.
- After 7 minutes, take out all the test tubes and observe color changes within the test tubes.
- After 7 minutes, take out all the test tubes and observe color changes within the test tubes.
- The order from the least amount of glucose to the most is given in order rank below.

OBSERVATIONS

After the two-week-long period, the results of the test tubes were as follows: 1. The test tube with no fungus did change in color. 2. The test tube with the least amount of glucose was the control. 3. The test tube with the most amount of glucose was the control. 4. The test tube with the most amount of glucose was the control. 5. The test tube with the most amount of glucose was the control. 6. The test tube with the most amount of glucose was the control. 7. The test tube with the most amount of glucose was the control. 8. The test tube with the most amount of glucose was the control. 9. The test tube with the most amount of glucose was the control. 10. The test tube with the most amount of glucose was the control.

CONCLUSION

The hypothesis was proven correct. The polyperes did degrade the cellulose paper to glucose for ethanol production.



The Effect of Gravity on the Growth And Development of Halobacteria



The Design and Construction Of an Adjustable Footstool



An Investigation into the Effects of Variable Diets on *Drosophila melanogaster*

Research Question

Is there a difference in the behavior between healthy *Drosophila melanogaster* flies being fed variable diets?

Hypothesis

If healthy wild-type *Drosophila melanogaster* are all exposed to the same environmental surroundings, the group being fed organic food will perform better in terms of activity than that being fed conventional food.

Background

Drosophila melanogaster

- Common fly found near to or on other fruit
- One of the first model organisms to be used in genetics
- Covered in ethical regulations, with three main body regions, and the same sets of segmented legs. (Body: 1.5mm, weight: 0.1-0.2 mg, and 120,000-150,000 cells)
- One of the few organisms whose entire genome is sequenced and whose genome is being mapped and sequenced in parallel
- Very popular model organism in genetics and developmental biology
- Many fly lines have been developed and are available to researchers
- Can be used to study a wide range of biological processes, including:
 - Genetics
 - Development
 - Neurobiology
 - Behavior
 - Evolution
 - Immunology
 - Metabolism
 - Regeneration
 - Stem cell biology
 - Cellular signaling
 - Cellular differentiation
 - Cellular homeostasis
 - Cellular death
 - Cellular growth
 - Cellular division
 - Cellular migration
 - Cellular adhesion
 - Cellular communication
 - Cellular transport
 - Cellular metabolism
 - Cellular signaling
 - Cellular differentiation
 - Cellular homeostasis
 - Cellular death
 - Cellular growth
 - Cellular division
 - Cellular migration
 - Cellular adhesion
 - Cellular communication
 - Cellular transport
 - Cellular metabolism

What does "Organic" mean?

Organic food is produced from plants and animals that have not been treated with synthetic pesticides, herbicides, or fertilizers. Organic food is also produced from plants and animals that have not been genetically modified.

Benefits of an Organic Diet

- Organic food is produced from plants and animals that have not been treated with synthetic pesticides, herbicides, or fertilizers.
- Organic food is also produced from plants and animals that have not been genetically modified.
- Organic food is produced from plants and animals that have not been treated with synthetic pesticides, herbicides, or fertilizers.
- Organic food is also produced from plants and animals that have not been genetically modified.

Methodology

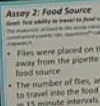
All Assays will be carried out for each of the five groups of *Drosophila*, as listed above

Assay 1: Vertical Movement

Goal: To determine the fly's vertical activity to travel a light source.

The experiment will be carried out in the same manner as a light trap. The experiment will be carried out in a dark room.

- Conducted in a dark room
- Plastic tube was secured upright using the laboratory clamp (light attached to the top of the glass tube)
- Flies placed one at a time, into the glass tube
- Time taken for the each fly to travel 30 cm was recorded



Assay 2: Food Source

Goal: To determine the fly's ability to travel to a food source.

The experiment will be carried out in the same manner as a light trap. The experiment will be carried out in a dark room.

- Flies were placed on the bacteria plate, away from the petriette tip, containing the food source
- The number of flies, and time taken for them to travel into the food source will be recorded in 15 minute intervals

Assay 3: Phototaxis T-Maze Design

Goal: To determine the phototaxis behavior of the fly.

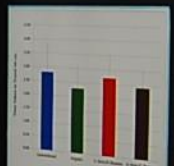
The experiment will be carried out in the same manner as a light trap. The experiment will be carried out in a dark room.

- Narrow corridors were created (2mm diameter)
- One narrow canal branched off into two canals, leading to either a light, or dark light area
- Surface of T-Maze apparatus was covered in red translucent paper
- Flies injected into the device, and given option of either light or dark light area
- Results recorded

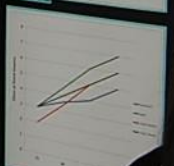


Results

Group	Time taken to travel 30 cm (s)
Healthy Wildtype	120
Organic Diet	150
Conventional Diet	180
Organic Diet + Conventional Diet	160



Group	Number of flies that traveled to food source
Healthy Wildtype	10
Organic Diet	12
Conventional Diet	8
Organic Diet + Conventional Diet	11



Group	Number of flies that chose light area
Healthy Wildtype	15
Organic Diet	18
Conventional Diet	12
Organic Diet + Conventional Diet	16



References

1. [Reference 1]
2. [Reference 2]
3. [Reference 3]



Handwritten notes on a whiteboard: "Molashik", "Bill", "Craigola".

Continuous Positive Airway Pressure (CPAP) for Obstructive Sleep Apnea

Lauren Mares

Abstract

Obstructive sleep apnea (OSA) is a common respiratory disorder characterized by repeated episodes of partial or complete upper airway obstruction during sleep. This leads to fragmented sleep and hypoxemia, which can have significant health consequences. Continuous positive airway pressure (CPAP) is the gold standard treatment for OSA, as it maintains airway patency throughout the night. This study aims to evaluate the effectiveness of CPAP in improving sleep quality and reducing symptoms in patients with OSA.

Methods

A cohort of 50 patients with OSA was recruited and randomized into two groups: CPAP and control. Sleep quality was measured using the Epworth Sleepiness Scale (ESS) and the Apnea-Hypopnea Index (AHI). Symptoms were assessed using the Epworth Sleepiness Scale (ESS) and the Apnea-Hypopnea Index (AHI).

Results

The CPAP group showed a significant improvement in sleep quality and a reduction in symptoms compared to the control group. The mean ESS score decreased from 10.5 to 5.2, and the mean AHI score decreased from 15.2 to 2.1.

Conclusion

CPAP is an effective treatment for OSA, as it improves sleep quality and reduces symptoms. Further research is needed to determine the long-term effects of CPAP on health outcomes.

A Study of Antifungal Agents in the *Nepenthes ventricosa* X *sibuyanensis* Pitcher Plant

Research Goal
To determine the production of secondary metabolites in the pitcher plant, *Nepenthes ventricosa* X *sibuyanensis* and whether they can be effectively used as antifungal agents.



Data

Procedure
1. Obtain the pitcher plant, *Nepenthes ventricosa* X *sibuyanensis* from the field.
2. Prepare the pitcher plant for the study.
3. Determine the production of secondary metabolites in the pitcher plant.
4. Test the effectiveness of the secondary metabolites as antifungal agents.

Sample	Metabolite	Concentration
1	1	0.1
1	2	0.2
1	3	0.3
2	1	0.2
2	2	0.3
2	3	0.4
3	1	0.3
3	2	0.4
3	3	0.5



The Effect of El Niño - Southern Oscillation Precipitation Fluctuations in Terrestrial Biomes From 1948-2011, Inclusive

Purpose
The purpose of this study was to determine the effect of El Niño - Southern Oscillation precipitation fluctuations on terrestrial biomes from 1948-2011, inclusive.

Background
El Niño - Southern Oscillation (ENSO) is a natural climate cycle that occurs every 3-7 years. It is characterized by a shift in the position of the equatorial Pacific trade winds, which results in a change in the amount of rainfall that falls over the equatorial Pacific. This change in rainfall can have a significant impact on the climate of the region, and can also affect the amount of precipitation that falls over the rest of the world.



Analyzing the data
The data was analyzed using a variety of statistical methods, including correlation analysis, regression analysis, and time series analysis. The results of the analysis show that there is a strong positive correlation between ENSO precipitation fluctuations and the amount of precipitation that falls over the equatorial Pacific region.

Conclusions
The results of this study show that there is a strong positive correlation between ENSO precipitation fluctuations and the amount of precipitation that falls over the equatorial Pacific region. This correlation is likely due to the fact that ENSO precipitation fluctuations are a natural part of the climate cycle, and they have a significant impact on the amount of rainfall that falls over the equatorial Pacific region.

Limitations
The limitations of this study include the fact that the data was only collected from 1948-2011, and that the study did not take into account other factors that may affect precipitation, such as global warming.

Effect of Acidic Precipitation Erosion of Soil in the Small-Scale

How Do Fruit Flies (*Drosophila melanogaster*) Of Different Ages Respond to Sleep Deprivation?

Research Question
How do fruit flies of different ages respond to sleep deprivation?

Results
The results of the study show that fruit flies of different ages respond differently to sleep deprivation. Younger flies are able to maintain their sleep patterns for a longer period of time than older flies.



Does a Change in Host Affect the Number Of *Melittobia* Offspring Produced?

Research Question
Does a change in host affect the number of *Melittobia* offspring produced?

Hypothesis
It is hypothesized that a change in host will affect the number of *Melittobia* offspring produced.

Background Information
Melittobia is a parasitic wasp that feeds on the larvae of other insects. It is a common pest of many types of insects, and it is known to be a major pest of the silkworm industry.

Data
The data from the study shows that a change in host does affect the number of *Melittobia* offspring produced. The number of offspring produced is significantly higher when the host is a silkworm than when the host is a caterpillar.

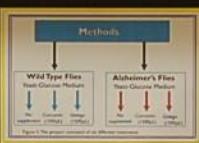
Energy Drink Consumption Amongst Adolescents and Young Adults Impacting their Academic Performance.



A Study of the Effect of Various Therapeutic Substances On the Neurophysiological Capabilities of *Drosophila melanogaster* Models of Alzheimer's Disease

Purpose

Determine the effects of the chemical curcumin, flavonoid, and Ginkgo biloba extract on a *Drosophila melanogaster* model of Alzheimer's Disease (AD) as determined by locomotion and light stimuli response.



Methods

I. Process for Preparing AD Flies
 The process for preparing AD flies involves the use of a specific genetic construct that allows for the expression of mutant human amyloid precursor protein (Aβ) in the brain of the fly. This is achieved by crossing flies that carry the Aβ transgene with flies that carry a specific driver line that targets the expression of the transgene to the brain.

II. Behavior Assay

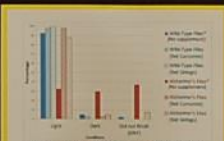


Hypothesis 1

AD flies that are treated with curcumin will show a decrease in locomotion and an increase in light response.

Hypothesis 2

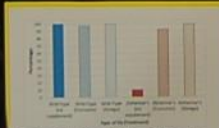
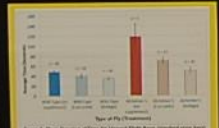
AD flies that are treated with Ginkgo biloba extract will show a decrease in locomotion and an increase in light response.



Data Analysis (Sample Result)

1. Chi-Square Test for Goodness of Fit
Null Hypothesis: The distribution of light response is uniformly distributed across the age of the flies in the control group.
Alternative Hypothesis: The distribution of light response is not uniformly distributed across the age of the flies in the control group.
 $\chi^2 = 12.34$
 $p < 0.05$
 We reject the null hypothesis.

2. Chi-Square Test for Independence
Null Hypothesis: The distribution of light response is independent of the age of the flies in the control group.
Alternative Hypothesis: The distribution of light response is dependent on the age of the flies in the control group.
 $\chi^2 = 12.34$
 $p < 0.05$
 We reject the null hypothesis.



A Study of Nephenther...

of TSP2 upregulates VIII expression after vascular injury in arterial carotids

RESULTS/DISCUSSION

- TSP2 is present in the arterial injury
- TSP2 expression by TSP2 and 21 days following arterial injury
- TSP2 is involved in proinflammatory response following vascular injury and 14 days following arterial injury
- TSP2 expression is localized to blood vessels and is expressed in the arterial injury

CONCLUSION

- Neurological Dementia
- Inflammatory response
- Without TSP2



How the Brain Flies (Drosophila melanogaster) Respond to Glucose Deprivation?

Using a Light to Test the Effect of Glucose Deprivation on the Brain

Using a Light to Test the Effect of Glucose Deprivation on the Brain

Using a Light to Test the Effect of Glucose Deprivation on the Brain

Using a Light to Test the Effect of Glucose Deprivation on the Brain

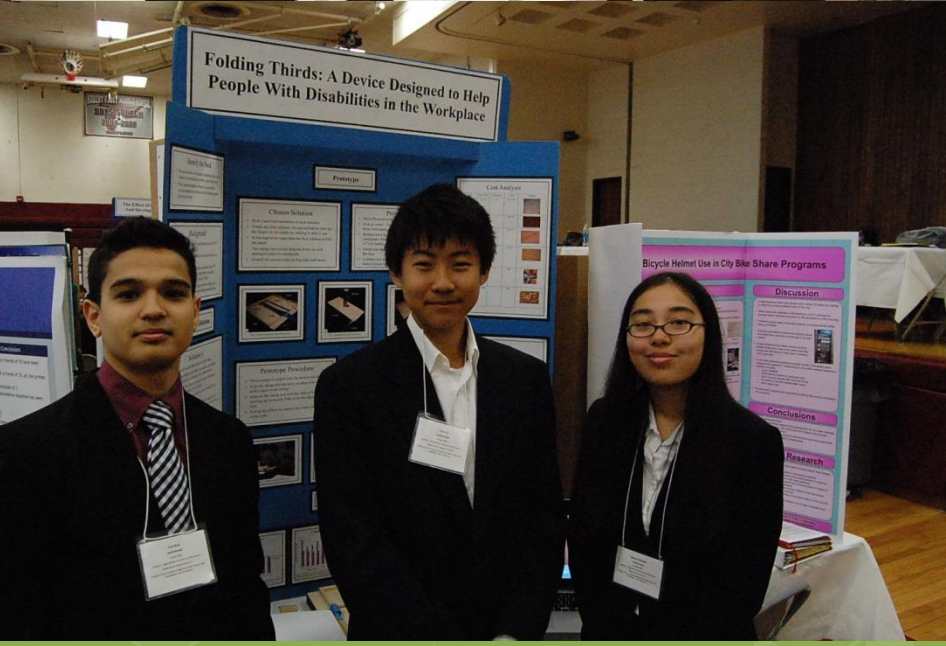
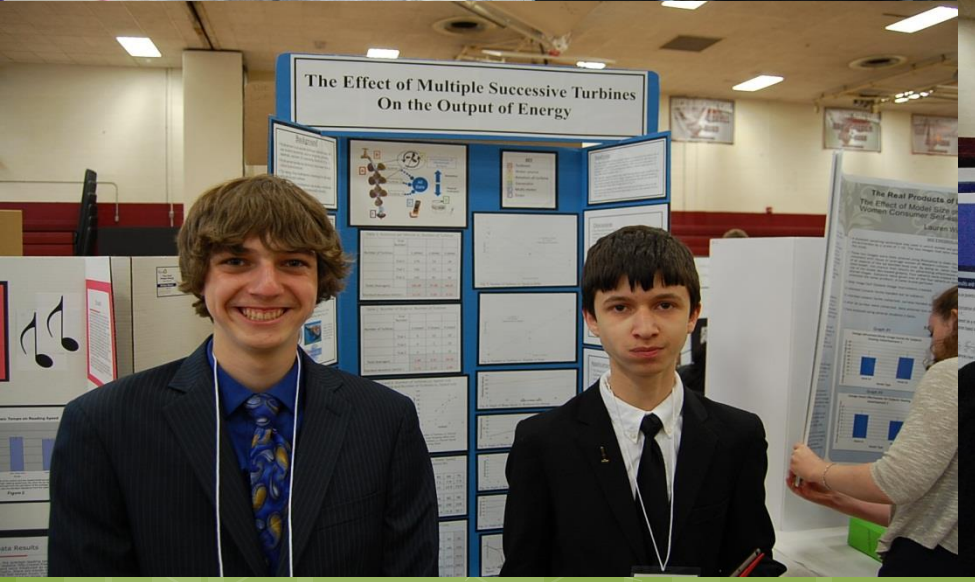
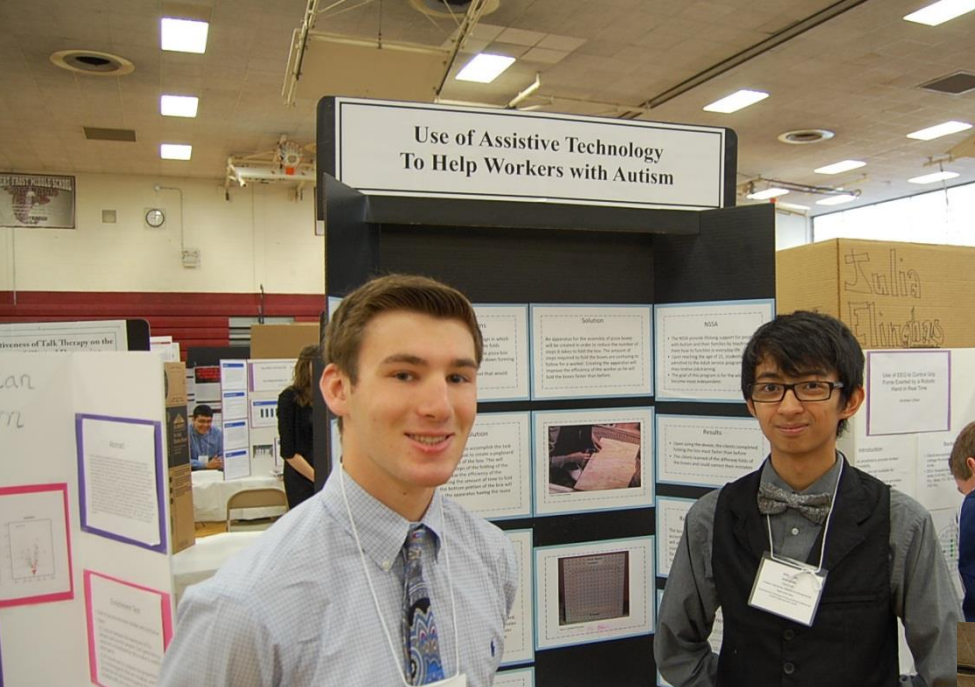
Using a Light to Test the Effect of Glucose Deprivation on the Brain

Using a Light to Test the Effect of Glucose Deprivation on the Brain

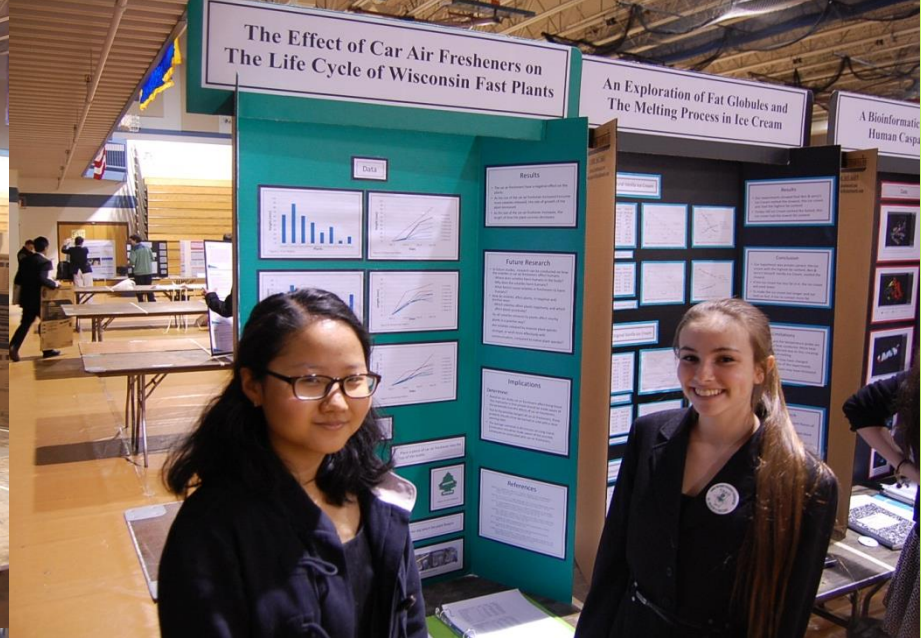
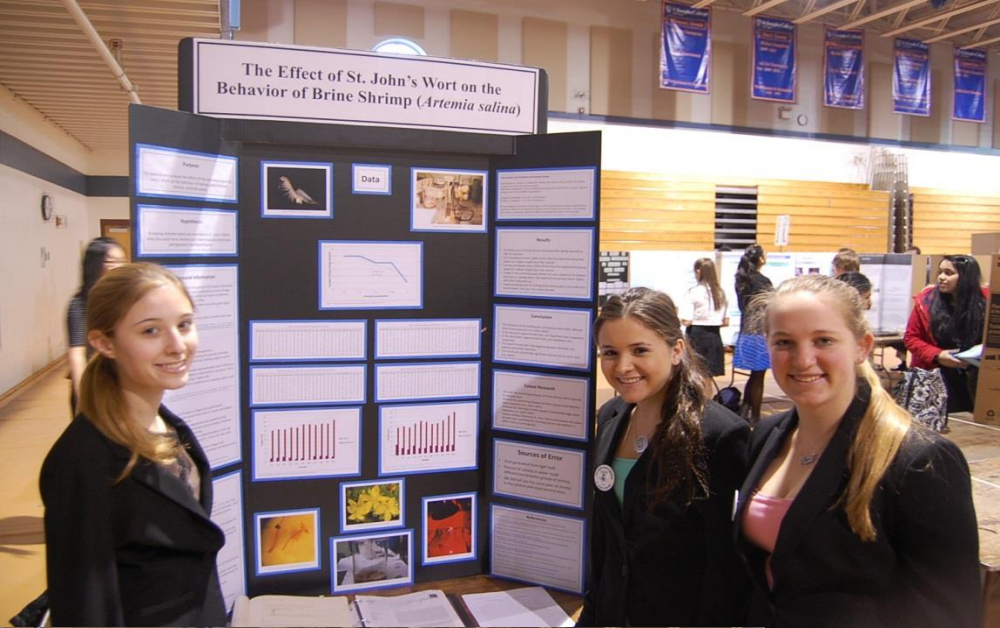
Using a Light to Test the Effect of Glucose Deprivation on the Brain

Using a Light to Test the Effect of Glucose Deprivation on the Brain

Using a Light to Test the Effect of Glucose Deprivation on the Brain







Remedies on Melanogaster

Conclusions

- It can be inferred that CBEs have the ability to counteract the side effects of simulated Huntington's disease
- Motor skills are repaired as seen in the results of the positive photostasis assay and the grid assay
- Photostasis was simulated when flies were given CBEs as seen in the results of positive photostasis assay and choice chamber assay

Implications

- Implications include natural ways to help counteract the side effects of various neurodegenerative diseases
- Neurogenetics provides an alternative to other drugs
- Various homeopathic remedies could help to counteract other neurodegenerative diseases such as Parkinson's disease

Future Directions

- Future directions could include testing other homeopathic remedies for their effect on Huntington's disease such as Magnesia Phosphorica and Calcarea Carbonica
- Preferring other behavioral assays such as negative geotaxis
- Increasing sample size
- Investigating the expression of the HTT protein and genes related to neurodegenerative diseases using RT-PCR and qPCR

References

The Relationship Between APP Mutations in Alzheimer's Disease and Ethnic and Geographic Factors

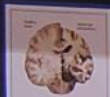


Figure 1. Alzheimer's disease in a mouse model (amyloid plaques).



Figure 2. Map of geographic prevalence and ethnic distribution of APP mutations.

Procedure

- Identify the mutation and location of disease and disease causing mutations
- Download and cut the location from the genomes of the individuals from each specific ethnic group from 1000 genome
- Identify number of people with disease causing mutations in each ethnic/geographical group
- Compare percentage to percentage of each group, but is over 65 estimated to have Alzheimer's disease

Population	Number of people with APP mutations	Percentage of population with APP mutations
European	100	10%
African	50	5%
East Asian	20	2%
South Asian	10	1%
Admixed American	30	3%
Hispanic/Latino	15	1.5%
Other	5	0.5%

Conclusion

The results of this experiment do not support the hypothesis that populations with higher rates of APP mutations would have higher rates of Alzheimer's Disease. This suggests that non-genetic factors such as diet, use, geographical location and other environmental factors may be more influential than the APP mutations used in this study. This information can be used by scientists or doctors trying to develop preventative measures for people worried about developing Alzheimer's Disease by creating a larger focus on lifestyle changes than attempts to treat the genetic causes.

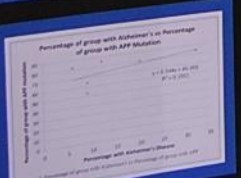
Future Research

Some modifications could be made to this experiment to further study the relation between genetic causes of Alzheimer's disease and the rates of the occurrence of the disease. It could be improved by increasing the size of the population examined for mutations or by modifying the experiment to only test people being treated for dementia for APP mutations. Though these would both have the same limitation that Alzheimer's Disease can't be officially diagnosed postmortally, could increase the accuracy of the experiment. Other areas of focus could include investigations of other causes.

References

Year	Number of people with APP mutations	Percentage of population with APP mutations
2000	100	10%
2005	100	10%
2010	100	10%
2015	100	10%
2020	100	10%
2025	100	10%
2030	100	10%
2035	100	10%
2040	100	10%
2045	100	10%
2050	100	10%

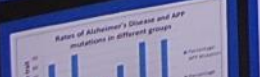
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2035	100	10%
2040	100	10%
2045	100	10%
2050	100	10%

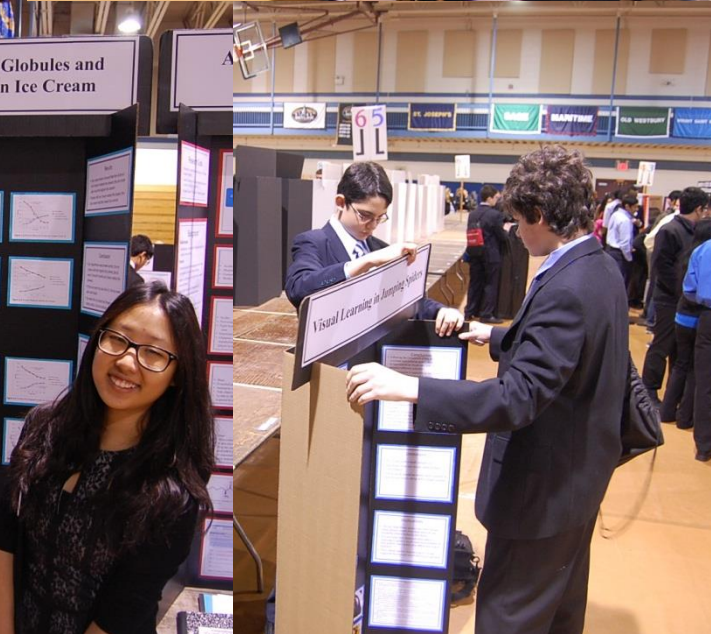
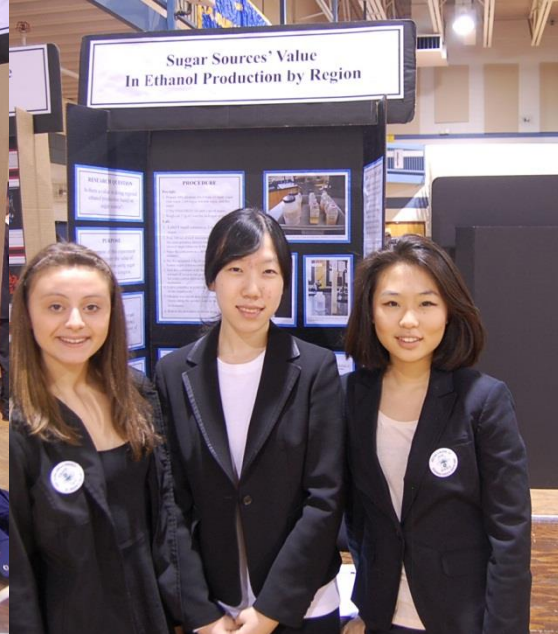


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2005	100	10%
2010	100	10%
2015	100	10%
2020	100	10%
2025	100	10%
2030	100	10%
2035	100	10%
2040	100	10%
2045	100	10%
2050	100	10%

Results

The results do not show a high correlation between a high rate of Alzheimer's disease in a certain geographic and ethnic population and the rate of APP mutations in that geographic and ethnic population. The R² value is 0.01 and therefore shows a weak correlation.









I completed my application to the Siemens Competition 2013

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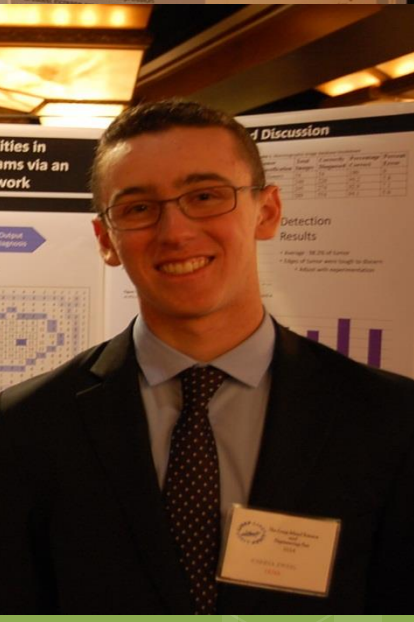
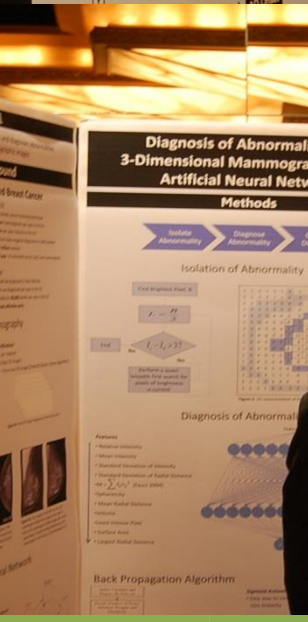
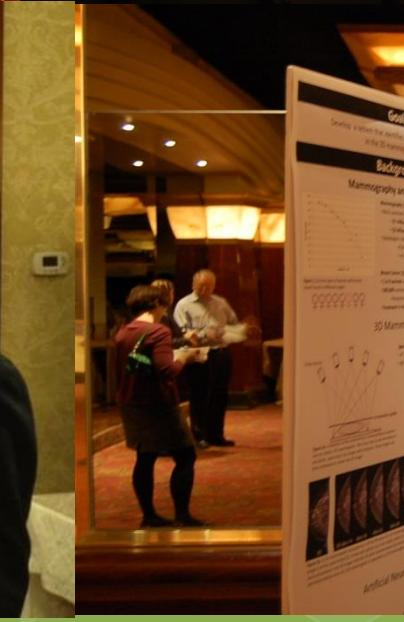
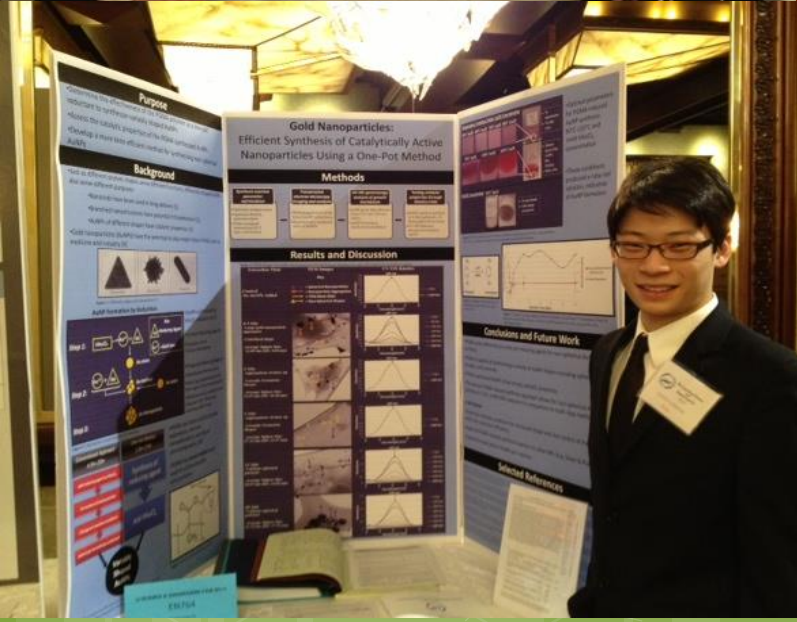
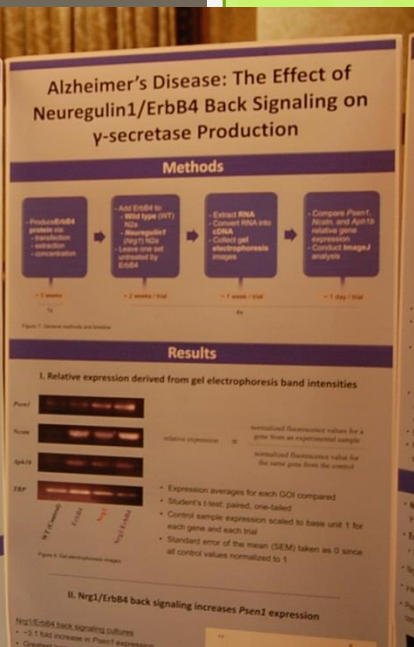
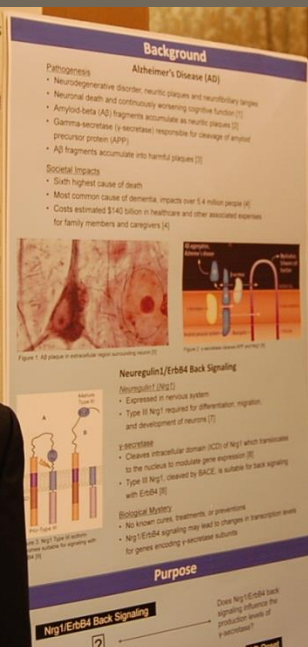
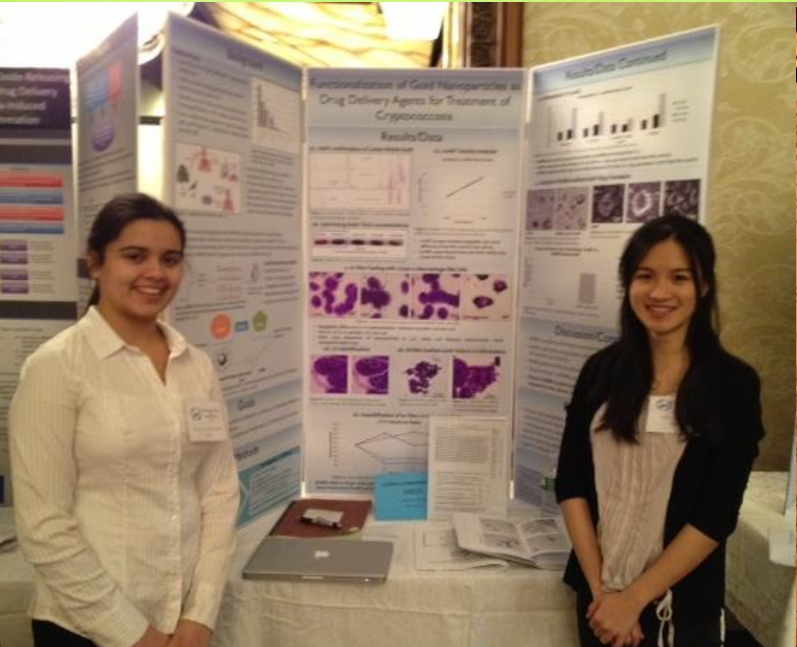
The Effect of Coprophagic Microbiome Transfer in Isopods

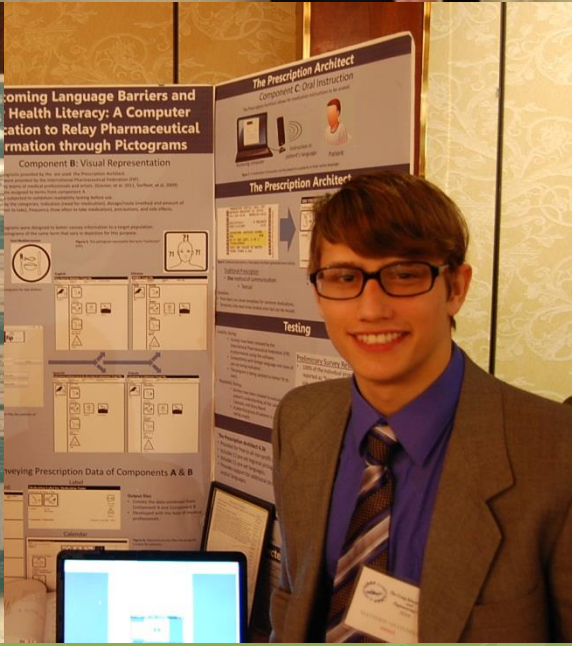
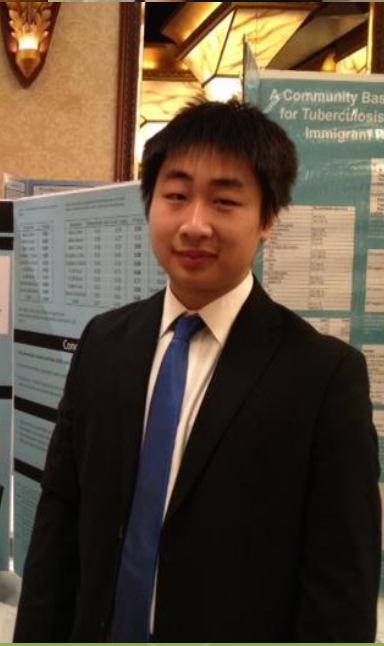
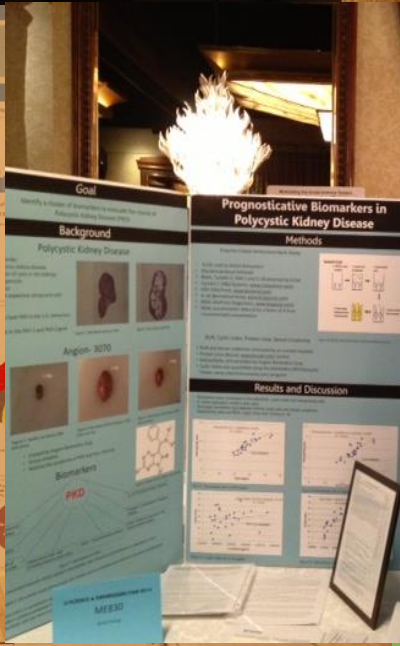
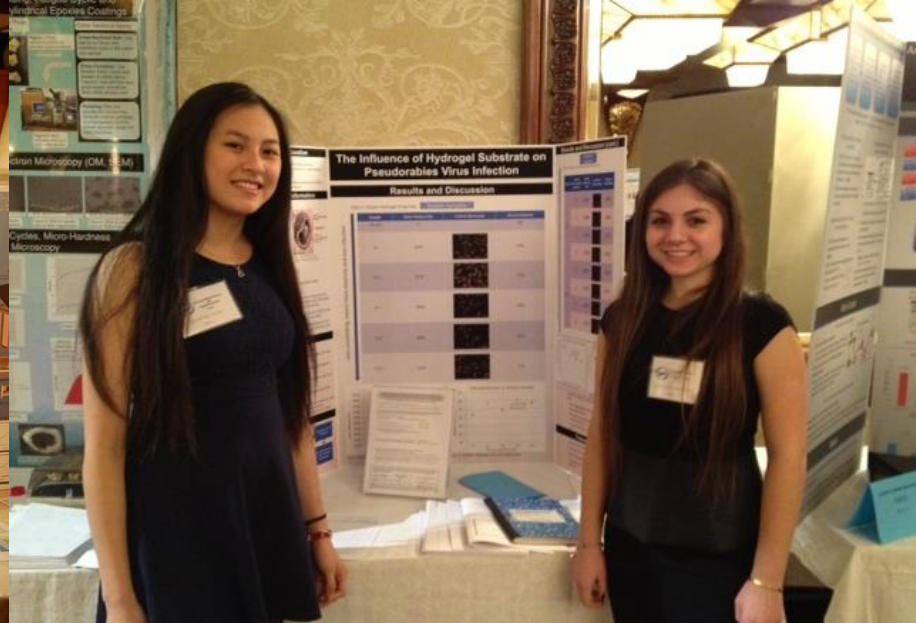
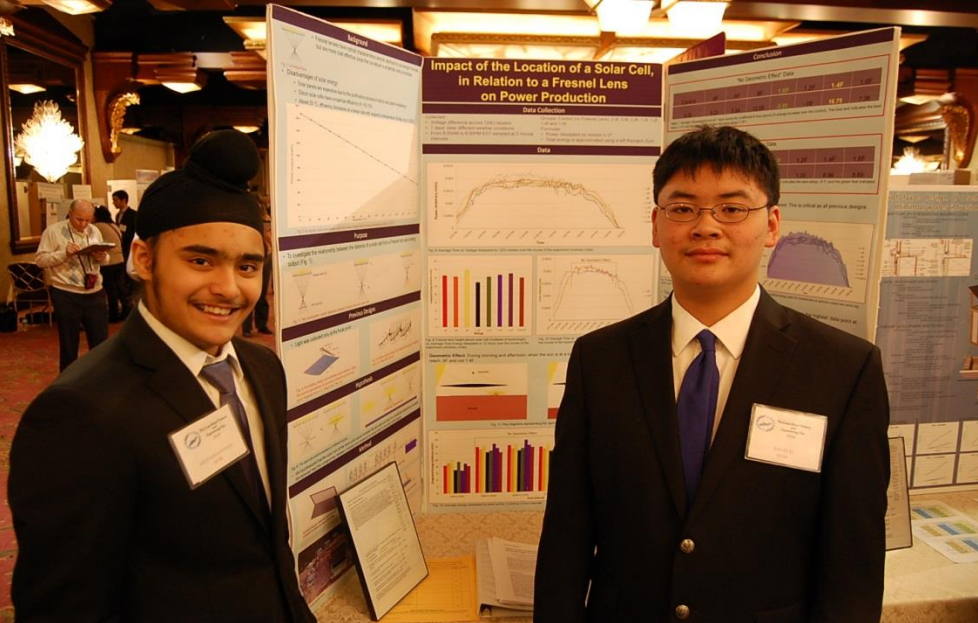
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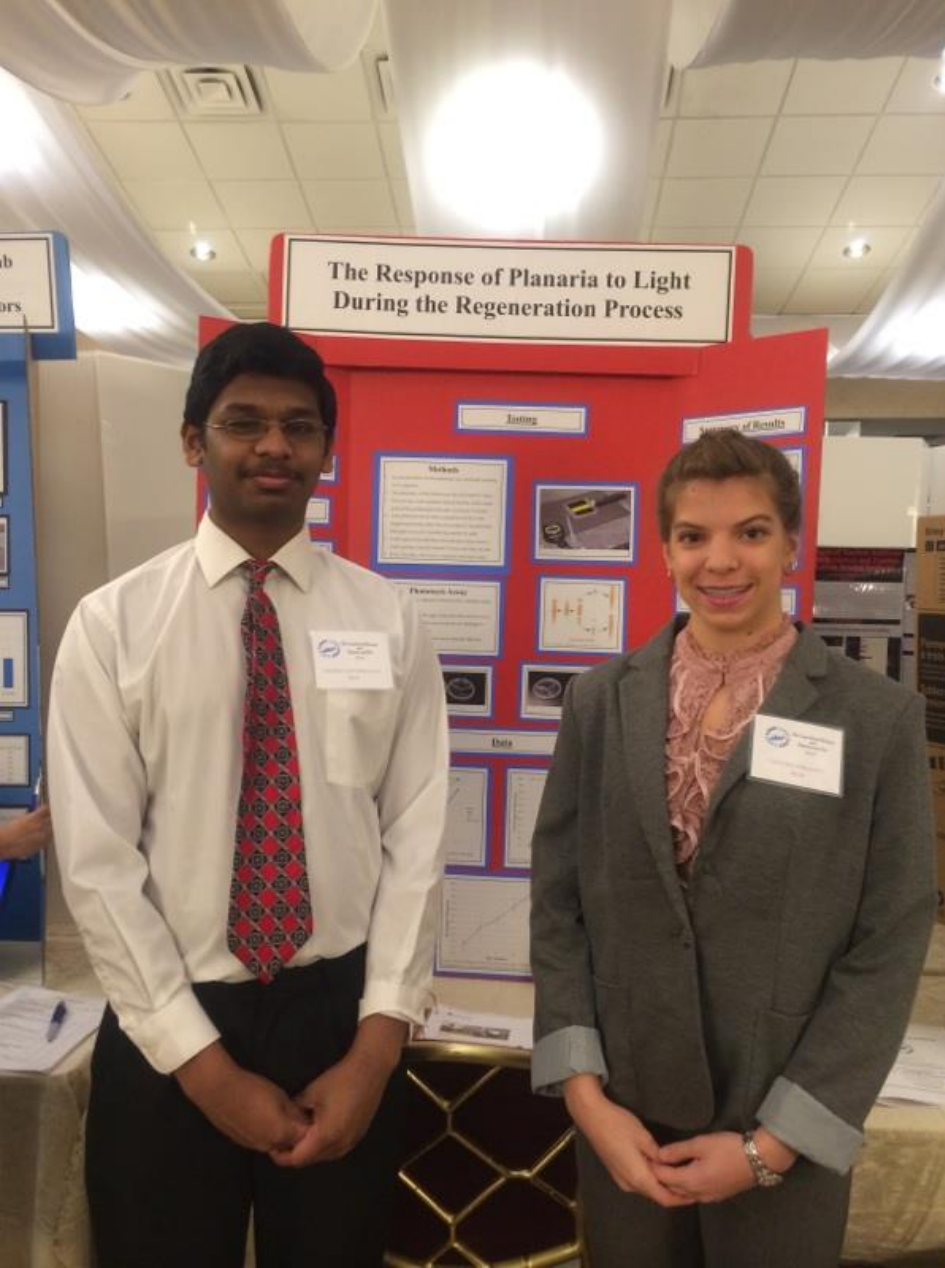
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PRINCIPAL CATHERINE BOLAS

DIRECTOR OF ATHLETICS	Steve Brown
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SOCIAL STUDIES COORD	Teresa D'Amico
ESPERANTO COORD	Barbara Dwyer
WORLD LANGUAGE COORD	Barbara Dwyer
SWIMMING ED	Donna Mennillo
ART LEAD	Lisa Anne White
BUSINESS ED & TECH	Angela Davis
GOVERNOR ED	Michelle Ryan
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HEALTH PHYS ED LEAD	Michelle Ryan
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ESPERANTO LEAD	Michelle Ryan
SOCIAL STUDIES LEAD	Michelle Ryan
WORLD LANGUAGE LEAD	Michelle Ryan

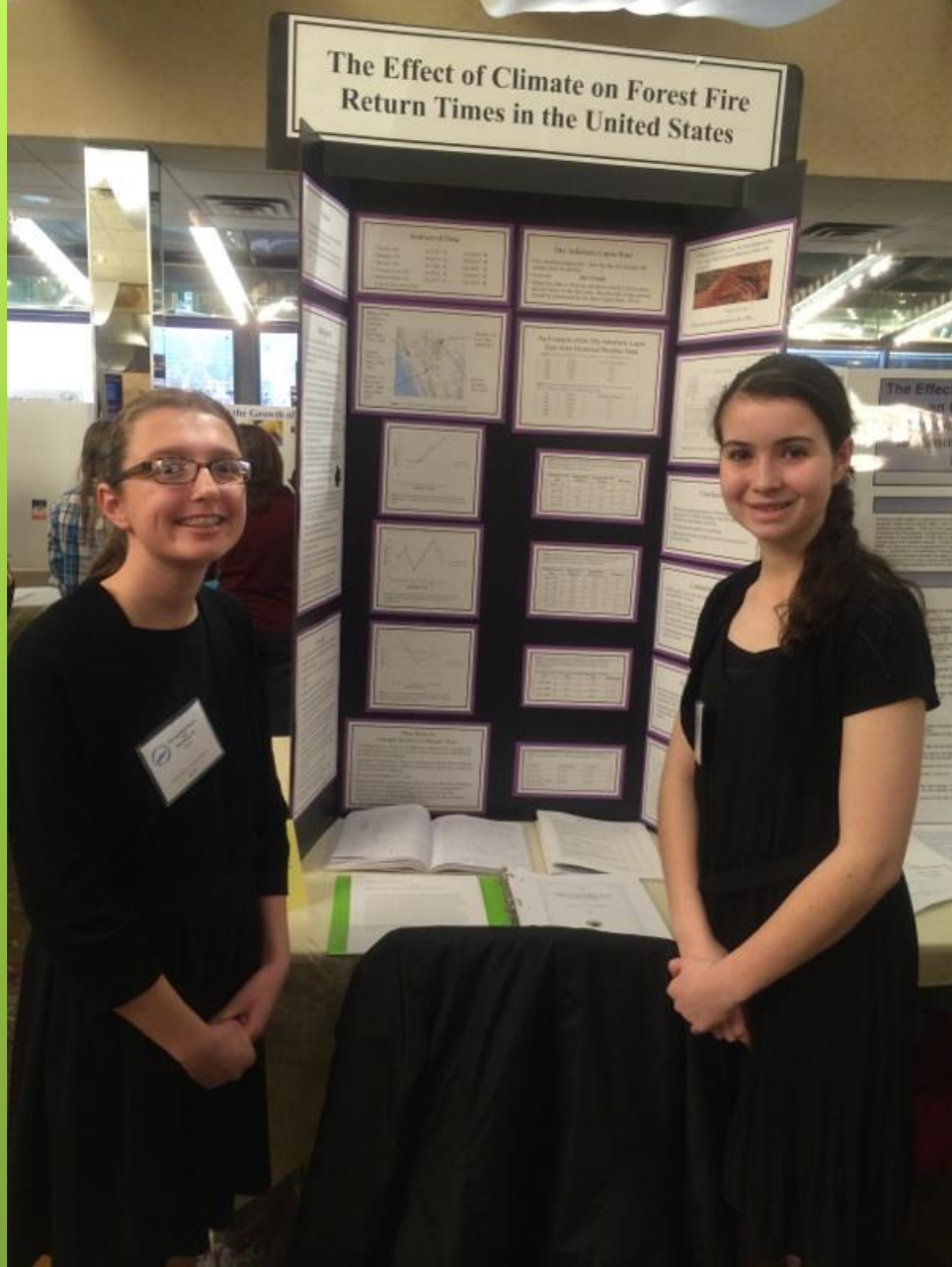
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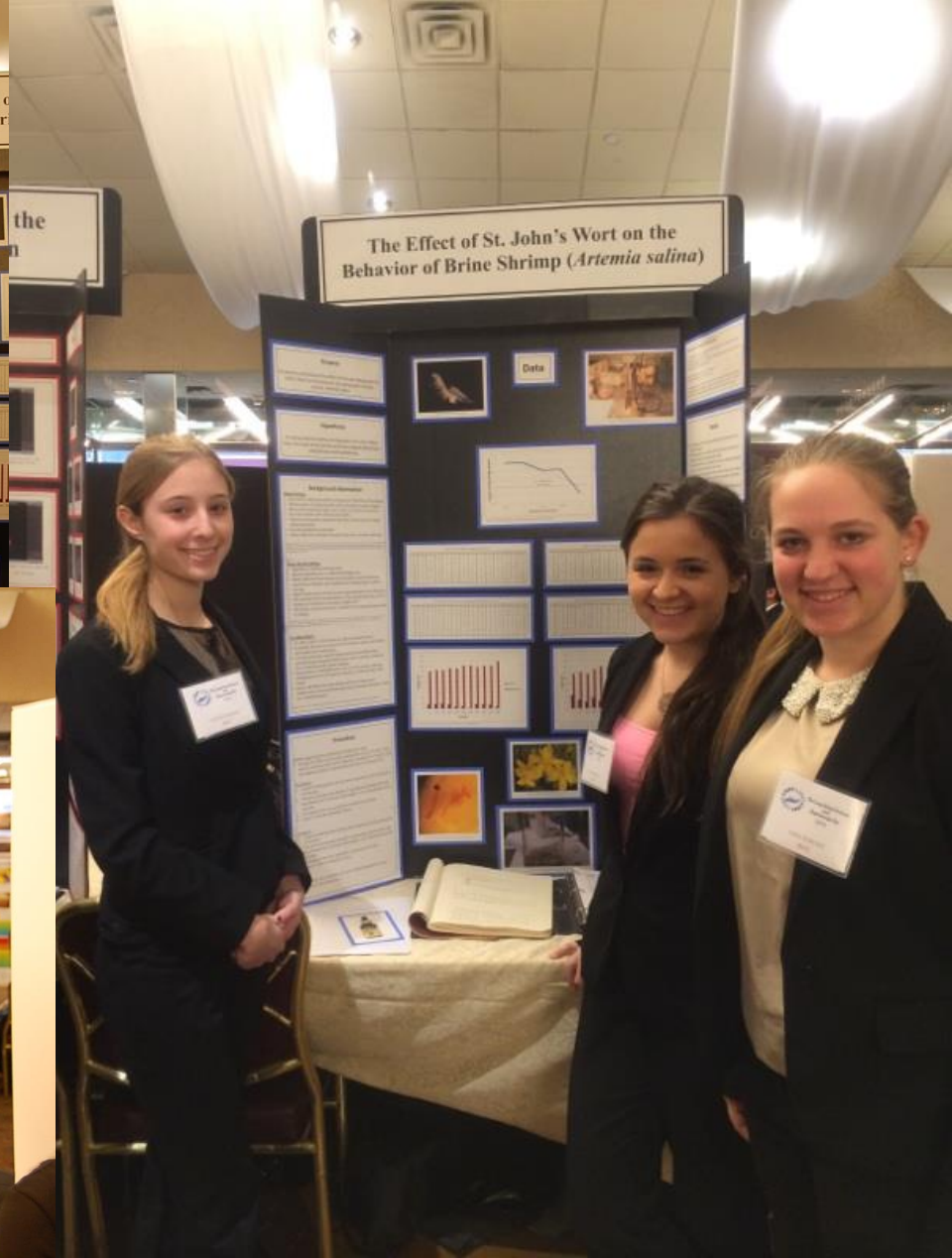


The Effect of Climate on Forest Fire Return Times in the United States



Shell Preference of the Marine Hermit Crab *Pagurus longicarpus* Based on Competitive Environmental Factors





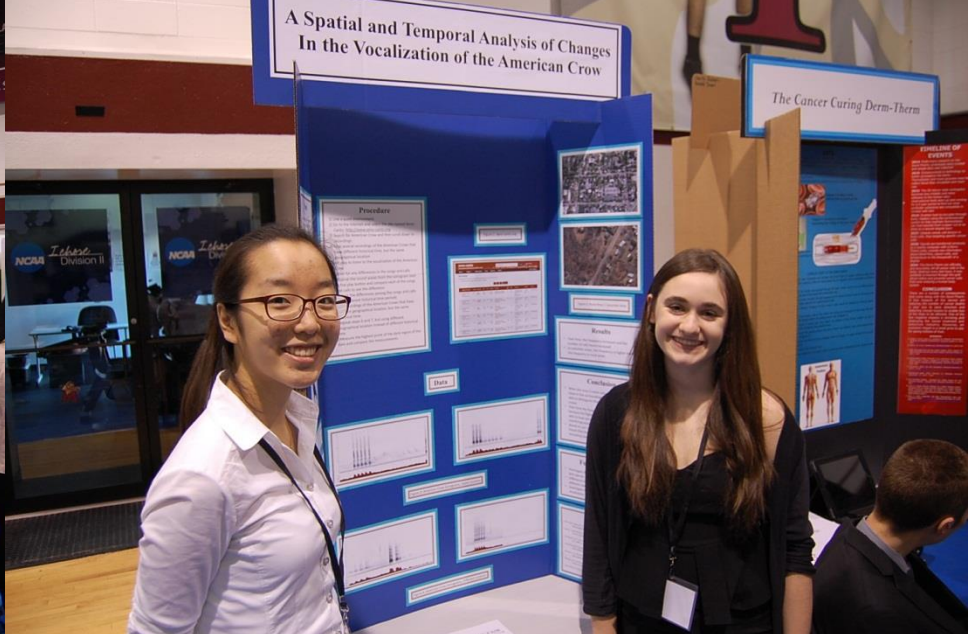
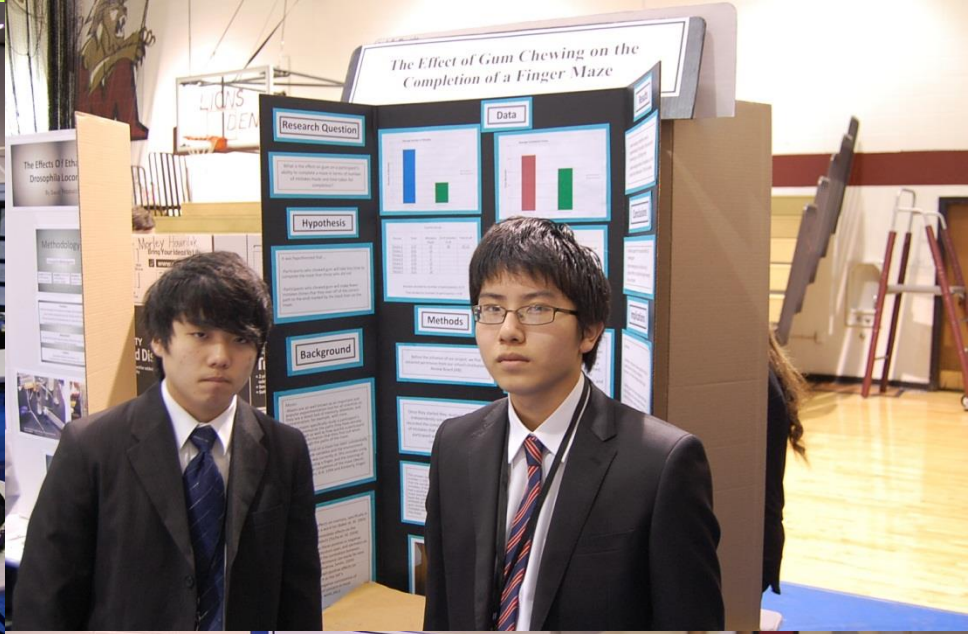
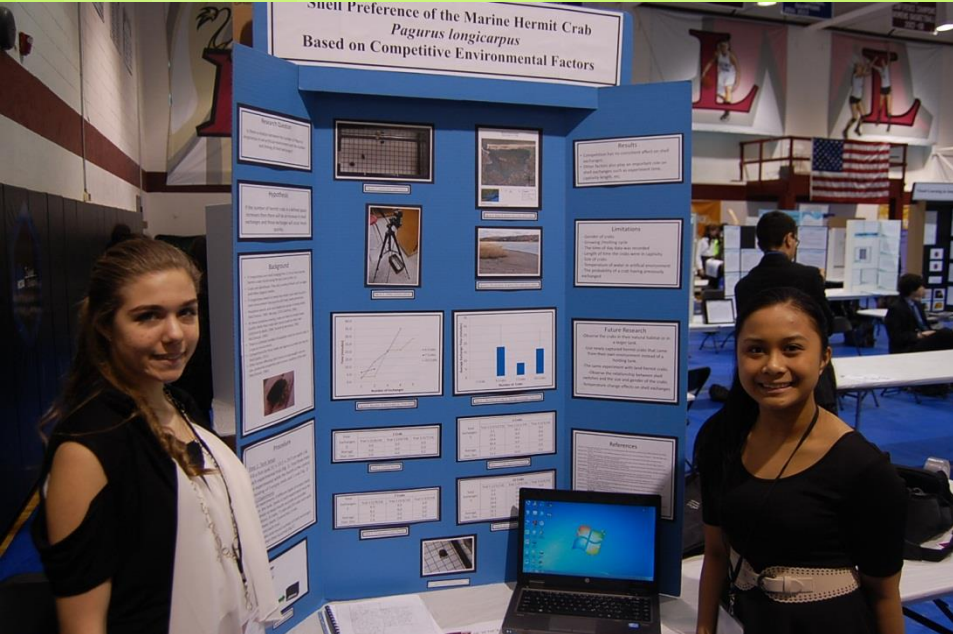
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WELCOME
CORNING
HIGH
SCHOOL

CONGRATULATIONS & WELCOME HOME
FROM NATIONALS! GREAT JOB GIRLS!

JOB CORNING HIGH SCHOOL 1914
Principal: [Name]
Vice Principal: [Name]
Director of Guidance: [Name]
Director of Athletics: [Name]
Director of Music: [Name]
Director of Art: [Name]
Director of Career Center: [Name]
Director of Special Services: [Name]
Director of Student Services: [Name]
Director of Transportation: [Name]
Director of Facilities: [Name]
Director of Security: [Name]
Director of IT: [Name]
Director of Nutrition: [Name]
Director of Safety: [Name]
Director of Community Relations: [Name]
Director of Fundraising: [Name]
Director of Parent Relations: [Name]
Director of Alumni Relations: [Name]
Director of Intercultural Affairs: [Name]
Director of Environmental Education: [Name]
Director of Health Education: [Name]
Director of Social Studies: [Name]
Director of English: [Name]
Director of Math: [Name]
Director of Science: [Name]
Director of History: [Name]
Director of Physical Education: [Name]
Director of Health: [Name]
Director of Art: [Name]
Director of Music: [Name]
Director of Drama: [Name]
Director of Student Government: [Name]
Director of Peer Leadership: [Name]
Director of Career Center: [Name]
Director of Job Training: [Name]
Director of Internship: [Name]





Respond to Sleep Deprivation?

Line Crossing Assay

Table 1: New Sleep Deprived Line Crossing Assay

Days	1	2	3	4	5
Total 1	14	26	21	24	17
Total 2	11	2	26	19	11
Total 3	47	31	19	21	44
Total 4	31	21	23	26	12
Total 5	13	26	26	26	26
Average	17.2	12.4	14.2	21.4	14.2
St Deviation	6.2	9.2	4.4	7.2	6.6



Figure 1: A Comparison of New Sleep Deprived and Sleep Deprived Line Crossing Assay (10-15, 16-20, 21-25)

Results

Table 2: Sleep Deprived Line Crossing Assay

Days	1	2	3	4	5
Total 1	11	26	21	17	17
Total 2	11	2	26	19	11
Total 3	14	26	19	26	11
Total 4	11	21	17	26	11
Total 5	11	26	11	26	11
Average	10.8	13.8	20.2	14.6	13.2
St Deviation	2.8	3.2	3.2	6.2	3.2

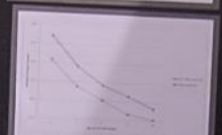


Figure 2: A Comparison of New Sleep Deprived and Sleep Deprived Line Crossing Assay (10-15, 16-20, 21-25)

Upward Movement Assay

Table 3: New Sleep Deprived Upward Movement Assay

Days	1	2	3	4	5
Total 1	27.00	10.41	42.31	43.06	43.43
Total 2	14.00	12.29	39.98	41.19	33.62
Total 3	14.50	20.79	46.24	36.75	36.72
Total 4	22.41	17.34	41.73	49.00	49.79
Total 5	17.54	16.24	26.36	17.11	31.46
Average	22.8	13.4	39.2	43.8	39.9
St Deviation	4.3	3.9	7.2	4.7	4.4



Figure 3: A Comparison of New Sleep Deprived and Sleep Deprived Upward Movement Assay (10-15, 16-20, 21-25)

Table 4: Sleep Deprived Upward Movement Assay

Days	1	2	3	4	5
Total 1	42.76	49.42	54.29	43.22	72.74
Total 2	39.27	54.42	39.23	59.97	66.36
Total 3	46.29	38.44	51.21	49.14	39.62
Total 4	43.19	46.26	37.47	46.07	36.34
Total 5	47.08	57.34	49.97	75.12	44.79
Average	42.3	51.3	44.7	49.3	49.3
St Deviation	8.1	3.3	2.4	3.7	8.7

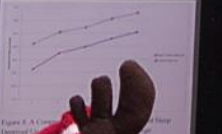


Figure 4: A Comparison of New Sleep Deprived and Sleep Deprived Upward Movement Assay (10-15, 16-20, 21-25)

Procedure

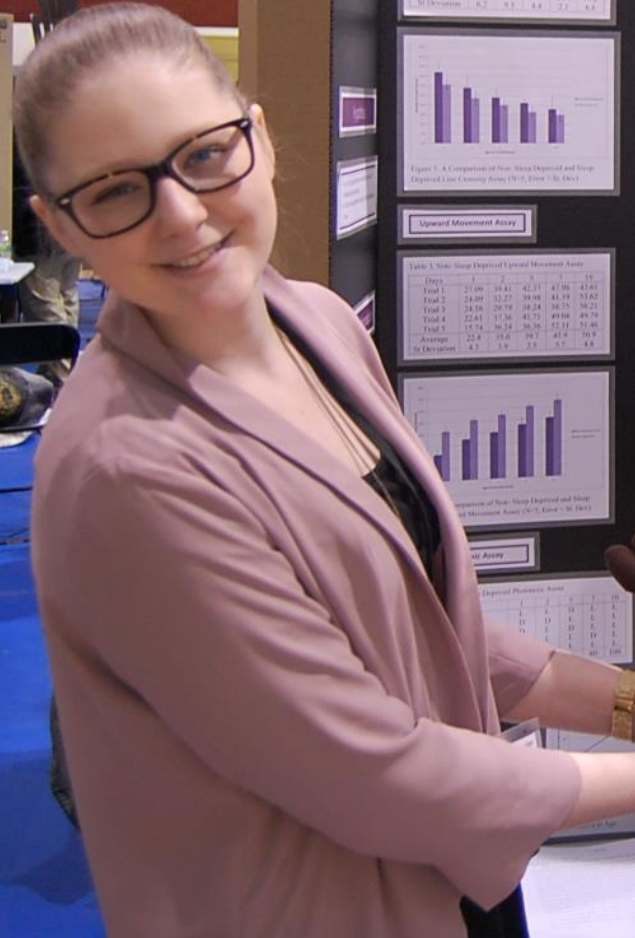
Line Crossing Assay
 Assay to test temporal stability
 1. The subject was placed in a dark room with a light source in the center.
 2. A horizontal line was drawn across the room.
 3. The subject was instructed to cross the line.
 4. The number of crossings was recorded.
 5. The assay was repeated 5 times.

Upward Movement Assay
 Assay to test temporal stability
 1. The subject was placed in a dark room with a light source in the center.
 2. A horizontal line was drawn across the room.
 3. The subject was instructed to move upward.
 4. The number of upward movements was recorded.
 5. The assay was repeated 5 times.

Conclusion
 The results of the assay show that sleep deprivation significantly affects the subject's performance in the Line Crossing Assay and Upward Movement Assay. The subject's performance was significantly lower in the Line Crossing Assay and Upward Movement Assay when they were sleep deprived compared to when they were not sleep deprived.

Implication
 The results of the assay have implications for the study of sleep deprivation and its effects on human performance. The results suggest that sleep deprivation significantly affects the subject's performance in the Line Crossing Assay and Upward Movement Assay.

Future Work
 Future work should focus on the effects of sleep deprivation on other aspects of human performance, such as reaction time and decision making.



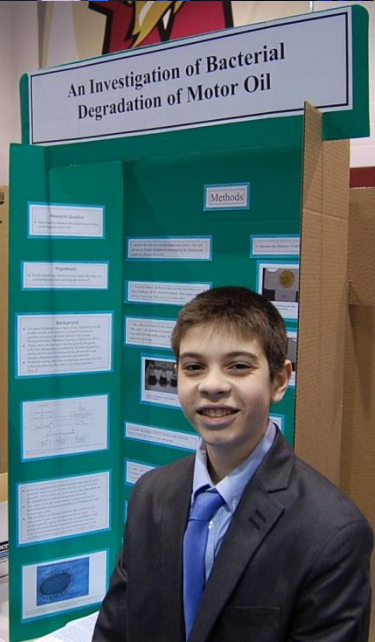
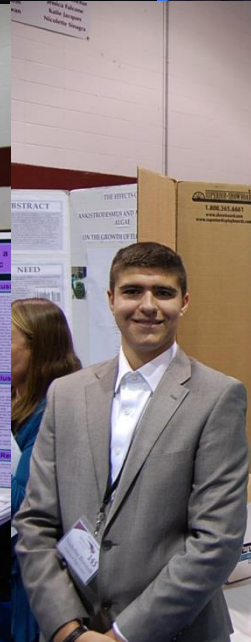
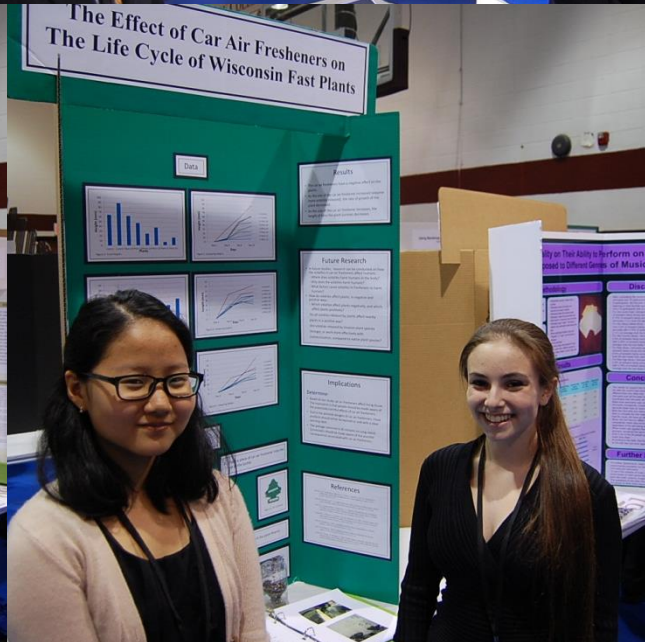
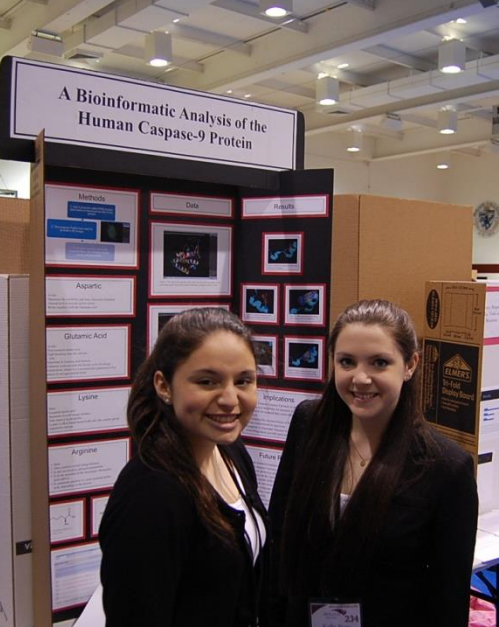
218
 Charity Russell
 Central High School

ELMER'S
 Tri-fold Display Board
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For Student selected
 correctly answers the

TRIALS VARIAB

EDURE



The Effect of Simple Sugars on the Regenerative Rate of California Blackworms (*Lumbricus variegatus*)

Purpose

The purpose of this experiment is to determine the effect of simple sugars on the regenerative rate of California Blackworms (*Lumbricus variegatus*).

Hypothesis

My hypothesis is that if simple sugars such as glucose, fructose, and galactose are used as energy sources and not the carbohydrates, then they will increase the rate of regeneration in California Blackworms (*Lumbricus variegatus*).

Background

Lumbricus variegatus, or the California Blackworm, have "strong" segments. Adults have 10-12 segments. The individual segments are green, yellow, or white, and when separated from the rest of the worm, they will regenerate. The method of regeneration is the most rapid of regeneration.

Human-made carbohydrates are used as an energy source in most organisms. In the very early stages of the human brain and body, and in an important factor for the case of paramecia, and are used to produce energy for the organism to survive. Although, California Blackworms are not humans, they are able to regenerate their segments, and it is this ability that allows them to regenerate. The regeneration process is a complex one, involving the production of new cells, and the development of new cells, using the DNA, and proteins.

Simple sugars are used because they are the most abundant and easiest to produce, which are the most abundant and easiest to produce, which are the most abundant and easiest to produce.

Data

Time	Regeneration Rate
1	0.1
2	0.2
3	0.3
4	0.4
5	0.5
6	0.6
7	0.7
8	0.8
9	0.9
10	1.0

Method

- 1) Eight California Blackworms were cut in half.
- 2) The worms were placed in Petri dishes with 10 mL of water.
- 3) Every week a photograph was taken of the worms through a microscope.

Conclusion

The results of this experiment show that simple sugars such as glucose, fructose, and galactose increase the regenerative rate of California Blackworms (*Lumbricus variegatus*).

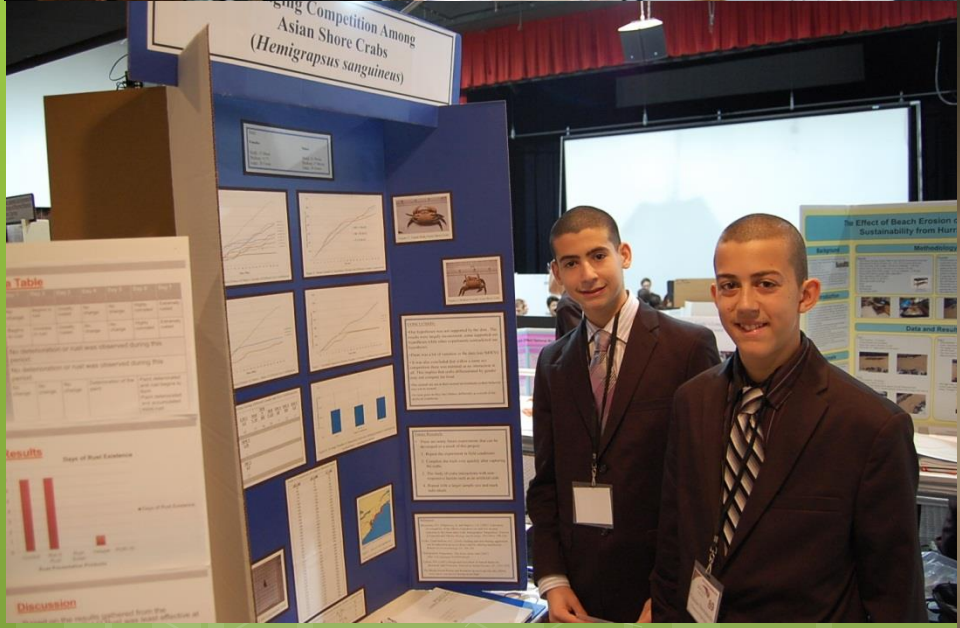
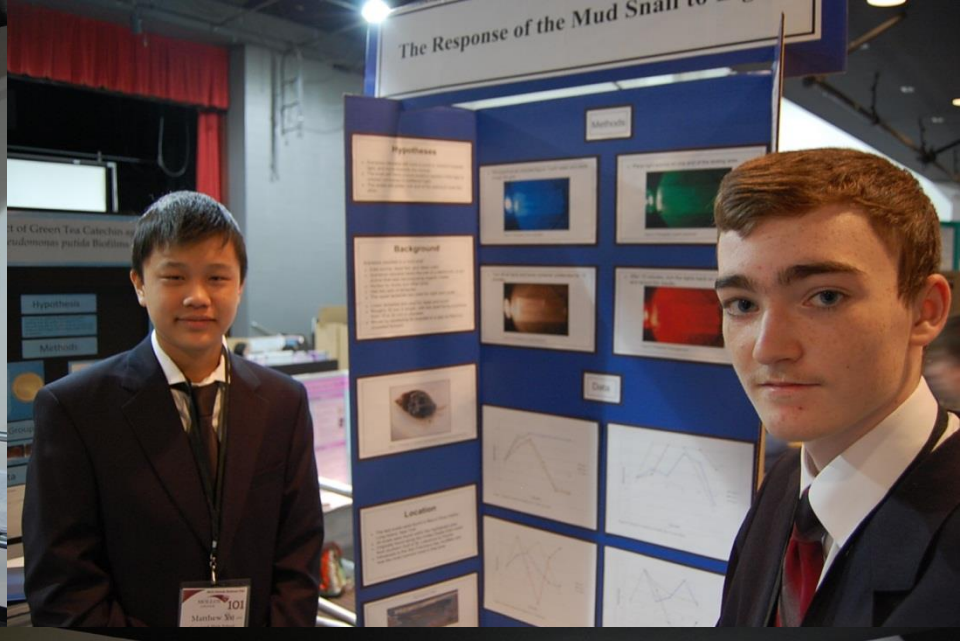
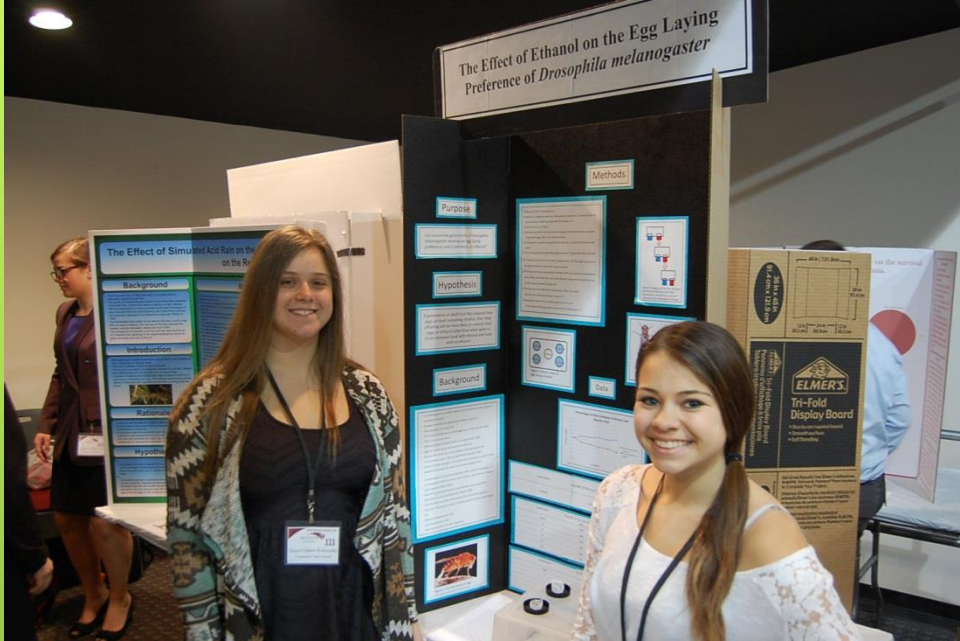
Limitations

The limitations of this experiment are that the worms were not kept in a controlled environment, and the results may vary if the worms were kept in a controlled environment.

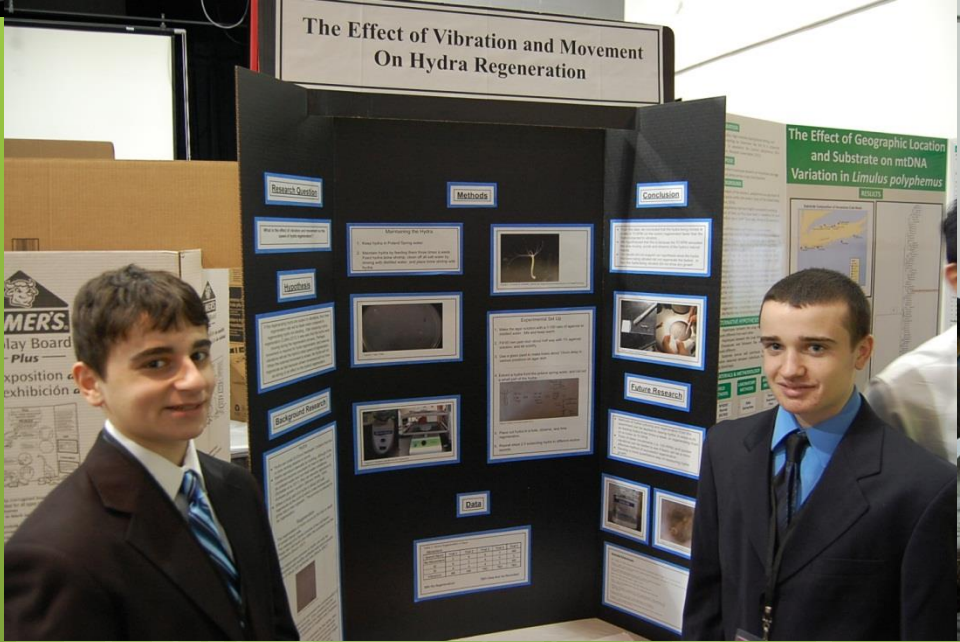
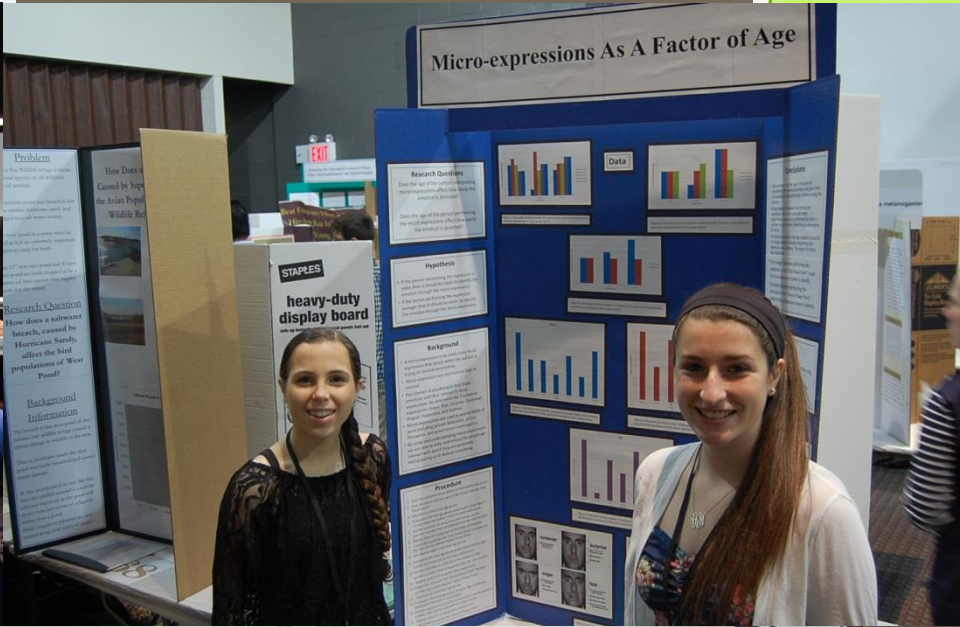
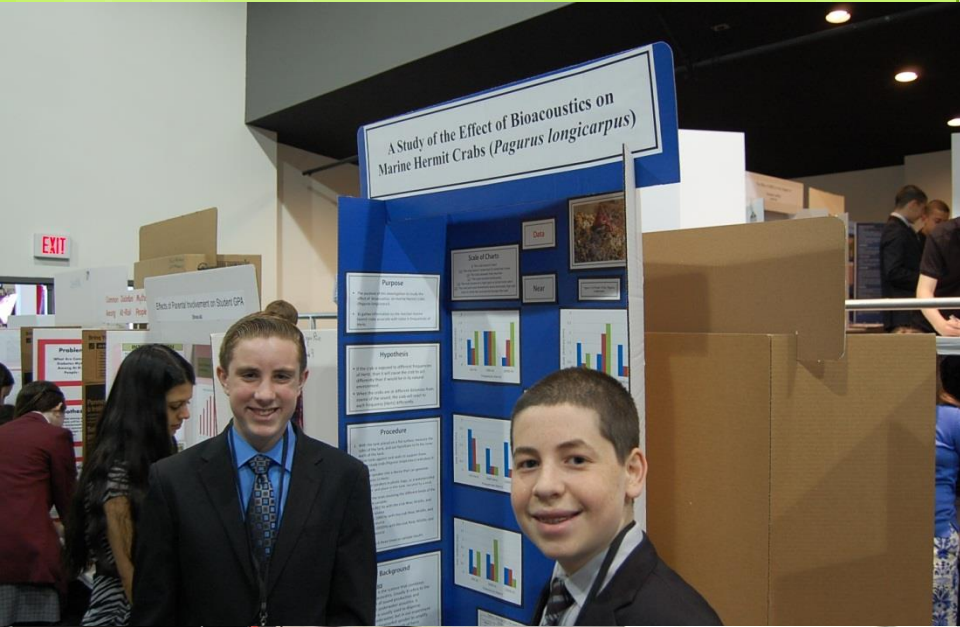


Egg Laying
Melanogaster







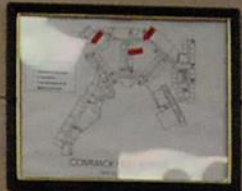






Community High School's Annual
Art Happening
Join Us
Thursday May 15
5:30 - 7:30

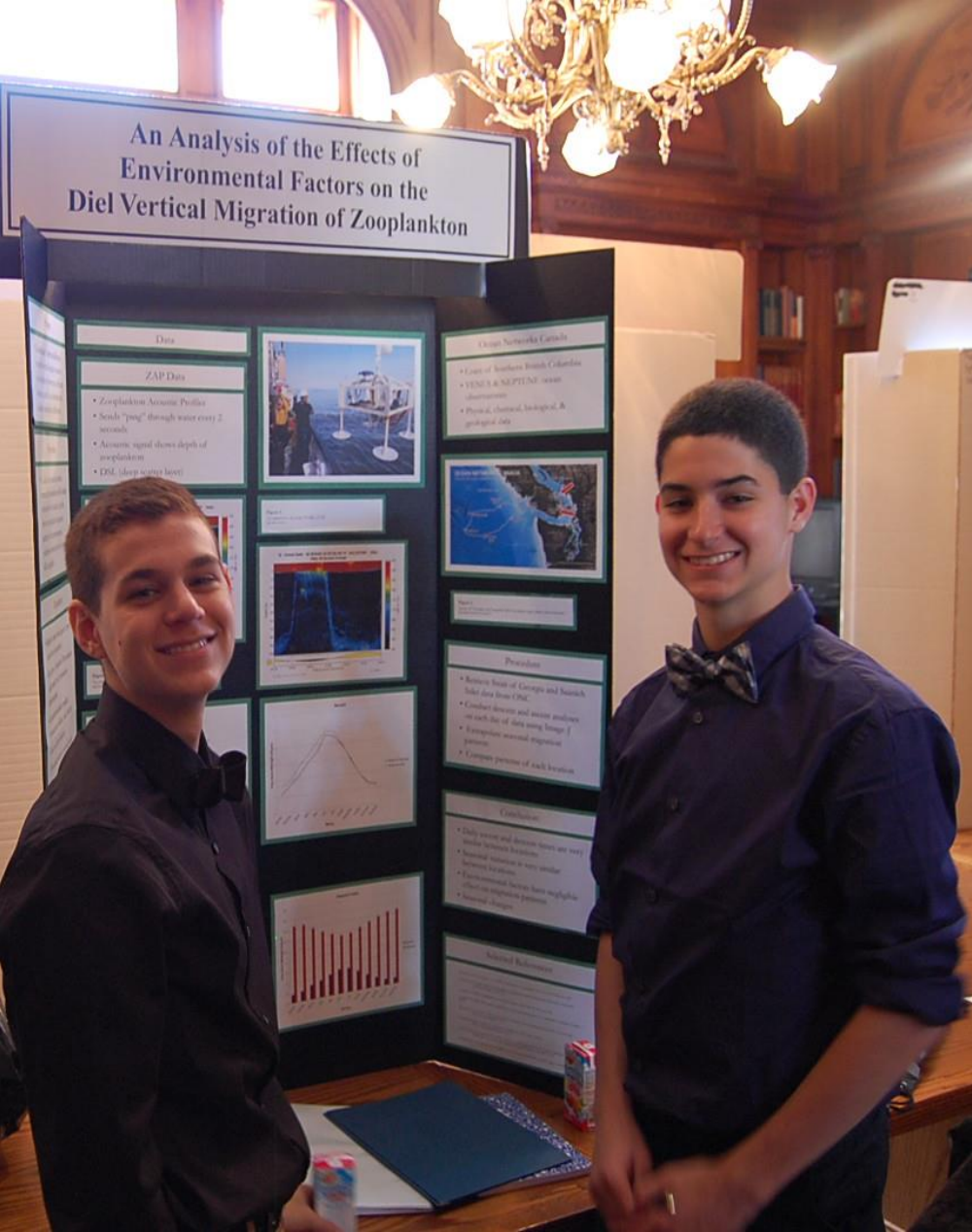
BUILDING PERMIT



H1N1 INFLUENZA
SIGNS AND SYMPTOMS
FOR CLASSROOMS

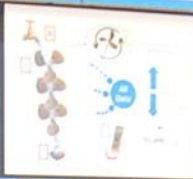
AED
Automated
Defibrillator
#1 - Cafeteria
#2 - Outdoor







The Effect of Multiple Successive Turbines On the Output of Energy



Abstract
This project explores the effect of multiple successive turbines on the output of energy. The results show that the output of energy increases as the number of turbines increases.

Introduction
The purpose of this project is to determine the effect of multiple successive turbines on the output of energy. The hypothesis is that the output of energy will increase as the number of turbines increases.

Methods
The experiment was conducted in a laboratory setting. The independent variable was the number of turbines, and the dependent variable was the output of energy. The data was collected and analyzed using a graph.

Results
The results of the experiment show that the output of energy increases as the number of turbines increases. The graph shows a clear upward trend in the output of energy as the number of turbines increases.

Conclusion
The conclusion of this project is that the output of energy increases as the number of turbines increases. This finding has implications for the design of power plants and other energy-generating facilities.

References
The following references were used in this project:
1. "The Effect of Multiple Successive Turbines on the Output of Energy." *Journal of Energy Research*, 2018.

The Response of Planaria During the Regeneration P

Abstract
This project explores the response of Planaria during the regeneration process. The results show that Planaria can regenerate their body parts and return to their original state.

Introduction
The purpose of this project is to determine the response of Planaria during the regeneration process. The hypothesis is that Planaria can regenerate their body parts and return to their original state.

Methods
The experiment was conducted in a laboratory setting. The independent variable was the type of regeneration, and the dependent variable was the response of Planaria. The data was collected and analyzed using a graph.

Results
The results of the experiment show that Planaria can regenerate their body parts and return to their original state. The graph shows a clear upward trend in the response of Planaria as the type of regeneration increases.

Conclusion
The conclusion of this project is that Planaria can regenerate their body parts and return to their original state. This finding has implications for the study of regeneration and the development of new medical treatments.

References
The following references were used in this project:
1. "The Response of Planaria During the Regeneration Process." *Journal of Biology*, 2018.

An Analysis of the Movement Patterns of Juvenile and Mature Brook Trout (*Salvelinus fontinalis*)

Procedure

Conclusion

Applications

Future Research

References

A science fair project board with a black background and red-bordered sections. It contains text boxes for Procedure, Conclusion, Applications, Future Research, and References, along with several small photographs and diagrams.



The Effect of Car Air Fresheners on The Life Cycle of Wisconsin Fast Plants

Research Question

Background Research Wisconsin Fast Plants (*Brassica rapa*)

Plants and Volatiles

Health of Volatiles on Humans

Hypothesis

Data

A green science fair project board with white-bordered sections. It includes a Research Question, Background Research on Wisconsin Fast Plants, Plants and Volatiles, Health of Volatiles on Humans, and a Hypothesis. The Data section features several bar graphs and line charts.



The Regeneration of *Lambriculus varicosus*

Purpose

Hypothesis/Explanation

Background

Method

Data

A blue science fair project board with white-bordered sections. It includes sections for Purpose, Hypothesis/Explanation, Background, Method, and Data, with various diagrams and text boxes.



The Relationship Between WiFi Antenna Distance and Signal Strength

Methods

Summary of Results

Calculations

Future Research/Recommendations

Select References

A blue science fair project board with white-bordered sections. It includes sections for Methods, Summary of Results, Calculations, Future Research/Recommendations, and Select References, featuring graphs and text boxes.





The Response of Planaria to Light During the Regeneration Process

Testing

Methods
Planaria were exposed to different light conditions during the regeneration process. The response was observed and recorded.

Procedure
1. Planaria were cut into two halves.
2. One half was placed in a dark environment.
3. The other half was placed in a light environment.
4. The growth and development of the new head and tail were monitored.

Summary of Results

The results showed that Planaria in the light environment regenerated faster and more completely than those in the dark environment. The new head and tail were clearly visible and functional.

Conclusion

Light plays a significant role in the regeneration process of Planaria, influencing the speed and quality of the new growth.

Research

Further research is needed to explore the molecular mechanisms behind the light-induced regeneration process.

A Spatial and Temporal Analysis of Changes in the Vocalization of the American Crow



The study analyzed the vocalization patterns of American Crows in a specific geographic area over a period of time. The results showed significant changes in the frequency and duration of their calls.



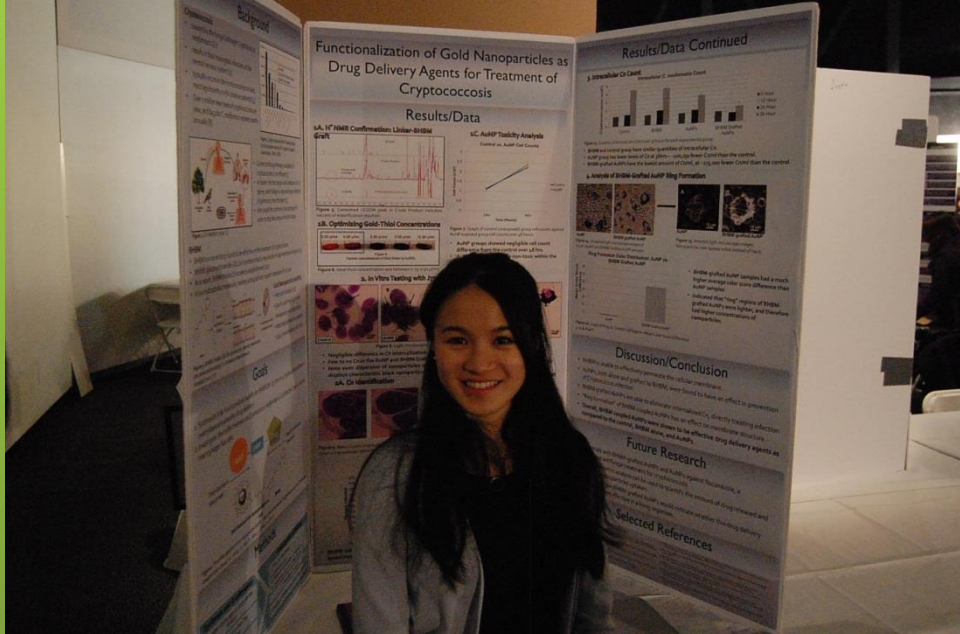
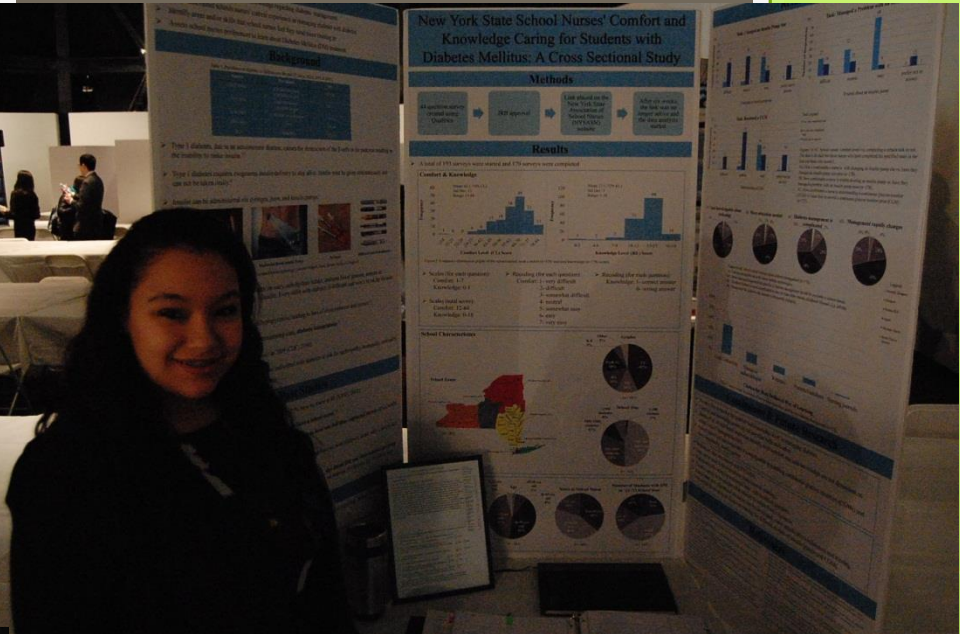
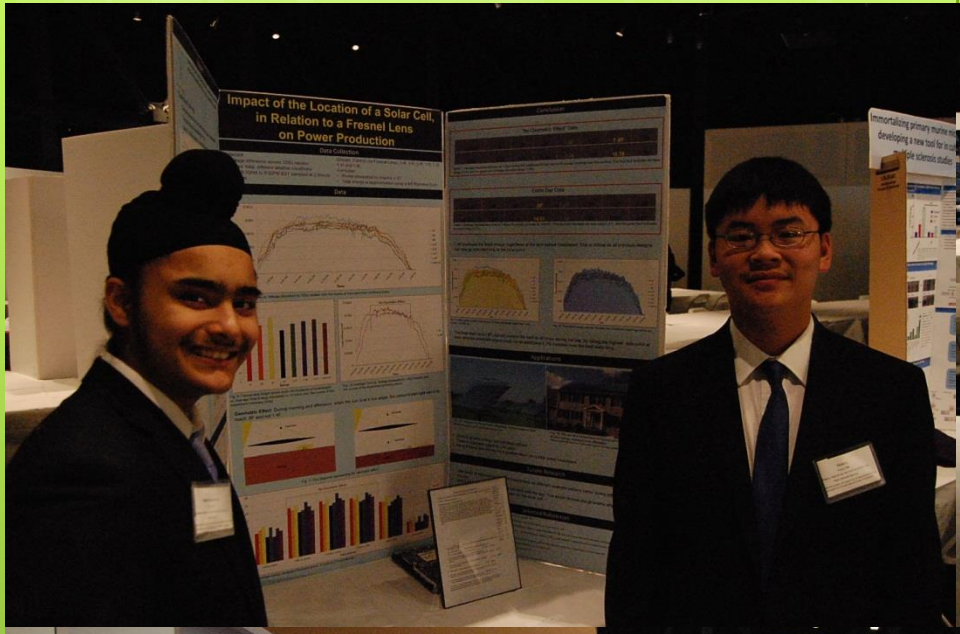








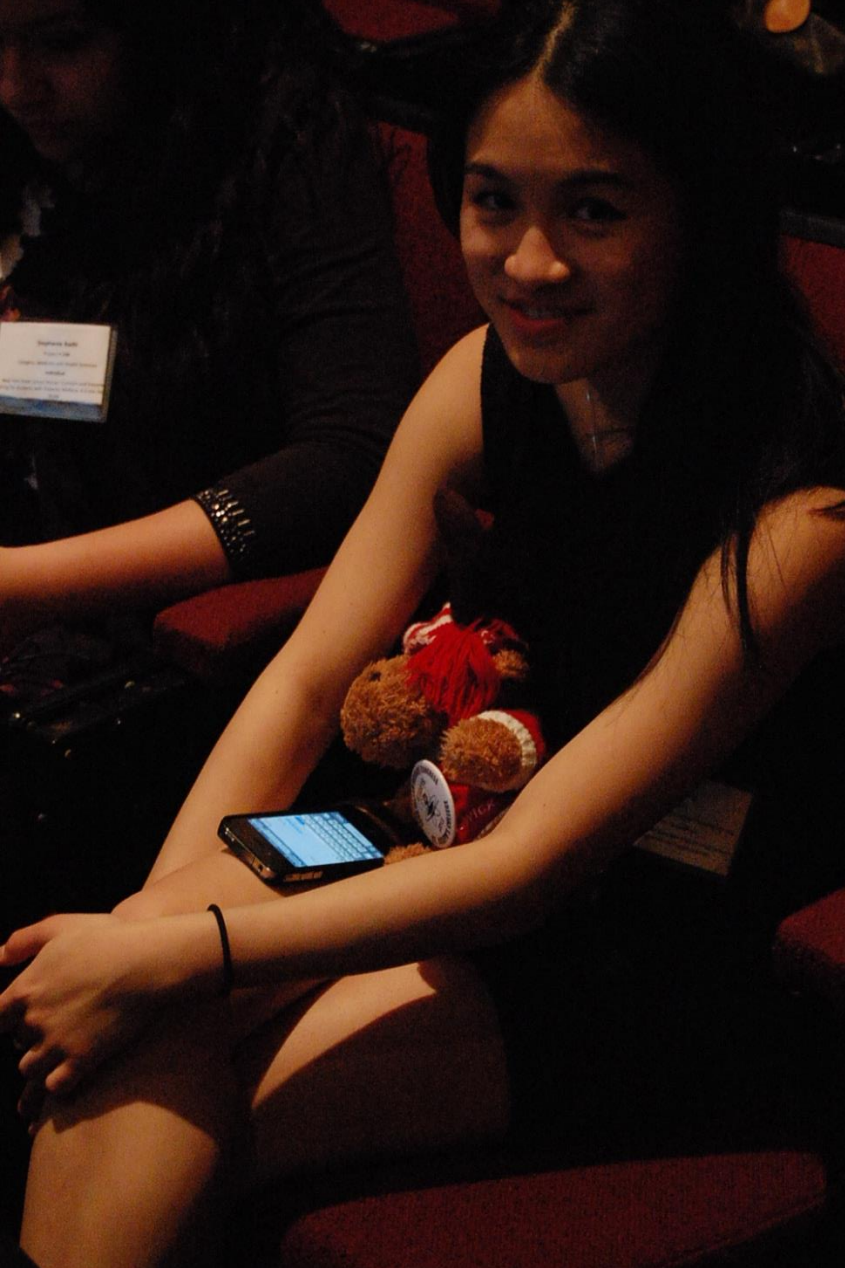
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NEW YORK STATE SCIENCE AND ENGINEERING FAIR





Reflecting Light

waves





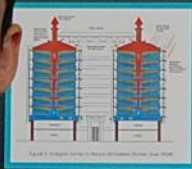
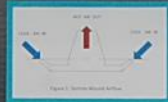
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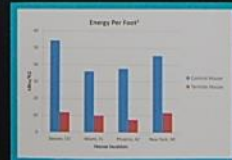
JAZZ
APRIL 2015
7-8 PM

Modeling an Energy Efficient House Influenced by a Natural Design



Data

City	Miami, FL	Phoenix, AZ	New York, NY
1	36.1	27.7	45.4
2	199.4	161.1	196.6
3	10.1	7.6	11.8
4	44.2	32.8	61



Procedure

- Use Google Sketch Up to model an average American house based upon standards of 2,300 sq ft with a hot high air average floor space of 2,300 sq ft and of standard building materials (wood framing, concrete base, brick, double wall).
- Use control house using Google Earth in a number of other areas across different climates, ranging from sea level to a mile above, and climate zones for energy usage specific to the area.

Procedure Continued

- A termites inspired house was modeled. The house was built using the same materials as the control house and the same floor space, dimensions, but following the idea behind a termites house.
- The house featured a heat sink, and long open connecting tubes leading up and away from being quarters.
- The termites house was tested in the same locations in the U.S. as the control house for energy use.

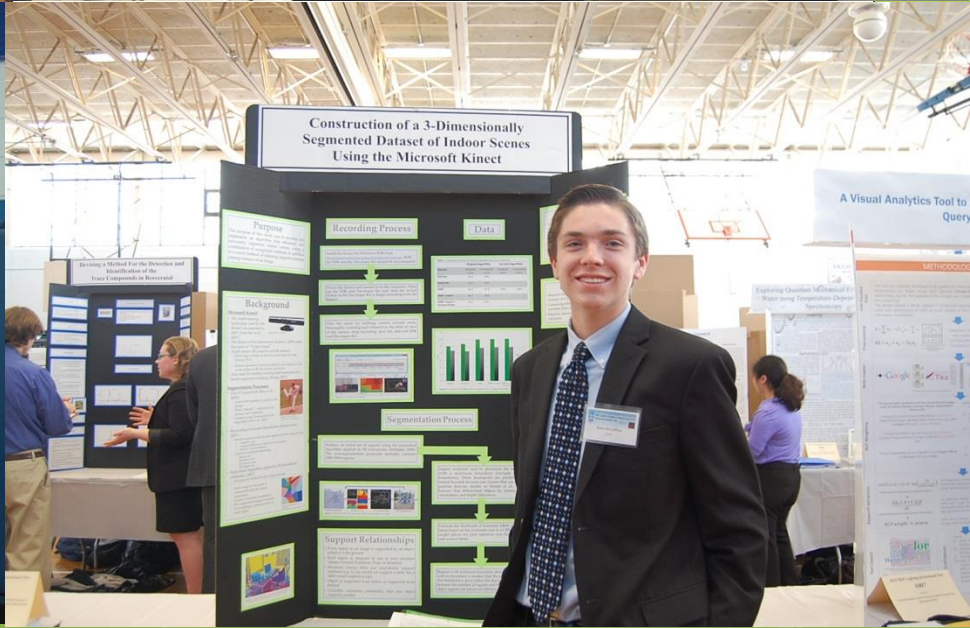
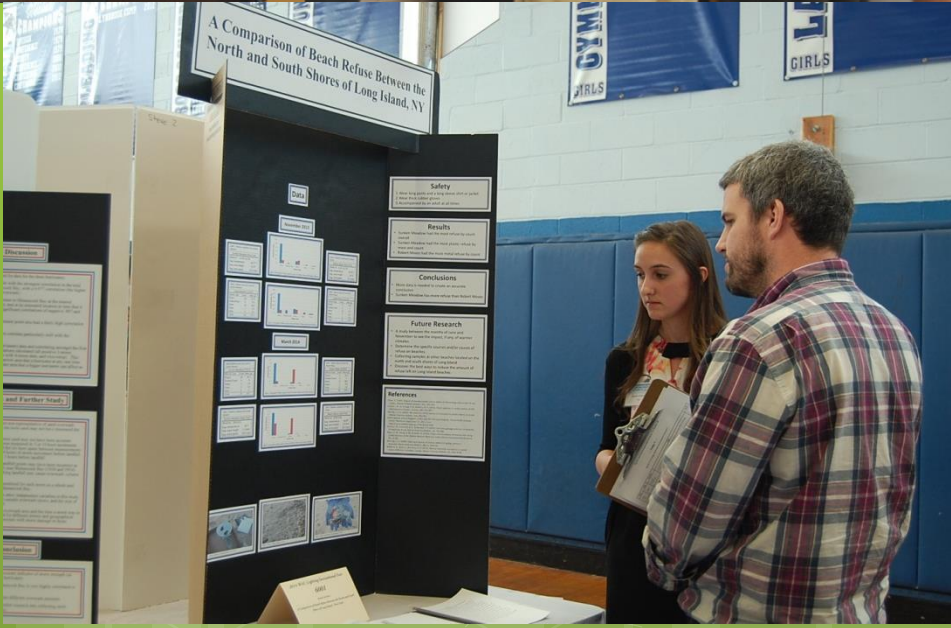
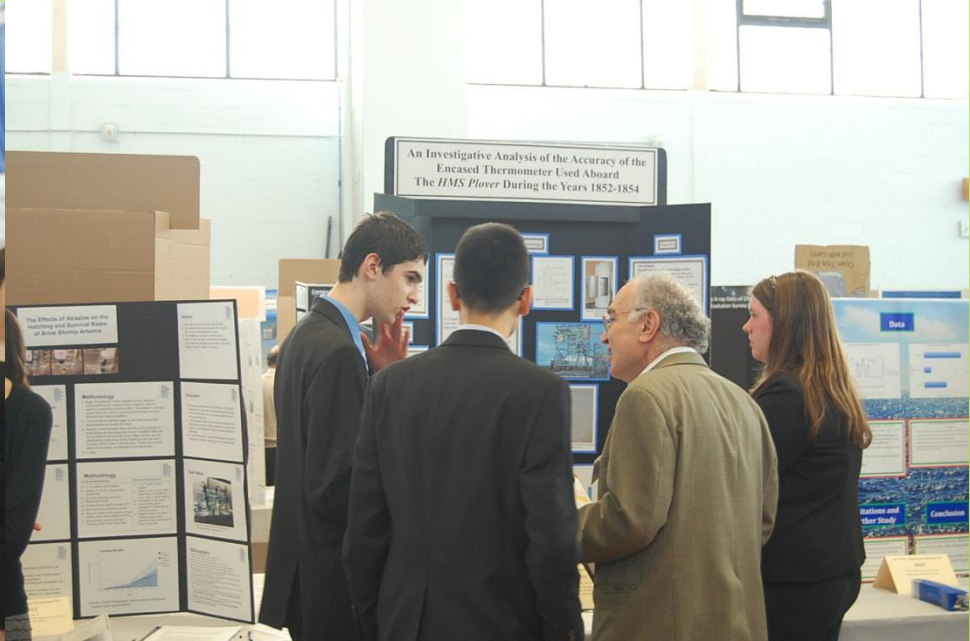
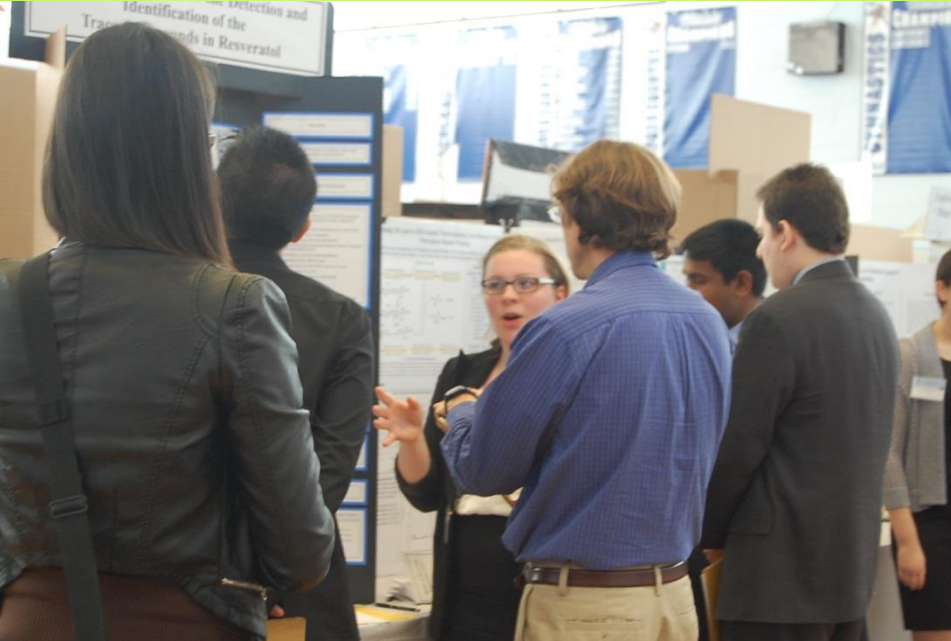
Conclusion

It can be concluded, that it is possible to successfully build an energy efficient, termites inspired domicile. The termites inspired house, in terms of energy consumption, was much better performing than the control house in all locations tested in the program.

Future Research

Experiment with and build physical models of the houses, modeled on the computer in this study.

Already look into not only what humans can learn from termites, but whenever nature may be a model for people. This is the idea of biomimicry, looking to nature for solutions to mankind's problems.





Objective

Develop a program that can efficiently create medication information in a format that health care and language barriers between a prescribing professional and their patients.

Background

Health professionals need to give medication information to their patients. Language and literacy barriers make communicating this information difficult. Many patients do not understand the written word, and many do not understand the spoken word. This is especially true for patients who are non-English speaking. This is a significant barrier to patient care. The program will help overcome these barriers by providing medication information in a format that is easy to understand. The program will be used by health care professionals to create medication information for their patients. The program will be used by patients to understand their medication information. The program will be used by health care professionals to create medication information for their patients. The program will be used by patients to understand their medication information.

Design

I. Requirements

- Allow pharmacists to create and manage prescriber accounts, patient files, and prescriptions.
- Allow additional languages, terms, and programs to be easily appended to the program's database.
- Allow prescribers to select culturally sensitive programs in addition to generic programs.

II. Program Use

Prescriber Account Creation
Prescriber Account Management
Prescriber Account Information

III. Conveying Prescription Information Component A: Textual Translation

The program will be used by health care professionals to create medication information for their patients. The program will be used by patients to understand their medication information. The program will be used by health care professionals to create medication information for their patients. The program will be used by patients to understand their medication information.

IV. Conveying Prescription Data of Components A & B

Overcoming Language Barriers and Poor Health Literacy: A Computer Application to Relay Pharmaceutical Information through Pictograms

Component B: Visual Representation

Specifically describe the program and design a user interface that is easy to use. The program will be used by health care professionals to create medication information for their patients. The program will be used by patients to understand their medication information. The program will be used by health care professionals to create medication information for their patients. The program will be used by patients to understand their medication information.

The Prescription Architect

Component C: Oral Instruction

Additional Functions

The Prescription Architect

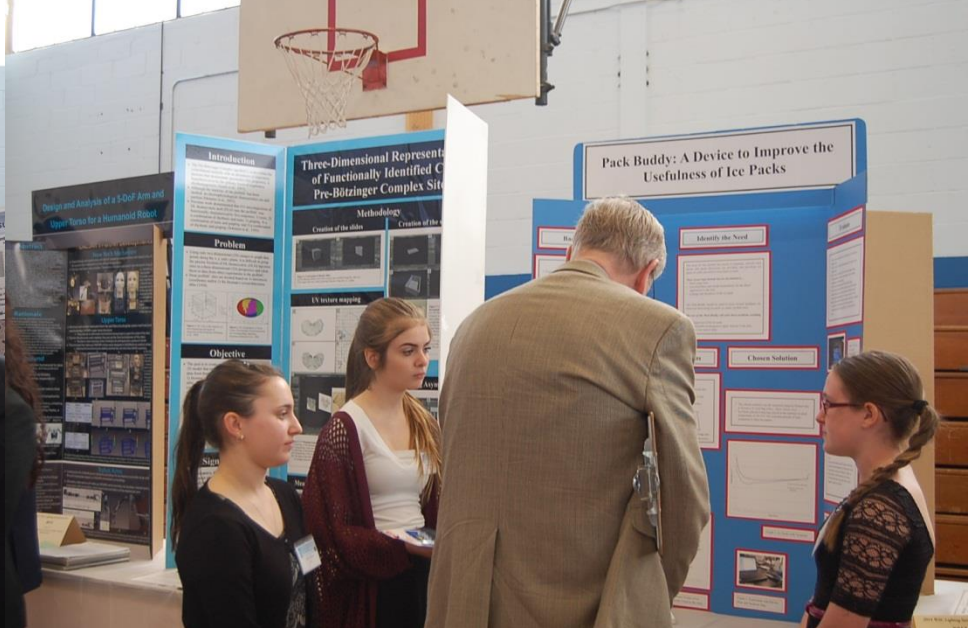
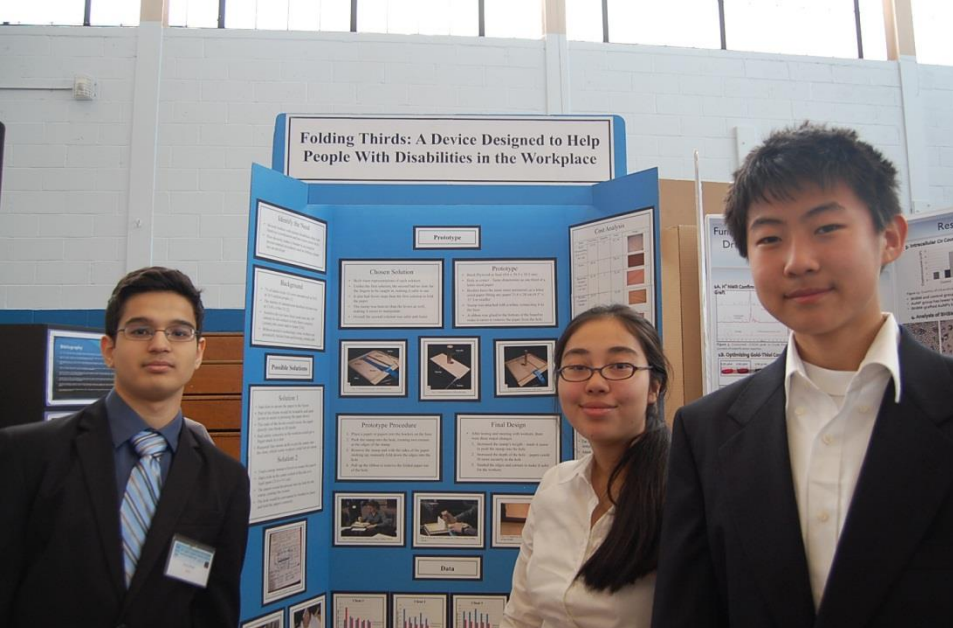
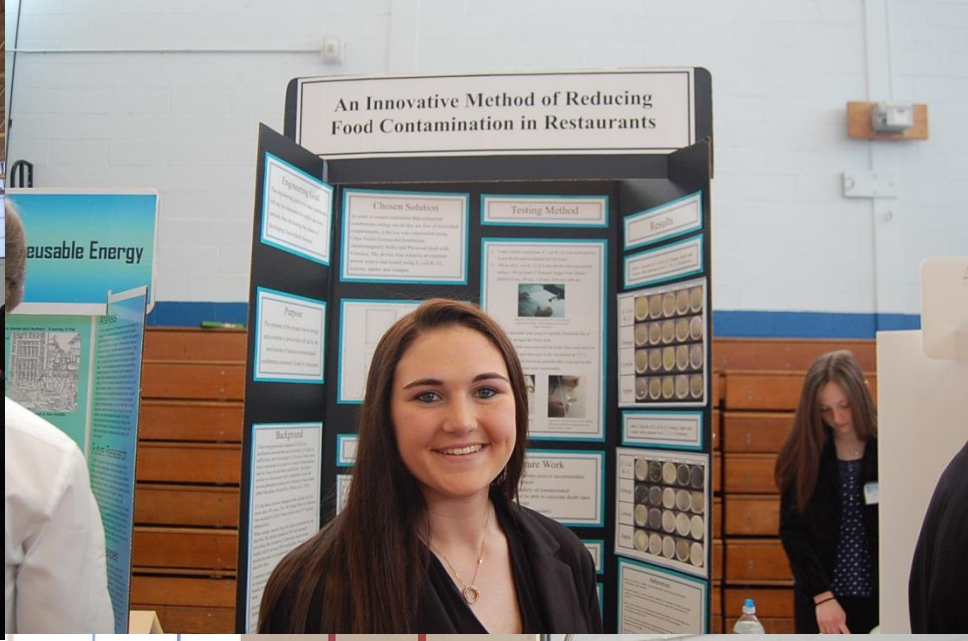
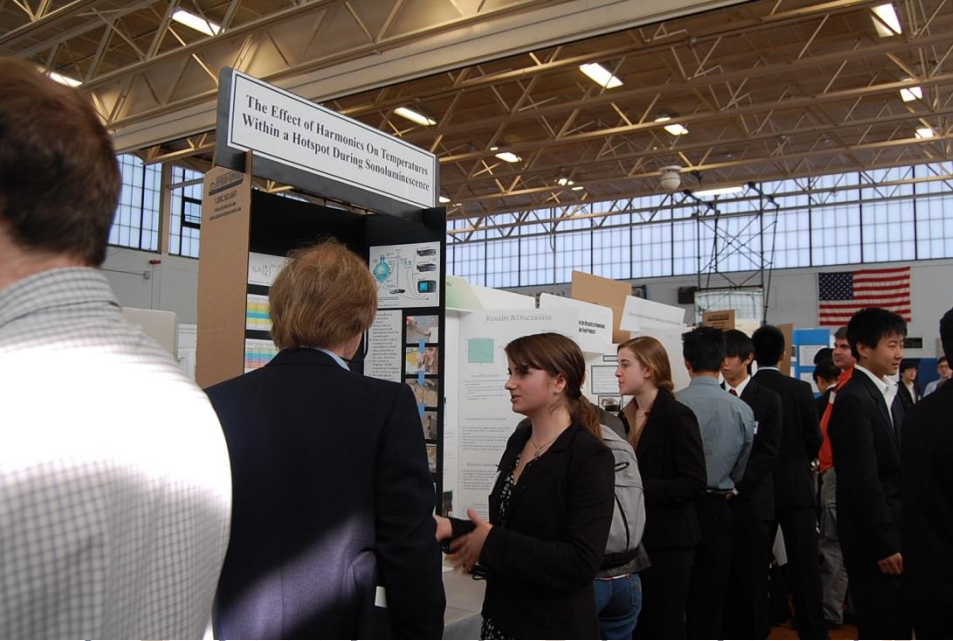
Results

Future Work

Selected References



2014-2015 Lighting Development Plan
10079



Device Designed to Help Abilities in the Workplace

Prototype

Backflow preventer (BPP) is a device that is used to prevent backflow of water into a clean water supply. It is a device that is used to prevent backflow of water into a clean water supply. It is a device that is used to prevent backflow of water into a clean water supply.

Final Design

- After testing and meeting with students, there were three major changes:
 - Increased the weight to make it easier to push the stop over the hole.
 - Increased the depth of the hole, paper could fit more securely in the hole.
 - Made the stop and cones to make it safer for the workers.

Data

Cryptococcosis Background

Caused by the fungal pathogen *Cryptococcus neoformans* (Cn) results in fatal central nervous system (CNS) infections of the most significantly in HIV positive patients [1]. Over a million new cases of cryptococcosis per year, and 66,000 *C. neoformans* related deaths.

Figure 1. Cn infection cycle [1].

Current antifungal therapy available for cryptococcosis is not efficient [2]. Airborne infection begins with inhalation of Cn spores, which lodge in lungs and elicit infection of pulmonary macrophages [3]. Aids target the pulmonary macrophages in order to stop the disease at its first stage.

Functionalization of Gold Nanoparticles as Drug Delivery Agents for Treatment of Cryptococcosis

Results/Data

3.A. ¹H NMR Confirmation: Linker-BHBM Graft

3.B. Optimizing Gold-Thiol Concentrations

3.C. AuNP Toxicity Analysis

3. In Vitro Testing with J774.A.1 Macrophage-Like Cells

3.A. Cn Identification

3.B. BHBM-Grafted AuNP Role in Cn Elimination

3.C. Quantification of In-Vitro Cn Infectivity Data

Results/Data Continued

3. In Vitro Testing with J774.A.1 Macrophage-Like Cells (Continued)

3.A. Cn Identification

3.B. BHBM-Grafted AuNP Role in Cn Elimination

3.C. Quantification of In-Vitro Cn Infectivity Data

Discussion/Conclusion

- BHBM is unable to effectively permeate the cellular membrane of *Cryptococcus neoformans*.
- AuNPs, both alone and grafted to BHBM, were found to have an effect on *Cryptococcus neoformans*.
- BHBM grafted AuNPs are able to eliminate internalized Cn, and BHBM grafted AuNPs has an effect on Cn elimination.
- "Ring formation" of BHBM coupled AuNPs has an effect on Cn elimination.
- Overall, BHBM coupled AuNPs were shown to be effective compared to the control, BHBM alone, and AuNPs.

Future Research

- A future study with BHBM grafted AuNPs and AuNPs, conventional antifungal treatment for cryptococcosis, and immunosuppressants and can be used to quantify the nanoparticle system.
- Analysis of the BHBM grafted AuNPs would indicate system is safe and effective as a living organism.

Selected References

Prototype design of a cell-contaminated water filtration in residential buildings

Discussion/Conclusion

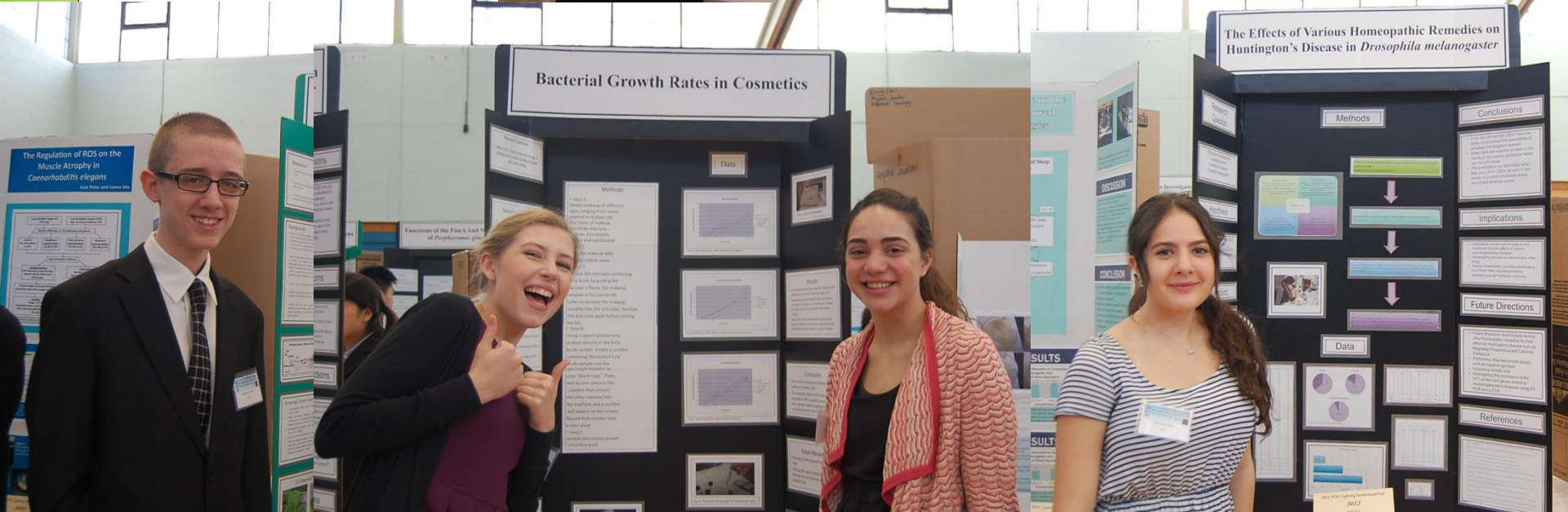
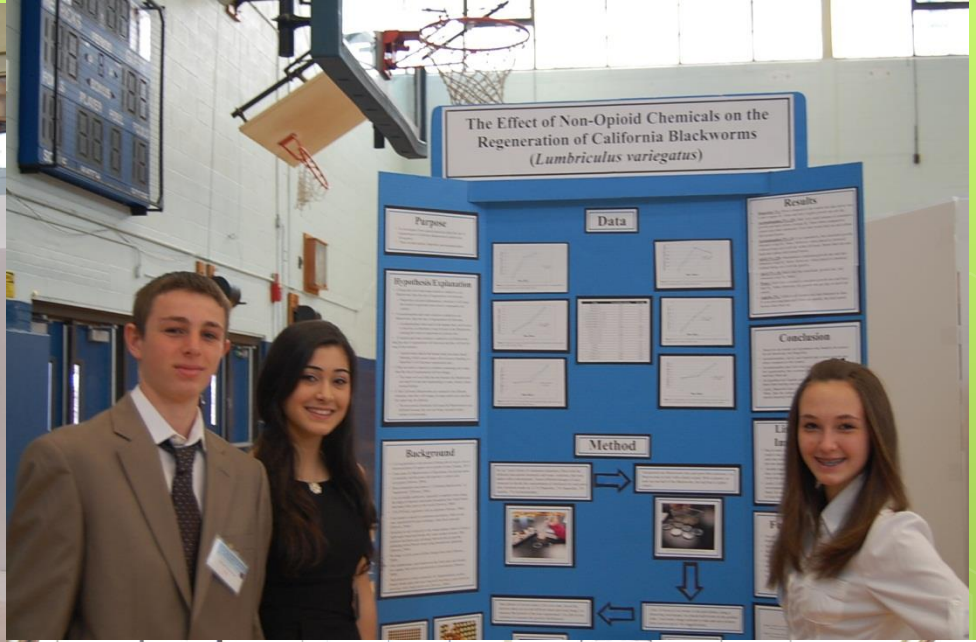
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Selected References





The Use of Genetic Spike-in Controls to Quantify Absolute Population Abundances In the Bacterial Microbiome

Purpose

Hypothesis

Background Information

The Gut Microbiome

- 10¹¹ to 10¹² cells living in humans (Clemente et al., 2012)
- Multiple populations interact with each other (Korolik and Shtrom, 2015)
- The gut microbiome provides benefits from all of the above angles
- Antibiotic resistance is a major threat to gut microbiome (Shan, 2015)
- Antibiotic resistance associated with cancer, asthma, heart disease, HIV, Autism, etc. (Shan, 2015)

Limitations to Current Methodology

- Sampling bias
- rRNA genes
- 16S rDNA
- Antibiotic resistance
- Cross-contamination
- Limited resolution of closely related species
- Cannot be used to quantify species abundance

Methodology

High Throughput Sequencing



Development of Spike-ins

- Cloning
- Based on 16S rDNA & 16S rRNA
- Customizable
- Specificity
- Cloning into by comparing both 16S rDNA & 16S rRNA
- High purity
- High stability
- High reproducibility
- High accuracy
- High sensitivity
- High specificity
- High stability
- High reproducibility
- High accuracy
- High sensitivity
- High specificity

QIIME

- Alpha Sequencing
- Beta Sequencing (to compare OTUs)
- Taxonomy
- OTU Picking
- Classification
- PCoA Plot
- Relative Abundance Correlation (Pearson)
- Alpha Diversity (Shannon diversity)

PCR & Gel Electrophoresis

- Positive Control
- Total Bacterial Protein DNA V4 Region
- Culture DNA
- Fungal DNA
- Negative Control
- -PCR



Discussion

Microbial communities are complex and dynamic. The use of genetic spike-in controls allows for the quantification of absolute population abundances in the bacterial microbiome. This is achieved by comparing the abundance of the spike-in controls to the abundance of the bacterial DNA. The spike-in controls are added to the sample before DNA extraction and sequencing. This allows for the quantification of the absolute number of bacterial cells in the sample.

The diagram shows a circular process. It starts with 'Spike-in control' (represented by a green arrow) and 'Sample DNA' (represented by a yellow arrow). These are combined and then 'Library preparation' (represented by a pink arrow) is performed. The final step is 'High Throughput Sequencing' (represented by a blue arrow), which results in 'Raw reads'.

Microbial communities are complex and dynamic. The use of genetic spike-in controls allows for the quantification of absolute population abundances in the bacterial microbiome. This is achieved by comparing the abundance of the spike-in controls to the abundance of the bacterial DNA. The spike-in controls are added to the sample before DNA extraction and sequencing. This allows for the quantification of the absolute number of bacterial cells in the sample.

Poster presenter information

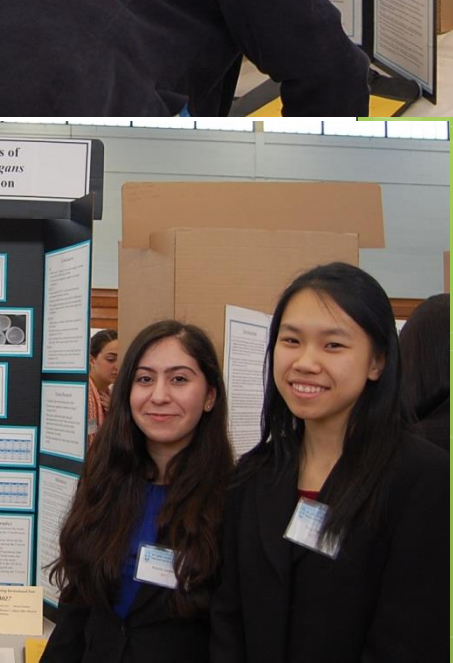
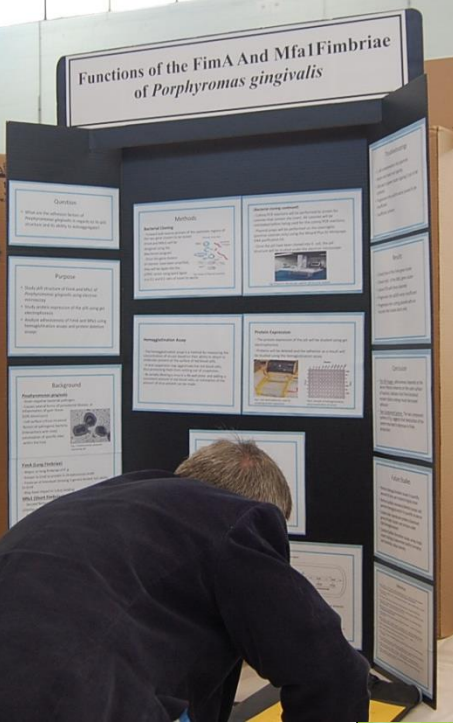
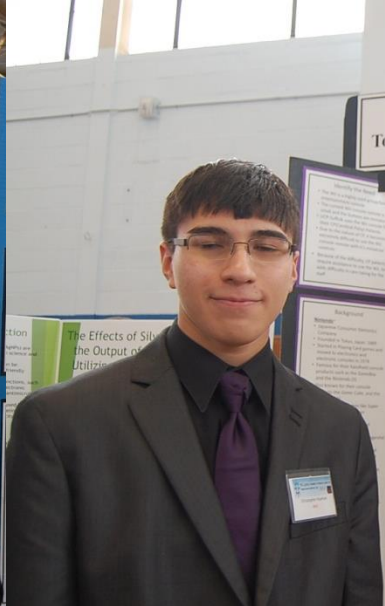
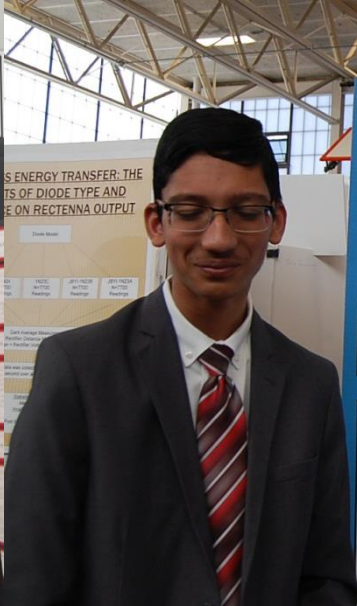
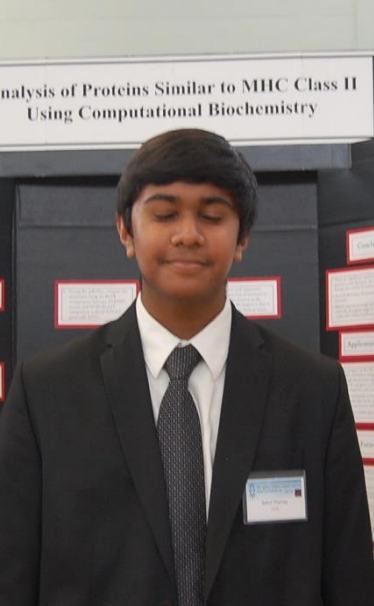
A young man in a suit and tie is standing next to the poster. He is looking towards the camera.

Poster presenter information

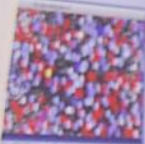
A young woman with long dark hair and glasses, wearing a white shirt and a light-colored jacket, is smiling at the camera. She is standing in front of the poster. A name tag is visible on her jacket.

Adjacent poster information

A large cardboard poster board is visible on the right side of the image. It contains text, but it is mostly obscured and difficult to read.



Visualizing Cardiac Networks



Discussion



Figure 10. Ciona heart regulatory genes WGCNA network.



Figure 11. Ciona heart regulatory genes WGCNA network.

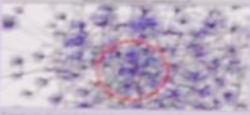


Figure 12. Ciona heart regulatory genes WGCNA network.

- Ciona clusters centered around: *FUNDC1/FUNDC2*, *Mbd1/LsMBTL2*, *KH1170.84*, and *Invs/Kng1/Kng2*
- Mouse clusters centered around: *Klf12*, *MITE*, *hoxb5*, and *Klf16*
- High similarity in clusters/cluster TF functions
- Key cliques contain same average number of genes (80-112)
- Indicates these genes are orthologous and this is where the heart development is conserved over evolution

Implications

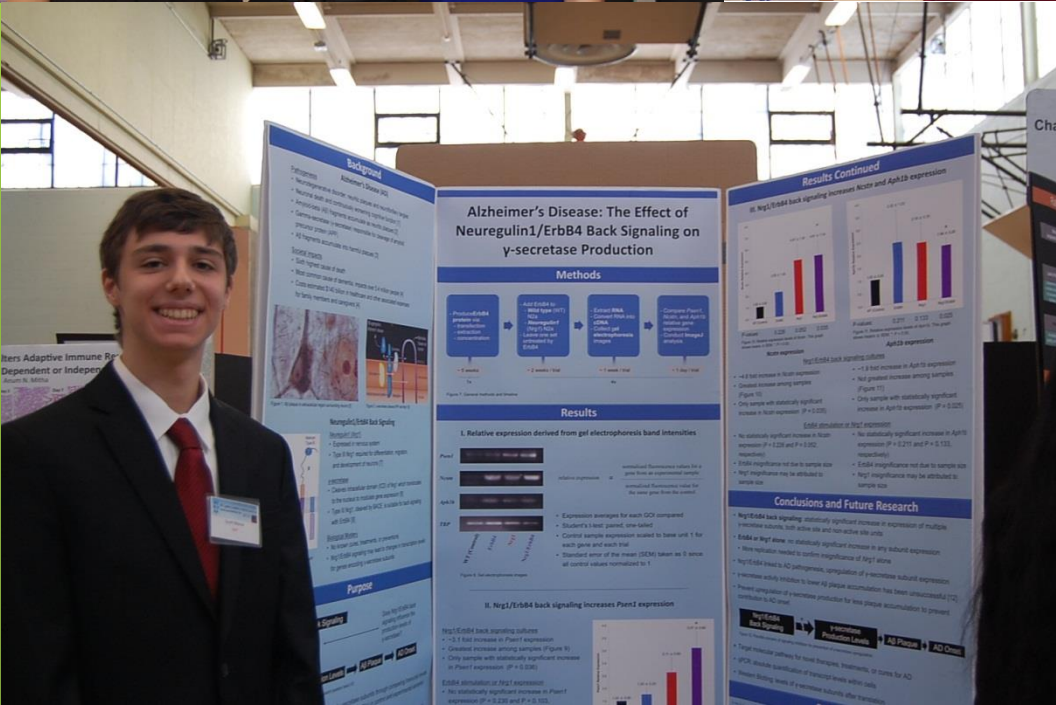
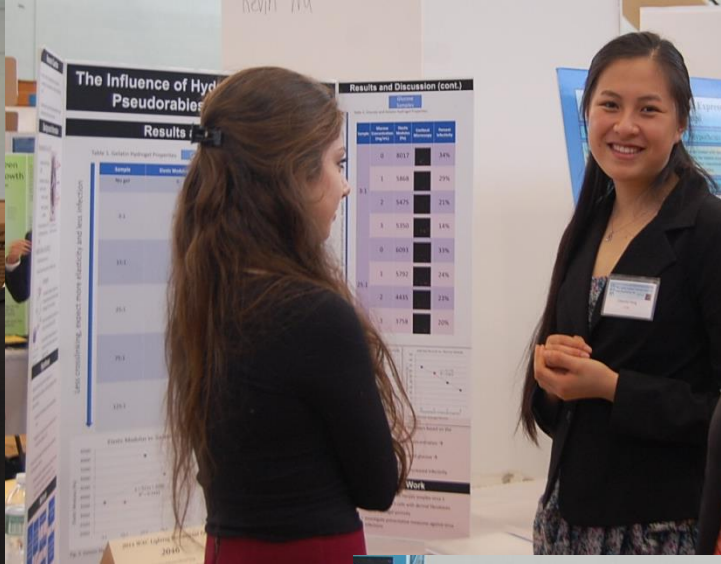
- By identifying key gene clusters and orthologous genes, the most significant in the Ciona and Mouse genomes that are most significant in heart development, as well as the pathways that are affected by mutations such as CHD occur, were learned.
- Learned data may be applied to cardiac complications in humans.
- This information enables scientists to engineer medication that target mutations at specific loci and cease the high frequency associated with CHD in humans.

Future Directions

- Utilize BioNet Builder to...
- Further research individual...
- Investigate orthologous genes...
- Use a biomedical simulation...

Selected References

1. ...
2. ...
3. ...
4. ...
5. ...



Dispersal of Disease Caused By Resistant Bacteria Passed Through the German Cockroach (*Blattella germanica*)

Abstract
How do German cockroaches (*Blattella germanica*) transmit resistant bacteria (*Enterobacteriaceae*)?

Hypothesis
Resistant bacteria can be transferred to and from German cockroaches through bacteria ingestion, body contact, and excretion.

Background Information
German Cockroach (*Blattella germanica*)

- Found in 1750 in Massachusetts
- They are resistant to many insecticides
- They are resistant to many antibiotics
- They are resistant to many disinfectants
- They are resistant to many pesticides
- They are resistant to many herbicides
- They are resistant to many fungicides
- They are resistant to many molluscicides
- They are resistant to many nematocides
- They are resistant to many acaricides
- They are resistant to many insect growth regulators
- They are resistant to many repellents
- They are resistant to many attractants
- They are resistant to many pheromones
- They are resistant to many kairomones
- They are resistant to many allelochemicals
- They are resistant to many secondary metabolites
- They are resistant to many primary metabolites
- They are resistant to many nutrients
- They are resistant to many vitamins
- They are resistant to many minerals
- They are resistant to many trace elements
- They are resistant to many essential amino acids
- They are resistant to many essential fatty acids
- They are resistant to many essential vitamins
- They are resistant to many essential minerals
- They are resistant to many essential trace elements
- They are resistant to many essential nutrients
- They are resistant to many essential vitamins
- They are resistant to many essential minerals
- They are resistant to many essential trace elements
- They are resistant to many essential nutrients

Health Hazard

- Cockroaches are known vectors for bacteria, fungi, and viruses
- Cockroaches are known vectors for allergens
- Cockroaches are known vectors for parasites
- Cockroaches are known vectors for toxins
- Cockroaches are known vectors for drugs
- Cockroaches are known vectors for chemicals
- Cockroaches are known vectors for pollutants
- Cockroaches are known vectors for carcinogens
- Cockroaches are known vectors for mutagens
- Cockroaches are known vectors for teratogens
- Cockroaches are known vectors for immunogens
- Cockroaches are known vectors for sensitizers
- Cockroaches are known vectors for irritants
- Cockroaches are known vectors for corrosives
- Cockroaches are known vectors for oxidizers
- Cockroaches are known vectors for flammables
- Cockroaches are known vectors for explosives
- Cockroaches are known vectors for radioactive materials
- Cockroaches are known vectors for hazardous waste
- Cockroaches are known vectors for biohazardous materials
- Cockroaches are known vectors for infectious agents
- Cockroaches are known vectors for drug-resistant bacteria
- Cockroaches are known vectors for antibiotic-resistant bacteria
- Cockroaches are known vectors for multidrug-resistant bacteria
- Cockroaches are known vectors for superbugs
- Cockroaches are known vectors for pathogens
- Cockroaches are known vectors for zoonotic agents
- Cockroaches are known vectors for foodborne pathogens
- Cockroaches are known vectors for waterborne pathogens
- Cockroaches are known vectors for airborne pathogens
- Cockroaches are known vectors for contact pathogens
- Cockroaches are known vectors for vector-borne pathogens
- Cockroaches are known vectors for sexually transmitted pathogens
- Cockroaches are known vectors for vertically transmitted pathogens
- Cockroaches are known vectors for horizontally transmitted pathogens
- Cockroaches are known vectors for all types of pathogens

Methods

- Phase 1: German cockroaches were the test subjects.
- Phase 2: German cockroaches were the test subjects.
- Phase 3: German cockroaches were the test subjects.
- Phase 4: German cockroaches were the test subjects.
- Phase 5: German cockroaches were the test subjects.
- Phase 6: German cockroaches were the test subjects.
- Phase 7: German cockroaches were the test subjects.
- Phase 8: German cockroaches were the test subjects.
- Phase 9: German cockroaches were the test subjects.
- Phase 10: German cockroaches were the test subjects.



Spread Test

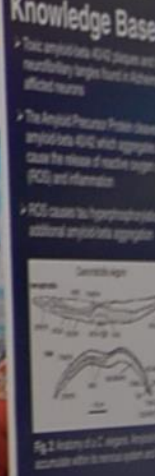
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- Phase 7: German cockroaches were the test subjects.
- Phase 8: German cockroaches were the test subjects.
- Phase 9: German cockroaches were the test subjects.
- Phase 10: German cockroaches were the test subjects.



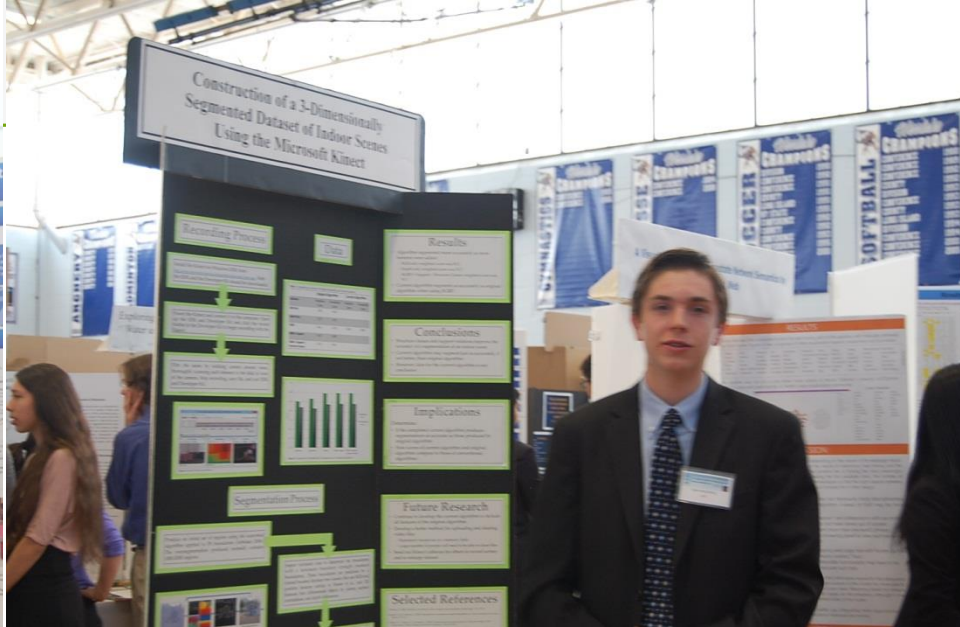
Abstract

Knowledge Base

- Toxic agents (ATC) possess and the neurotoxicity target found in Alzheimer affected neurons
- The Amyloid Precursor Protein cleaves amyloid beta (Aβ) which aggregates to cause the release of reactive oxygen (ROS) and inflammation
- ROS causes the hyperphosphorylation additional amyloid beta aggregation



Literature Review



Myocardial Contractility Invasive CMP

Methodology

Results

Conclusion

References

Transcriptional Regulation of miRNA Expression

Purpose

miRNAs are small non-coding RNA molecules that regulate gene expression post-transcriptionally. They are involved in various biological processes, including development, differentiation, and disease. This study aims to identify transcription factors that regulate miRNA expression.

Hypothesis

miRNA expression is regulated by transcription factors. We hypothesize that specific transcription factors will bind to the promoters of miRNA genes and regulate their expression.

Background

miRNAs are small non-coding RNA molecules that regulate gene expression post-transcriptionally. They are involved in various biological processes, including development, differentiation, and disease. This study aims to identify transcription factors that regulate miRNA expression.

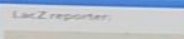
Method: Yeast One Hybrid (Y2H)

Yeast One Hybrid (Y2H) is a genetic method for identifying protein-protein interactions. In this study, it was used to identify transcription factors that interact with miRNA promoters.


Methods: Determining Conservation

Conservation analysis was performed to identify conserved regions in the miRNA promoters. This was done by comparing the promoters of miRNA genes across different species.

LacZ reporter




HIS3 reporter




Results

miRNA Promoter Interactions



This diagram illustrates the interactions between miRNA promoters and transcription factors. The nodes represent miRNA promoters and transcription factors, and the edges represent interactions between them.

Conservation through Orthologous Genes



This diagram shows the conservation of miRNA promoters through orthologous genes. It highlights the conserved regions in the promoters of miRNA genes across different species.

Discussion: Initial Screening

The initial screening of the miRNA promoter library identified several transcription factors that interact with miRNA promoters. These transcription factors were then validated using other methods.

Discussion: Functions of Selected Transcription Factors

The selected transcription factors were analyzed for their functions. They were found to be involved in various biological processes, including development, differentiation, and disease.

Discussion: Conclusions

This study has identified several transcription factors that regulate miRNA expression. These transcription factors are involved in various biological processes and may play a role in disease pathogenesis.

Validating the Royal in Royal Jelly: The Effect of Jelly Consumption on Short-term Memory in *Drosophila Melanogaster*

Introduction

Royal jelly is a natural substance produced by honey bees. It is rich in nutrients and has been shown to have various health benefits. This study aims to investigate the effect of royal jelly consumption on short-term memory in *Drosophila Melanogaster*.

Methods

The effect of royal jelly consumption on short-term memory was tested using a memory assay in *Drosophila Melanogaster*. The flies were divided into control and royal jelly-treated groups.

Results



The results show that royal jelly consumption significantly improved short-term memory in *Drosophila Melanogaster*.

Discussion

The improved short-term memory observed in the royal jelly-treated group may be due to the presence of certain nutrients in royal jelly. Further studies are needed to identify the specific components responsible for this effect.

Conclusion

Royal jelly consumption has a positive effect on short-term memory in *Drosophila Melanogaster*. This suggests that royal jelly may have cognitive benefits.

References

1. [Reference 1]
2. [Reference 2]
3. [Reference 3]

Results



Results





Effects of Colored Overlays on Computer Vision Syndrome (CVS): A Comparative Study Through Different Interfaces

Purpose

The development of an effective method in reducing the symptoms of Computer Vision Syndrome (CVS) when reading text on a cellular telephone in comparison to reading text on a desktop computer.

Research Question

To what extent does the implementation of Irlen Spectral Filters contribute to the increase or decrease in mistakes made when reading text on different interfaces?

Hypothesis

If people use an Irlen Spectral Filter against a cellular telephone screen, their Computer Vision Syndrome (CVS) can be diminished.

Background

When a young person like yourself experiences symptoms such as eye strain, blurred vision, and headaches, it may be a sign of Computer Vision Syndrome (CVS). This condition is caused by prolonged use of digital devices, leading to eye fatigue and discomfort. Research shows that using Irlen Spectral Filters can significantly reduce these symptoms, improving visual clarity and reducing eye strain. These filters are designed to filter out specific wavelengths of light that cause stress on the eyes, allowing the brain to make normal adjustments for various lighting conditions, glare, and brightness (Irlen 1998).

Who does CVS affect?

- Affects more than 70% of Americans who work on a computer every day (Heating 2013)
- Additionally affects millions of children who work on a computer every day (Heating 2013)
- Prolonged use may stress children's eyes and affect normal vision development (Heating 2013)

A sample of "Random Words"

Planning when optical error aging becomes a challenge. Several ocean paper human rarely association question full pressure cycle building to next segment background mode how

- They are colored overlay filters
- Intended to help people with perceptual processing
- Especially people with:
 - Dyslexia
 - ADHD (Attention deficit hyperactivity disorder)
 - Autism
 - Traumatic brain injury

Irlen® Spectral Filters are able to filter out the offending wave lengths of light which create the stress, thus allowing the brain to be able to make the normal adjustments for various lighting conditions, glare, and brightness (Irlen 1998)

Irlen Spectral Filters



Methods

Each volunteer will read the IRB consent form. If they choose to proceed with the experiment they will sign their name going forward. They must also be 18 to 30 years of age. Each volunteer will be asked to hold an iPhone at a comfortable reading distance and read aloud a word document containing



The Brightest Young Minds Inspired to Change Our World



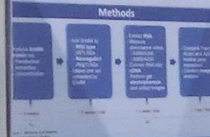


CB015



CB013

Alzheimer's Disease: The Effect of Neuregulin1/ErbB4 Back Signaling on γ -secretase Production

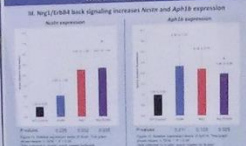


Results

1. Relative expression derived from gel electrophoresis band intensities

- 200 ng/ml Neuregulin1 significantly increased γ -secretase activity in HEK293T cells.
- Addition of 100 ng/ml ErbB4 significantly increased γ -secretase activity in HEK293T cells.
- Addition of 100 ng/ml Neuregulin1 and 100 ng/ml ErbB4 significantly increased γ -secretase activity in HEK293T cells.

Results Continued



2. γ -secretase activity was significantly increased in HEK293T cells treated with Neuregulin1 and ErbB4. This increase was significantly inhibited by the γ -secretase inhibitor, DAPT.

Conclusions and Future Research

• Neuregulin1 and ErbB4 back signaling significantly increase γ -secretase activity in HEK293T cells.

• Addition of 100 ng/ml Neuregulin1 and 100 ng/ml ErbB4 significantly increased γ -secretase activity in HEK293T cells.

• Addition of 100 ng/ml Neuregulin1 and 100 ng/ml ErbB4 significantly increased γ -secretase activity in HEK293T cells.

References

- 1. [Reference 1]
- 2. [Reference 2]
- 3. [Reference 3]



ME085



System Therapy

1. [Text]

2. [Text]

3. [Text]

4. [Text]

5. [Text]

6. [Text]

7. [Text]

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9. [Text]

10. [Text]

11. [Text]

12. [Text]

13. [Text]

14. [Text]

15. [Text]

The Prescription Architect

Component C: Oral Instruction



Additional Functions



The Prescription Architect



- Traditional Prescription: One method of communication
- Prescription Architect Prescription: Three methods of communication
 - Textual
 - Visual
 - Aural

Results

The Prescription Architect A, B, and C are approved for use by all non-profit organizations. After approval, it is available on different devices including 2.0 and 3.0 regional program sets. It includes 2.0 and 3.0 regional program sets. It provides support for additional program sets, and/or customization.

Future Work

Develop additional program sets.

Develop additional program sets.

Develop additional program sets.

Develop additional program sets.

Develop additional program sets.

Develop additional program sets.

Develop additional program sets.

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Develop additional program sets.

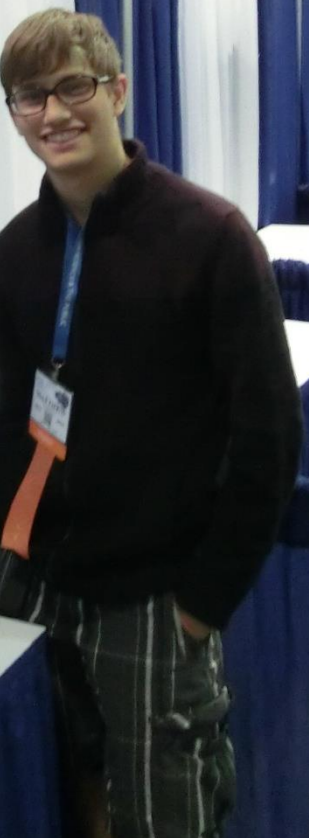
Develop additional program sets.

Develop additional program sets.

Develop additional program sets.

Develop additional program sets.

Develop additional program sets.



027



Goal

Develop a program that identifies and diagnoses abnormalities in 3D mammographic images

Background

Mammography and Breast Cancer

Mammography (M) is the most common breast cancer screening procedure. In the US, 23.5 million women per year receive the test. 1.4 million women are screened.

Breast Cancer (BC)

- 1 in 8 women will be diagnosed in their lifetime.
- 290,000 women are diagnosed per year in the US.
- Responsibility for BC: 80% hereditary and 20% BC.
- Treatment is most effective when cancer is detected early.

3D Mammography

Specification of per pixel: 28-bit color, 8-bit depth, 30-degree Gamma, 10-bit color, 8-bit depth, 30-degree Gamma

Diagnosis of Abnormalities in 3-Dimensional Mammograms via an Artificial Neural Network

Methods

Isolation of Abnormalities (Thresholding Region) → Obtain Feature Vector → Diagnose Abnormality

Isolation Algorithm: Drawing the Intensity Contours

Example Slice from a 3D Mammogram

248 × 000
000 × 000

Diagnosis of Abnormality

Back Propagation Algorithm

Decisions

CS02

Results and Discussion

Conclusions

Future Work

References

EN055



Characterization of Catalytically Active Nanoparticles: Developing a One-Pot Method

Methods

UV-Vis Spectroscopy

UV-Vis Spectroscopy

UV-Vis Spectroscopy

Results and Discussion

UV-Vis Spectroscopy

UV-Vis Spectroscopy

Conclusions and Future Work

UV-Vis Spectroscopy

UV-Vis Spectroscopy

Results and Discussion (Cont'd)

Conclusions and Future Work

UV-Vis Spectroscopy

UV-Vis Spectroscopy

Selected References



ar Silberstein •
Victor Solis •
Mya Steinwehr •
ra Svensson •
un Tanprasert •
isola Tinubu •
hao-Ying Tseng •
un Varshney •
Stephanie Vu •
na Wathugala •
arcin Witkowski •
ng (Tony) Yan •
Theresa Zeisner •
Joshua Zweig •



Andrew Carlson • Tai Hei Chan • Jay Chandar • Adit Chandra • C
iu Yung Chan • Nikita Chernyadev • Justin Cheung • Ria Chhabra • Temu
g • Hannah Coffey • Alexandra Cohen • Barbara Cohen • Army
a • Connor Cougher • Vasilis Courialis • Ya'el Courtney • Ch
anu • Caio Celsa • Soham Daga • Andrea Dahl
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Feltham • Anne
• Vsevolod Fomin
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Bright

— a program of —
**SOCIETY
FOR SCIENCE &
THE PUBLIC**

a Feltham • Anne Feng • Selena Feng • Jordan Fernandez • Achal Fernan
d • Vsevolod Fomin • Darius Ford • Mitchell Fosdick • Hayden Fowler
Gallo • Sarah Galvin • Milan Gambhir • Nimit Gandhi • Daniela G
Katelyn Girouard • Alexandru Glontaru • Julian Glowacz • Minse
Grimmett • Courtney Grinnell • Ezra Grothe • Mackenzie Grubb
/ • Lauren Hall • Maya Hall • John Ham • Farhang Hamad • V
• Joshua Hellerstein • Luke Hellum • Fares Helmy • Shannon
• Yiu Ting Ho • Rush Hoehne • Kate Hogan • J. Holleman
Hwang • Da Weon Hwang • Grace Hwang • Yeongwoo Hwan
Jaison Jain • Mika Jain • Shantanu Jakhete • Muhammad
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yon • Nayla Labban • Jessica Lackas • Clau
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• Andy Lopez • Fabian Lopez Caceres • Mackay • Griffin Macris • Pavel Madaj
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• Chinami Motomatsu • Crystal Moynan • Ekaterina Mozgunova • Erika Mueller • Sh
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nes • Daniel O'Brien • Seth Obritsch • Matthew O'Connell • Hamdi Ozmenekse
• Anouk Otsea • Zhong Liang Ou Yang • Omer Ozbekler • Mira Parker • Ser
• Kristine Park • Matthew Park • Ema Parker • Mirae Parker • Andrea Peters
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• Poniatowski • Qureshi • R



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Introduction

Introduction text describing the project's goals and objectives.

Current Treatments

Current treatments for the condition, including hormone therapy and androgen deprivation therapy.

2. Hypothesis

Hypothesis text explaining the proposed mechanism of action for the new treatment.

Materials and Methods

Materials and methods section detailing the experimental procedures.

Results

Results section presenting the findings of the study.

Conclusion

Conclusion text summarizing the study's outcomes and future directions.

The Role of Long-chain Fatty Synthase 4 (ACSL4) in Androgen Therapy Resistant Prostate Cancer

Hypothesis

Hypothesis text regarding the role of ACSL4 in androgen therapy resistance.

Materials and Methods

Materials and methods section for the ACSL4 study.

Results

Results section for the ACSL4 study.

Conclusion

Conclusion text for the ACSL4 study.



MATTHEW

Finalist

Objective

Develop a program that can effectively convey medication information to patients directly via mobile devices and/or language barrier prevent between prescribers and their patients. Focus: Help program is stand alone (internet independent) so that it can be implemented via private by doctor's computer.

Background

- Medical professionals need to take important prescriptive information to their patients.
- Language and literacy barriers make communicating this information difficult. Medication errors occur 10% to 20% in the United States.
- Identify errors can be as low as 10% in 10% in 10% in 10%.
- Language and literacy barriers in 20% higher incidence rates in 10% patients due to misunderstanding information from forms in 10% 10% 10% 10%.
- Studies with prescribers:
 - People need prescriptive information faster after experiencing with usual health status. 10% 10%.
 - People have difficulty learning from forms. 10%.
- A system with prescribers, intermediaries, and patients could provide the optimal means to convey prescriptive information to all 10% of our population.

Design

The Prescription Assistant: A program developed to help with pharmaceutical information through program representation, visual, interactive, and online assistance.

I. Requirements

- Allow prescribers to create and manage accounts, patient files, and prescriptions.
- Allow additional languages, forms, and pictograms to be easily appended to the program's database.
- Allow prescribers to select culturally sensitive pictograms in addition to generic pictograms.
- Allow for programs to be usable without internet access to disaster relief in low resource areas.

II. Program Use

Prescriber Account Creation, Patient Account Creation, Prescription Information, Patient Use, Patient Use, Patient Use.

III. Conveying Prescription Information

Conveying Prescription Information via A. Verbal Translation, B. Visual Translation, C. Pictogram Translation.

Development of a Multi-Sensory System to Better Relay Pharmacotherapy Information

Component B: Visual Representation

- Visual number pictograms are used in the Prescription Assistant.
- All pictograms used were provided by the International Pharmaceutical Education Group (IPEG) and are designed to be used by medical professionals and patients.
- Pictograms designed to be used by medical professionals and patients.
- High-contrast pictograms designed to be used by medical professionals and patients.
- High-contrast pictograms designed to be used by medical professionals and patients.

Substantially modified pictograms were designed to better convey information to a target population. Figure 4 contains the pictograms of the various icons that help to describe the drug product.

IV. Conveying Prescription Data of Components A & B

Drug Board, Label, Pictogram, Pictogram, Pictogram.

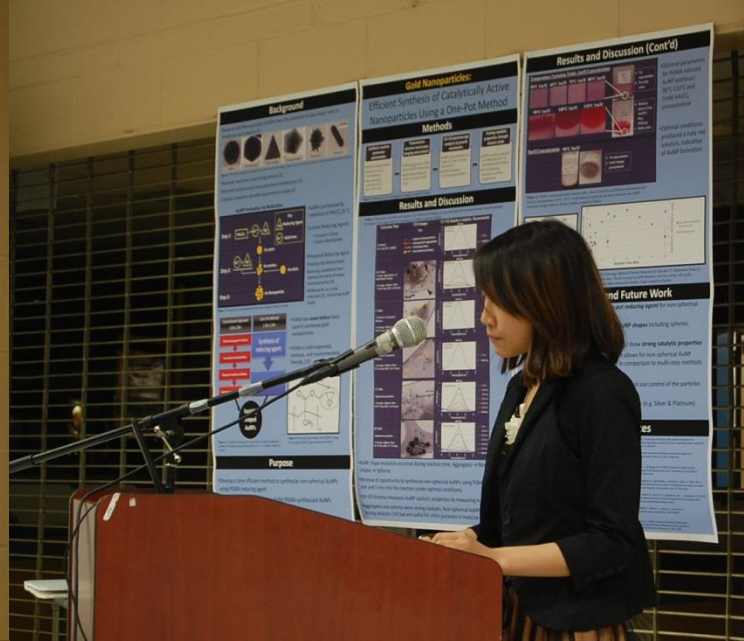


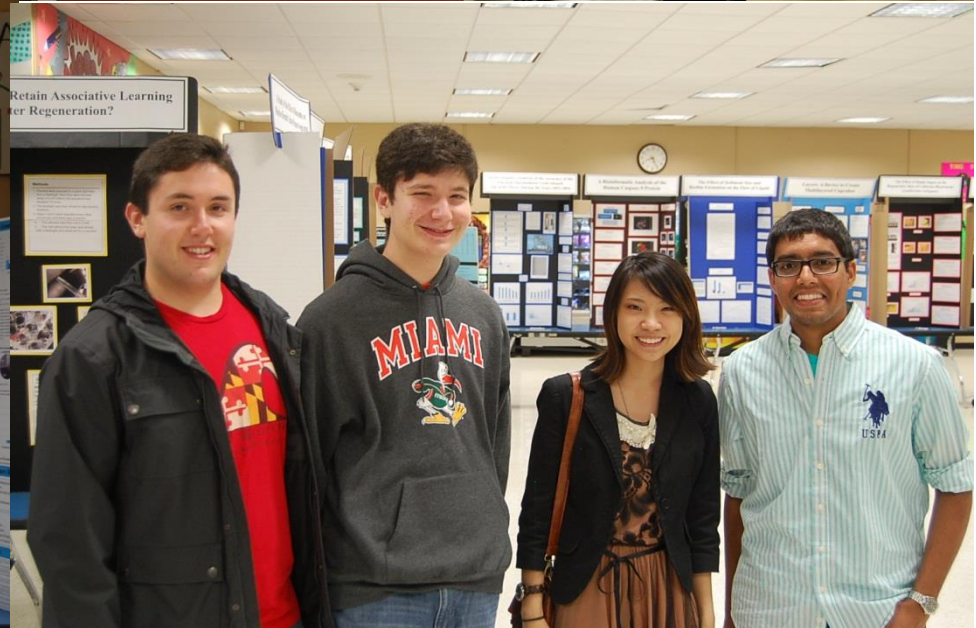
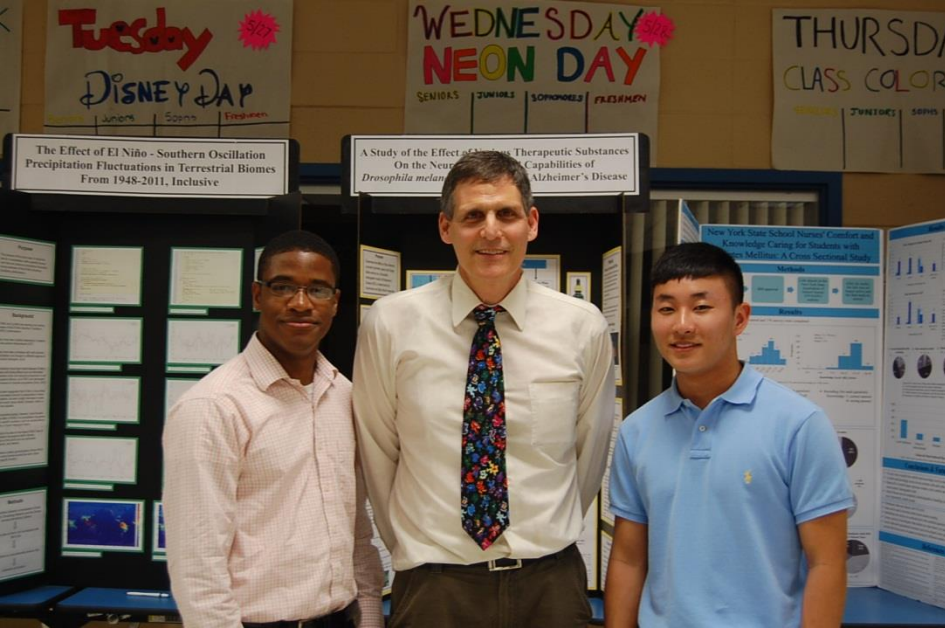


The Future is Bright
Intel ISEF

The image shows a large, light blue banner hanging from a white, geometric truss ceiling. The banner features the Intel ISEF logo on the left, which includes the Intel logo and the text 'ISEF' and 'Intel International Science and Engineering Fair'. To the right of the logo is the slogan 'The Future is Bright' in a large, blue, sans-serif font, with 'Intel ISEF' in a smaller font below it. The banner is decorated with blue circular graphics containing circuit-like patterns. Below the banner, a booth area is visible with a sign that reads 'Domestic Registration'.

Domestic Registration





LE OF THE CLASSES
Gym, May 29 4:30
JUNIORS JUNIORS SOPHOMORES FRESHMEN
20 30 40 10

EXIT

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Transcriptional Regulation of miRNA Expression

Effects of Colored Overlays on Computer Vision Syndrome (CVS): A Comparative Study Through Different Inten

Do Planaria Retain Associative Learning After Regeneration?

