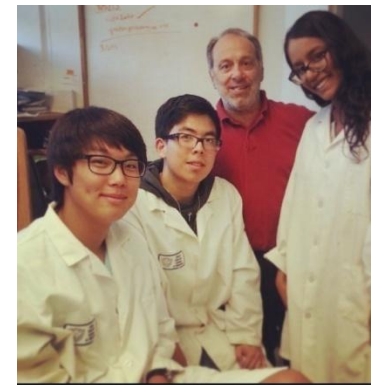


2013 Research Colloquium

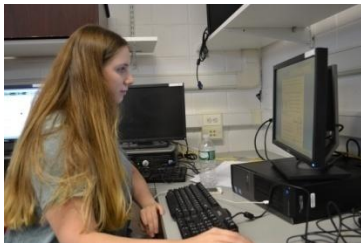
n. pl. **col-lo-qui-ums** or **col-lo-qui-a**

1. An *informal* meeting for the exchange of views.
2. An academic seminar on a broad field of study, usually led by a different lecturer at each meeting.



Tonight's presentation is available on the district share – Science – 2013 Independent research folder

Long Summer Days..... In the lab and during Summer Writing Week (Aug 27-29)



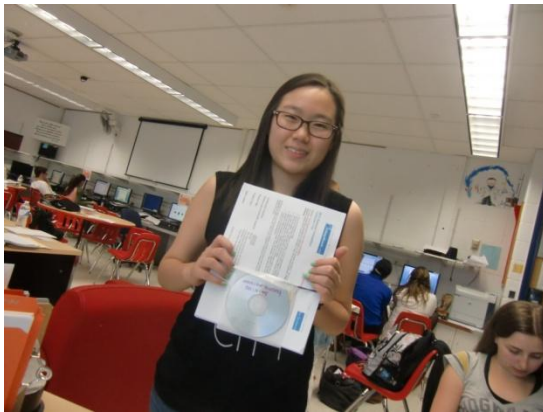
The goal of this evening is...

1. to honor the **efforts and commitment** of our summer researchers
2. to discover the array of **project topics** available to you in the future
3. to explore some of the wonderful **research institutions** that open their doors to students



Siemens Day – September 27

Next Deadline: INTEL STS - November 13



BIOTECHNOLOGY SUMMER CAMP AT STONY BROOK UNIV:

- 4 WEEK RESIDENTIAL RESEARCH PROGRAM OPEN TO NINTH GRADERS
- AMONG THE BEST TRAINING GROUND FOR FUTURE RESEARCHERS

- **Mentor:** Ms. Alexis Blondrage
- **Project:** The Effects of Antibiotics and Stilbenoids on Longevity Related Gene Expression in *C. elegans*
- **Antibiotics:** Rapamycin, Kanamycin
- **Stilbenoids:** Resveratrol, Pterostilbene
- **Goal:** Observe whether the four compounds would inhibit or increase protein production (gene expression) and therefore increase or decrease longevity



Evan Lander, Elizabeth Varghese, Anna Vaynrub

DR. DENIS PROSHLYAKOV AT MICHIGAN STATE UNIV. (HIGH SCHOOL HONORS SCIENCE PROGRAM)

9th: DuPont *Red Blood Cells Going Green*

9th Summer: Biotechnology Program at SBU
Vegetable-Oil Biodiesel Synthesis and Testing

10th: *Microbial Fuel Cells to Generate Electricity*

10th Summer/11th: *Cellulose Nanowhiskers:
Hydrolysis and Incorporation in Epoxidized
Polymers* – Dr. Gross

11th Summer/12th: *Evaluation of Novel
Polyacrylamide Gel for Studies on Biological Redox
Reactions* – HSHSP

Evaluation of Novel Polyacrylamide Gel for Studies on Biological Redox Reactions

- In my **electrochemistry** project, I developed a production protocol to synthesize **Agarose** and **Polyacrylamide** gels that are strong, flexible, electrically **conductive**, and ion-mobilizing.
- Once optimized, these materials can be used in electrochemical cells to study **dysfunction** of the **mitochondrial electron transport chain**, which is linked to diseases like Alzheimer's, Parkinson's, autism, and diabetes.



Reva Butensky: Senior

IN-HOUSE RESEARCH: MRS. O'DONNELL

9th Grade: DuPont Challenge: “How to Weigh a Star a Trillion Miles Away?”

10th Grade: 2013 Siemens We Can Change the World “Quantifying the Amount of Black Carbon Emitted by Home Oil Burners.

11th Grade: Toshiba Exploravision: Mosquito Population Control to Reduce Cases of West Nile Virus”

Geological and Climate change in the Western United States using Google Earth

In our project we used Google Earth as a measurement tool to determine if relationships exist between climate change, plate shifting and glacial recession.

Once the statistical correlations were calculated, we determined that the relationship between glacial recession and fault line changes are not correlated to warming of the environment.



Sara Naqui (11) Susan Huang (11) Connor Musick (12)

DR. RUSSELL BURKE AT HOFSTRA UNIVERSITY



9th - Coral Reefs: A Metropolis in Trouble

10th - Blew is the New Green

11th - Using Infrared Light to Create Shields Against Mosquitoes

Host Preferences of Wild Northern and Southern *Ixodes scapularis*

Both northern and southern ticks prefer feeding off of reptiles instead of mammals.

- In my behavioral biology project, I tested whether ticks exhibited preferences in hosts.
- This research will help to determine why Lyme disease is so much more common in northern states than southern.



Hannah Stewart



IN-HOUSE RESEARCH: MRS. O'DONNELL

9th grade: Germs: The New Fingerprints

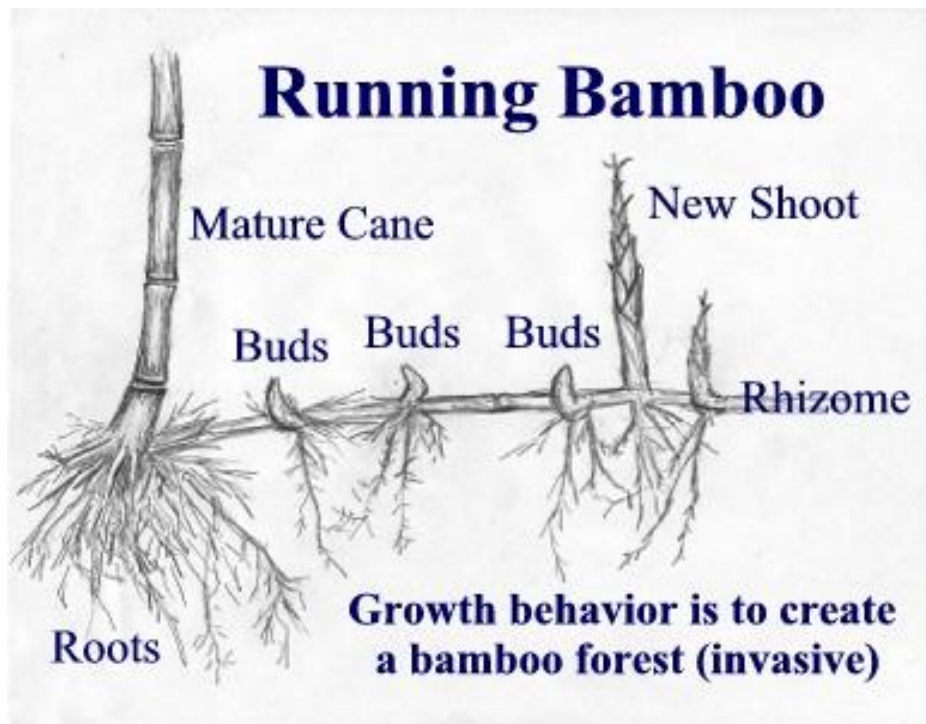
Biotechnology Program at Stony Brook

10th grade: Operation Triple R

11th grade: Extinction of West Nile Virus Using a Mimic Virus Genome

Invasive Species *Phyllostachys aureosulcata*: Inhibition and Alternative Uses

- In my botany project, I determined which solution (acid, base, or saline) could best inhibit the spread of the invasive species of bamboo. My partner and I also manipulated components of the bamboo for alternative purposes (bamboo paper).
- Once determined, the saline solution (best inhibitor) can contain the spread of the rapidly growing, *Phyllostachys aureosulcata*. Also, we were able to prove that the excessive bamboo can be used for alternative purposes, such as making durable and writeable paper.



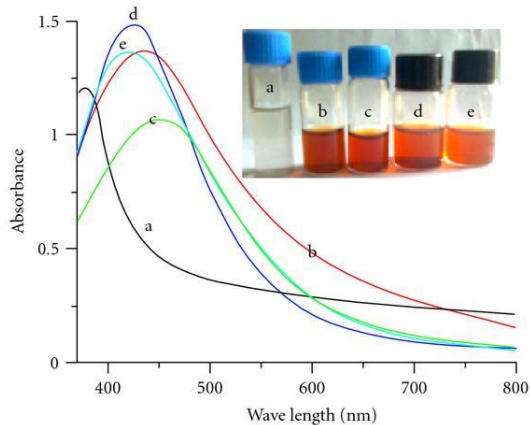
Rachel Mahadeo (12) and Matthew Fernbach (10)

DR. GUOFANG CHEN AT ST. JOHNS UNIVERSITY (QUEENS)

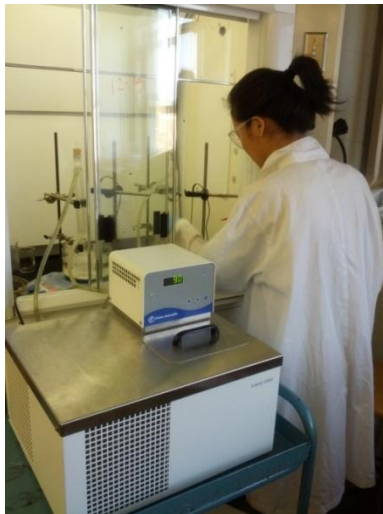
Novel Synthesis of Silver PGMA Nanocomposites

10th Grade- NYU Poly, biochemistry

11th Grade- St Johns University, nanoscience



- In my **nanoscience** project I developed a novel method of creating **nanocomposites** composed of the polymer **PGMA** and **silver** nanoparticles without an additional **reducing agent**.
- These nanoparticles are applicable in **antibacterial**, catalytic, or drug delivery uses.



Alma Wang- 12th Grade

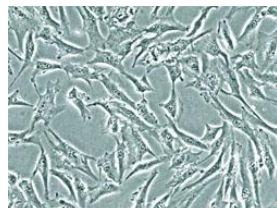
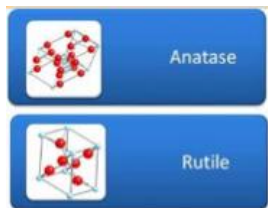
THE EFFECT OF TITANIUM DIOXIDE NANOPARTICLE EXPOSURE ON CELLULAR MIGRATION, PROLIFERATION, MORPHOLOGY, & COLLAGEN CONTRACTION IN ADIPOSE-DERIVED STEM CELLS

Question: How does TiO_2 affect the viability, cell morphology and migration of adipose derived stem cells and how will we measure these properties ?

Background

For this experiment, we utilized two types of TiO_2 : **Anatase and rutile** (which vary only in their crystalline structure)

These nanoparticles can be found in: toothpastes, sunscreens and cosmetic creams and are used in medical applications.

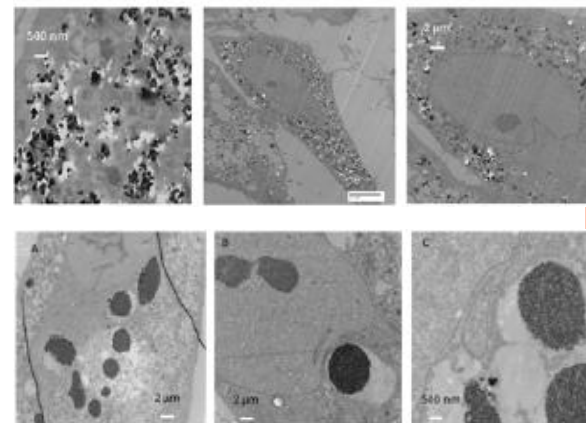


Adipose derived stem cells (ASCs) are found in the subcutaneous layer of the skin. These cells are vulnerable to the toxic effects of nanoparticles



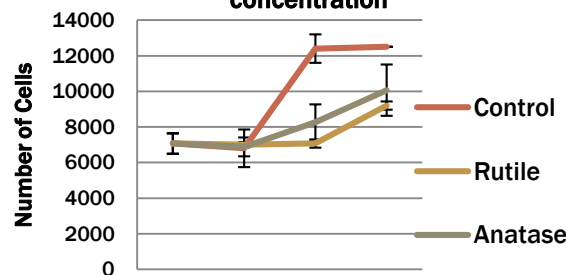
Nicolette Almer, Kimia Ziadkhanpour, POB JFK HS
Tatsiana Mironava, Miriam Raffailovich, Marcia Simon,
Stony Brook University

TEM Images

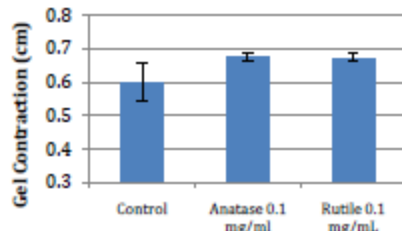


6 Day Growth Curve of ASCs

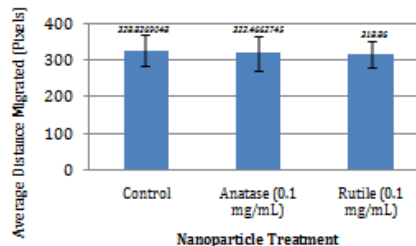
ASCs Growth Curve: 0.05 mg/mL concentration



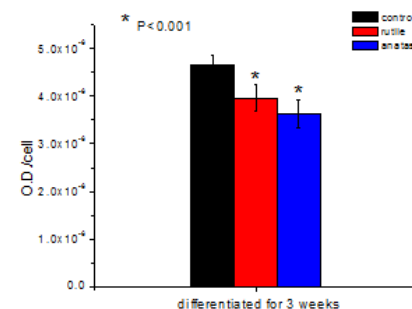
Collagen Contraction in ASCs



Cell Migration in ASCs



Lipid Accumulation



ASCs were tested for lipid accumulation, using Oil Red O Staining. Anatase was most detrimental to the differentiation of cells.



KAIE OJAMAA AT THE FEINSTEIN INSTITUTE FOR MEDICAL RESEARCH

The Cardio-protective Role of Natural Plant-Derived Compounds

9th gr. - “A Heart of Gold [Nanowires]”

10th gr. – Siemens WCCW “Increasing the R.A.T.E. of Photosynthesis: Reducing Acidification in The Environment”

North Shore LIJ Medical Marvels Competition

Summer 2013: Visiting Scholar at the Feinstein Institute for Medical Research

- In my molecular biology project, I discovered a potential protective role for both novel and known herbal extracts in pretreatment for cardiac cells suffering from ischemic heart disease.
- These compounds are showing promise of someday rescuing cardiac cells after ischemic injury by **reviving cellular survival pathways**—the extracts may ultimately be able to supplement or even replace drugs that in large quantities, take a toll on our liver and kidneys.



Roshni Sethi: Junior

ROSWELL PARK CANCER INSTITUTE

DR. DHYAN CHANDRA

Roswell Park Summer Research Program, Buffalo NY

The Effects of Dichloroacetic Acid (DCA) and Etoposide on the Apoptotic Pathway in Lung Cancer Cells



I tested a combination of the commonly prescribed chemotherapeutic drug etoposide and a new synthetic compound (DCA) on lung cancer cell lines. I measured apoptotic activity via protein and caspase assays.



Brian Coakley

DR. ALAN ALFIERI AND DR. GUHA

ALBERT EINSTEIN COLLEGE OF MEDICINE AND MONTEFIORE HOSPITAL

9th gr. - National DuPont Challenge

10th gr. – Siemens We Can Change the World Competition, Google Science Fair and Intel

11th gr. And 12th gr. - Siemens Competition in Math, Science, and Technology and Intel



Dept of Radiation Oncology

Megha Majumder, Joon Lee, and
Chris Li: SENIORS!!! 😊

Cerium Oxide Nanoparticles as Radiosensitizing and Radioprotecting Agents for Prostate Carcinoma and Surrounding Tissue

- We discovered a novel method to protect the normal tissues that are harmed when radiation therapy is administered (for prostate cancer).
- We hypothesized a rare Earth metal, cerium, could act as a radio-sensitizer in mice that had prostate cancer, and a radio-protectant in the normal mice, if we made the metal small enough to be able to penetrate the cell membrane.
- By engineering, then administering the nanoparticles to the cancerous and non-cancerous cells, followed by an administration of 4 Gy radiation, we determined whether or not the nanoparticles could initiate the apoptotic mechanisms within the cancerous cells by inducing reactive oxygen species (ROS) activity.
- The nanoparticles did protect the normal cells, and they did induce antioxidant defense enzymes like superoxide dismutase 2 (SOD-2) and CuZnSOD that act as free-radical scavengers.
- Our nanoparticles' abilities are extremely promising in the field of radiation oncology and many studies should be done in order to implement these NPs into a clinical scene.



OMAR GOULD, BROOKHAVEN NATIONAL LABORATORY (HIGH SCHOOL RESEARCH PROGRAM)

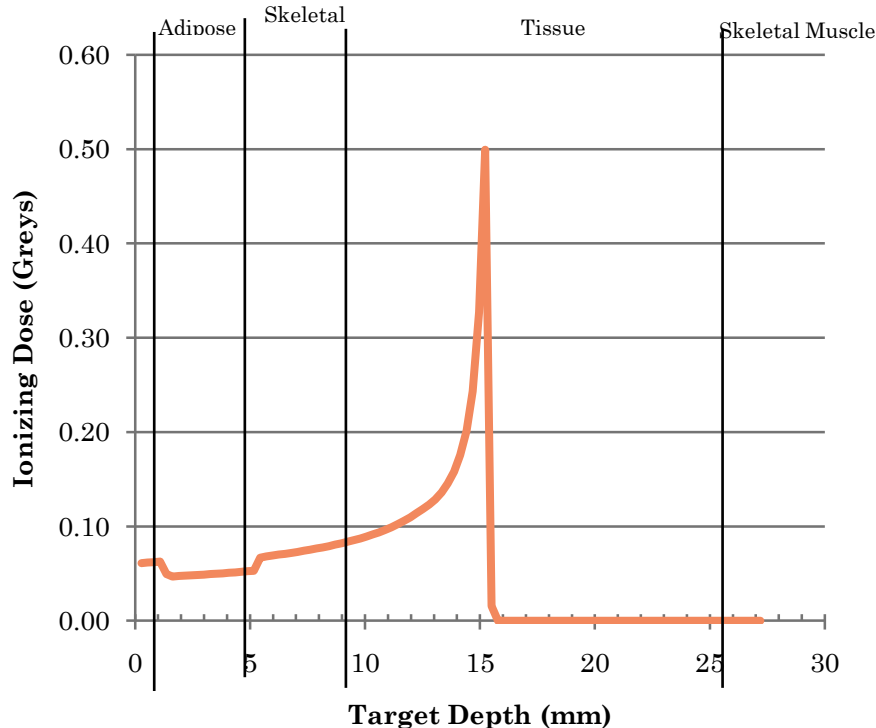
Carbon Radiotherapy and its Effect on the Human Body

10th – Generating Electricity by way of Microbial Fuel Cell

Isolation of Chlamydomonas Reinhardtii Mutants with Low Oil

11th – Infrared Technology Generates Light Shield Against Mosquitoes

Carbon Radiation Dose from Ionization



In my study I analyzed SRIM (Stopping and Range of Ions in Matter) simulations to compare the efficiency of Carbon and Proton radiotherapy.

This research has the potential to develop a highly efficient, yet aggressive Carbon Particle Accelerator that will aid in the treatment of late stage cancers.

Elana Laster

IN-HOUSE SUMMMER PROJECT

MRS. O'DONNELL



Divya John

2011 DuPont Title "Shining Light on Stem Cell Development"

2012 Novel Application of Cellulose Nanowhiskers as Emulsifying Agents- NYU-POLY Biocatalysis and Bioprocessing Lab

Aditi Mohapatra

2012 Dupont Title "Edible MOFs May Help Solve an Environmental Issue"

2013 Siemens We Can Change the World Finalist "Getting to the Coir of Hypoxia"

Madalyn Fernbach

2012 Dupont Title: "When Good Genes Go Bad, Tumor Suppressor Genes, Hero or Villain?"

10th Grade Medical Marvels Second Place "Stop The Outbreak of Pneumococcal Meningitis"

2013 Siemens We Can Change the World Finalist "Making Paper While Preventing Deforestation"



The Effects of Light Pollution on *Vanessa cardui*

- In our environmental science project, we studied the possible effect of light pollution using a survey and an experiment observing *Vanessa Cardui* behavior patterns.
- Our results showed that excess lighting has a negative effect on behavior. It is important to understand this as technology develops and the use of electrical lighting in the world increases.



Divya John (12), Madalyn Fernbach (11), Aditi Mohapatra (11)

DR. CHARLES LIU AT THE AMERICAN MUSEUM OF NATURAL HISTORY - NYC

9th- **A Quilt of The Senses as an Interwoven Reality**

10th - **Simple, Inexpensive Methods of Reducing the Carbon Footprint of Automobiles**

11th - **Preparation of Silver Nanoplates and their Various Sizes**
-St. John's University



Department of Astrophysics

12th Grade: An Exploration into QSO's in the Green Valley

- In my **astrophysics** project I attempted to determine the role of **active galactic nucleus (AGN)** in the evolution of Quasi-stellar objects (**QSO's**) through star formation rate by examining spectra, and images of galaxies with AGN.

Alexander Resnick: Senior

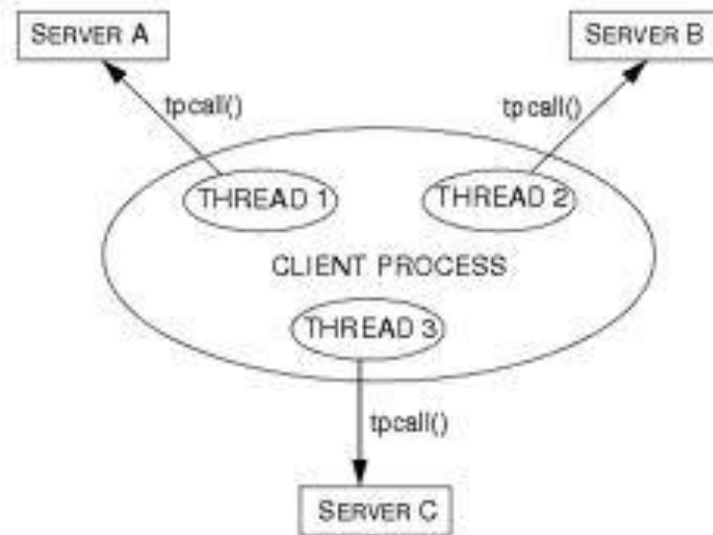
PROFESSOR JUNFENG YANG, COLUMBIA UNIVERSITY



Multi-Threading in Optimizing Network Computing

- Associate Professor & Co-director

Software Systems Lab
Department of Computer Science
Columbia University



Mustafa Ansari: senior

WITH THANKS AND GRATITUDE TO...

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Mary Lou O'Donnell – Research Coordinator
Francine Moustakalis – Research Teacher

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Mike LaMattina, Head Custodian

.... most especially the independence
and cooperation of tonight's
presenters

