Student Research Opportunities

School of Science, Engineering and Health

Roseann K. Sachs, Ph.D.

Department of Chemistry and Biochemistry

MESSIAH UNIVERSITY

Six Academic Departments within SEH

- Biological Sciences
- Chemistry and Biochemistry
- Computing, Mathematics and Physics
- Health, Nutrition and Exercise Science
- Engineering
- Nursing

Faculty of these departments routinely engage in research projects/programs that are *intended* to involve student collaborators.

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Research in the Natural and Physical Sciences at Messiah University

- Experience ***how*** science is done.
- Develop critical thinking, planning, reflection, technical skills and patience.
- Integrate material across disciplines to solve problems
- Discern potential career paths
- Student-faculty collaborations provide material for strong letters of recommendation (graduate school, medical school, or employment)

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Research as Part of the Curriculum at Messiah University

- Academic year credit for individual projects
- College honors projects
- Paid, on campus opportunities in the summer
- Advising and letters of recommendation for students seeking to pursue research at major research universities over the summer

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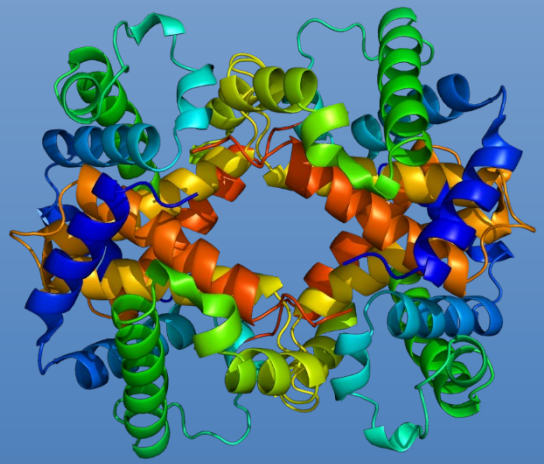
Designed Heme *c* Binding Proteins



Catalysis

O_2 Transport

Hydrogen Production

Dr. Jesse Kleingardner, Biochemistry

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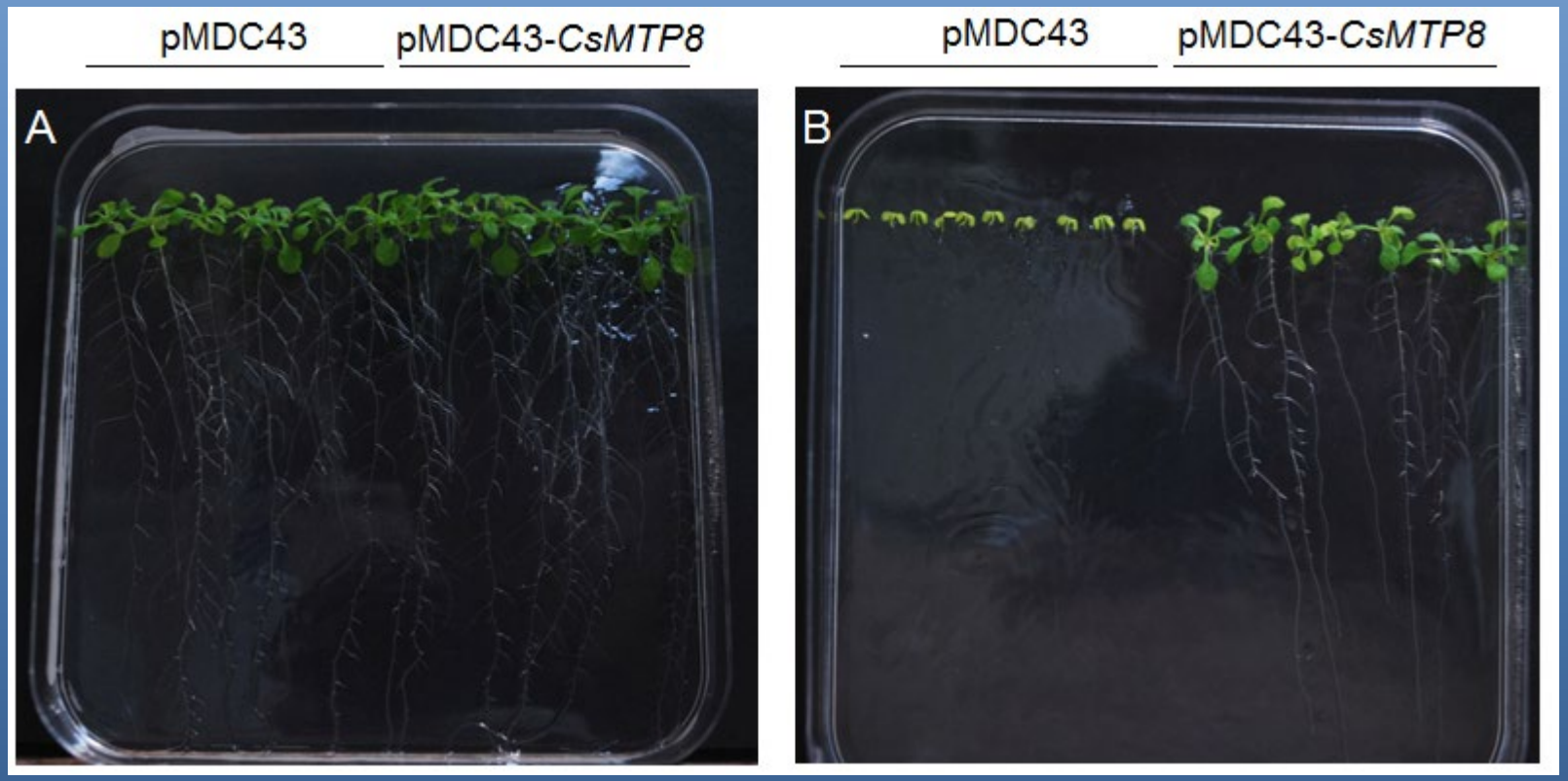
Designing plants to remediate heavy metals from soil



Dr. Michael Shin, Biology

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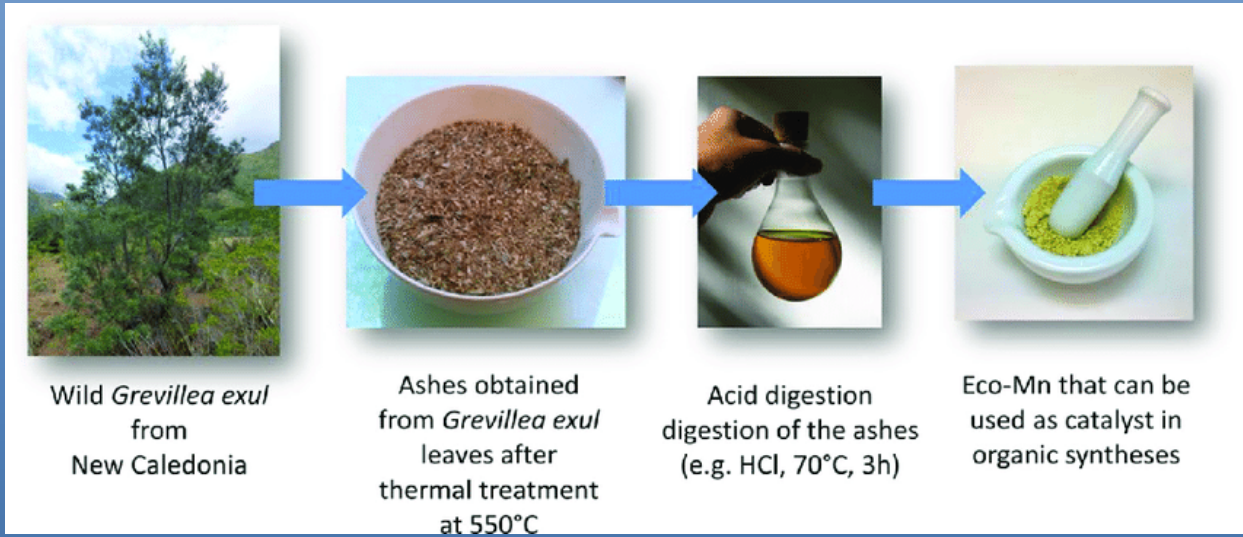
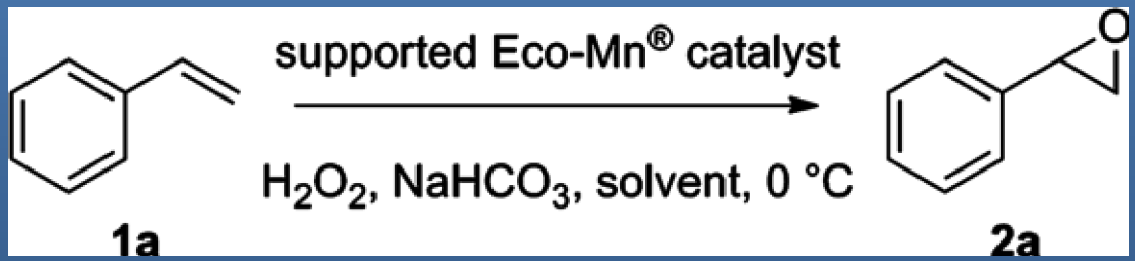
Ecocatalysis Using Heavy Metals Recovered by Phytoremediation





Dr. Roseann K. Sachs, Chemistry

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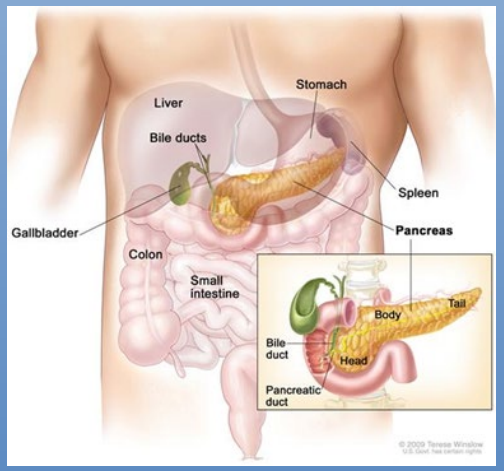
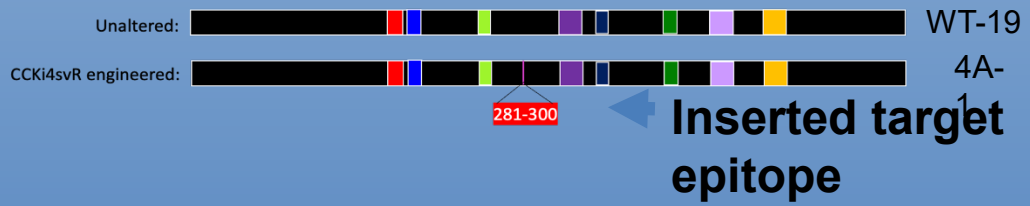
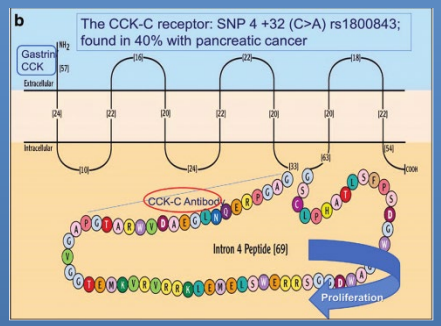
T cells: "Tumor Cell Vaccine" to fight pancreatic cancer

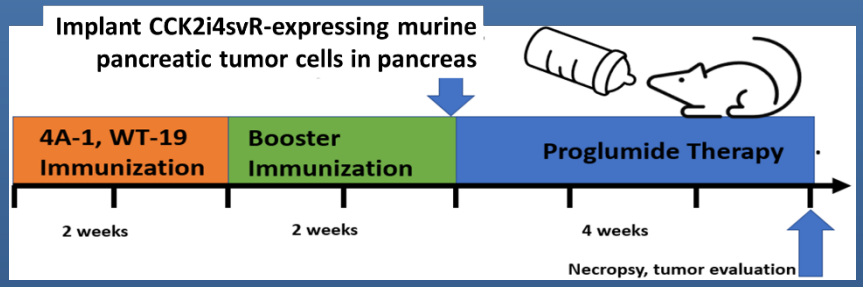


Control or engineered SV40 T antigen protein genes





- Weakly immunogenic epitope target from pancreatic cancer engineered into highly immunogenic oncoprotein (**SV40 T ag**)
- Tumors absent or very small in vaccine group!



Dr. Larry Mylin, Biology

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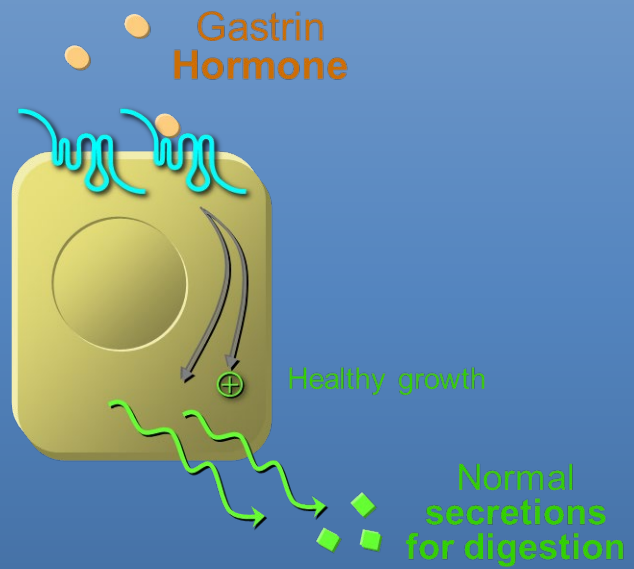
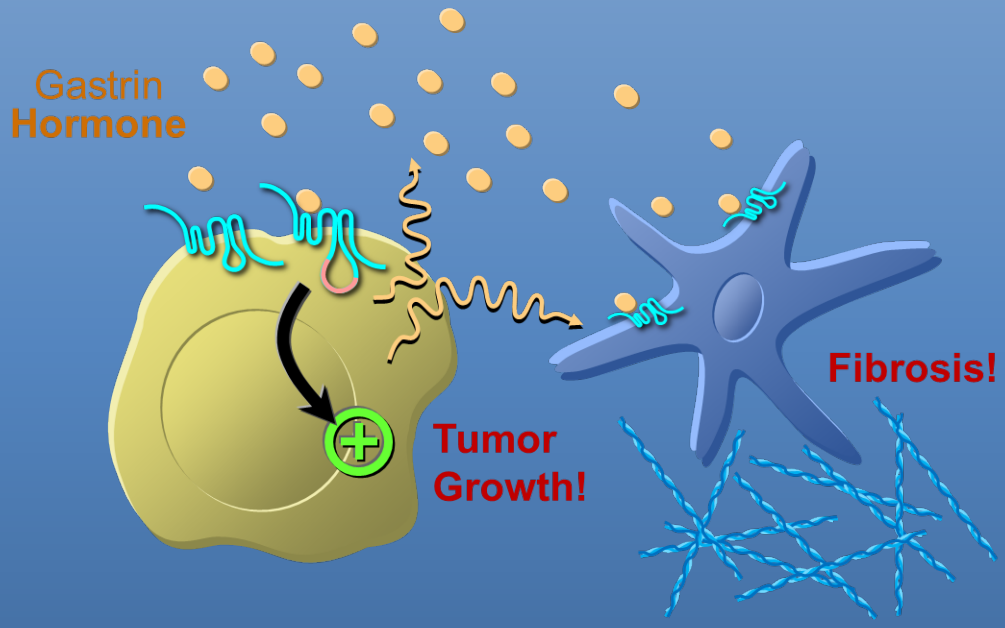
How hormone signaling drives Pancreatic Cancer Aggressiveness



Normal Pancreas



Pancreatic Cancer

Fibrous "scar tissue" collapses 75% of the blood vessels & **blocks chemotherapy**!

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Dr. John Harms, Biology

Flax in Pennsylvania

Flax as a functional food to prevent chronic diseases

- Flax variety trials in the field
- Flax hybrids in the greenhouse

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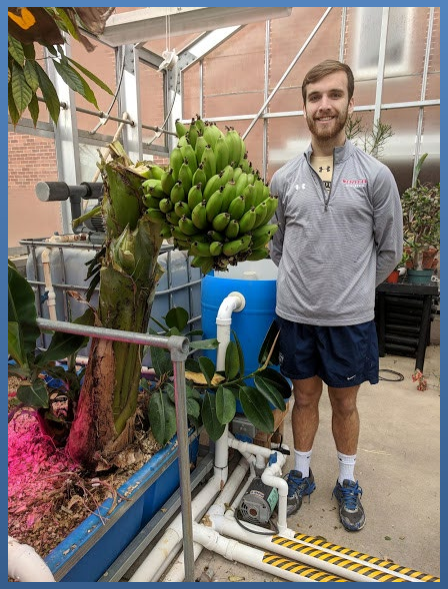
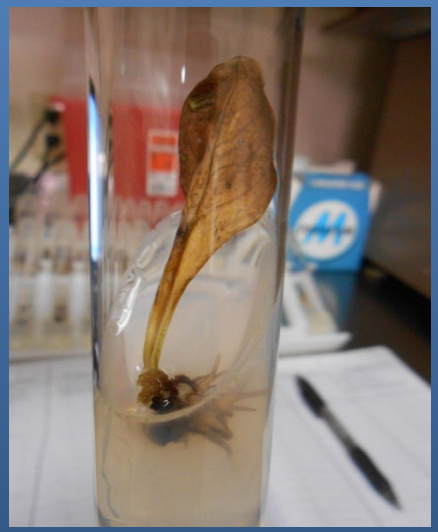
Dr. Janet Matanguihan

Aquaponics

- Optimization of aerobic fish waste digester for nitrate; fulvic acids
- Optimal fruit set
- Wide variety of plants



Native Plant Propagation



Dr. David Foster, Biology

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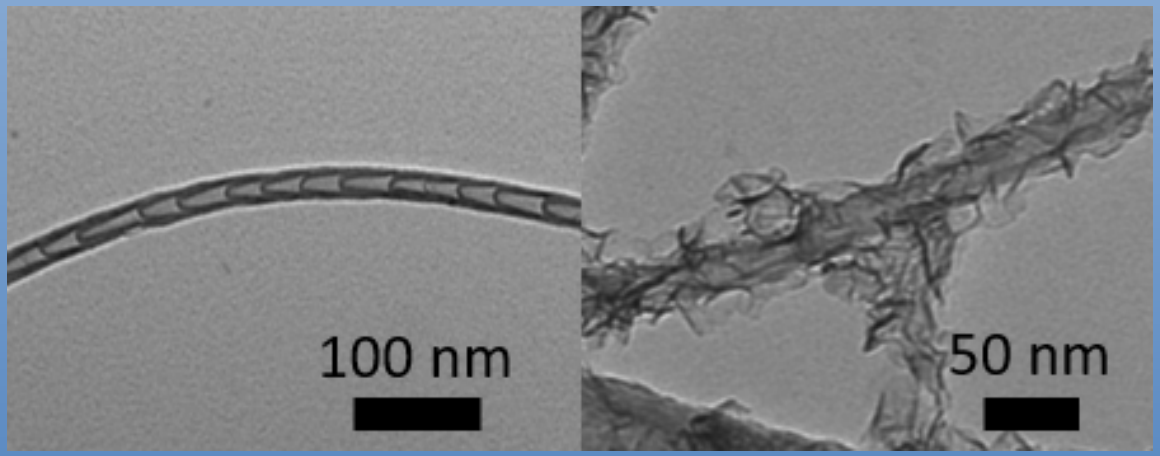
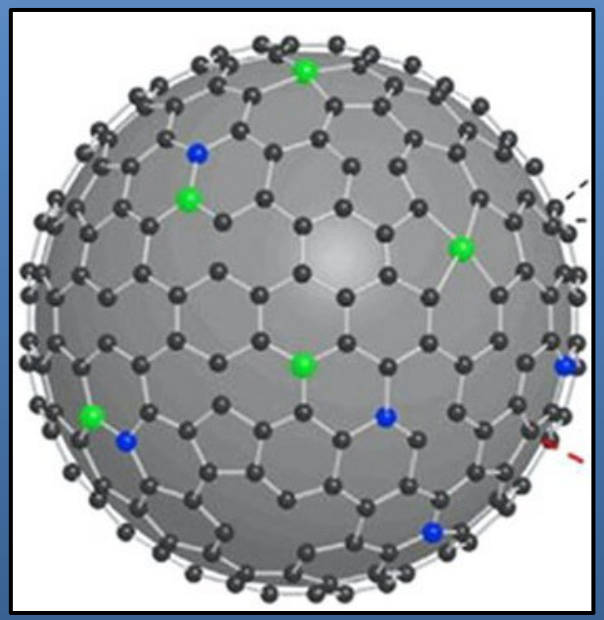
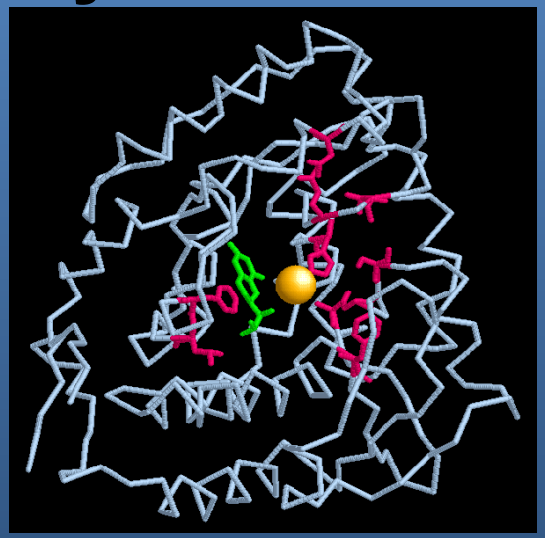
Carbon Nanomaterials as Electrocatalysts





Single Atom Catalysts as Enzymatic Mimics



Dr. Seth Burkert, Chemistry

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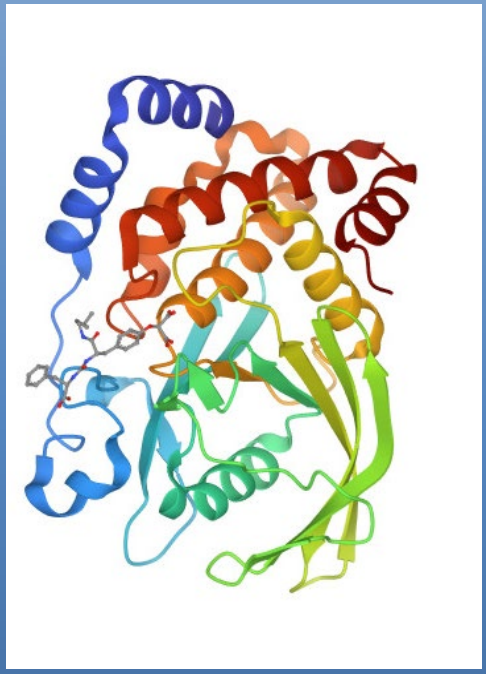
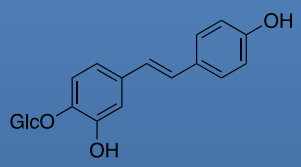
Design and Synthesis of Inhibitors of Protein Phosphatases

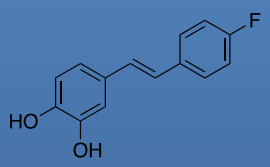
- Protein Tyrosine Phosphatase 1B
- Overexpression results in a variety of medical conditions such as type 2 diabetes and obesity
- Inhibitor can decrease this activity



Stilbene skeleton

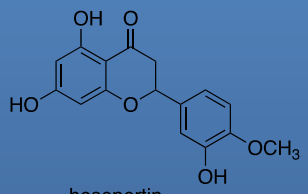


polydatin



compound ST3

Flavone skeleton



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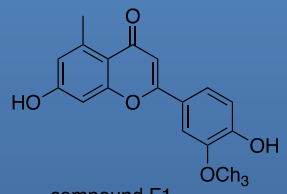
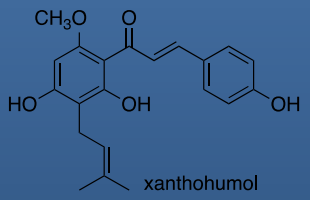
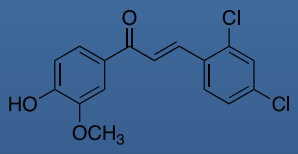


compound F1

Chalcone skeleton





Dr. Anne Reeve, Chemistry

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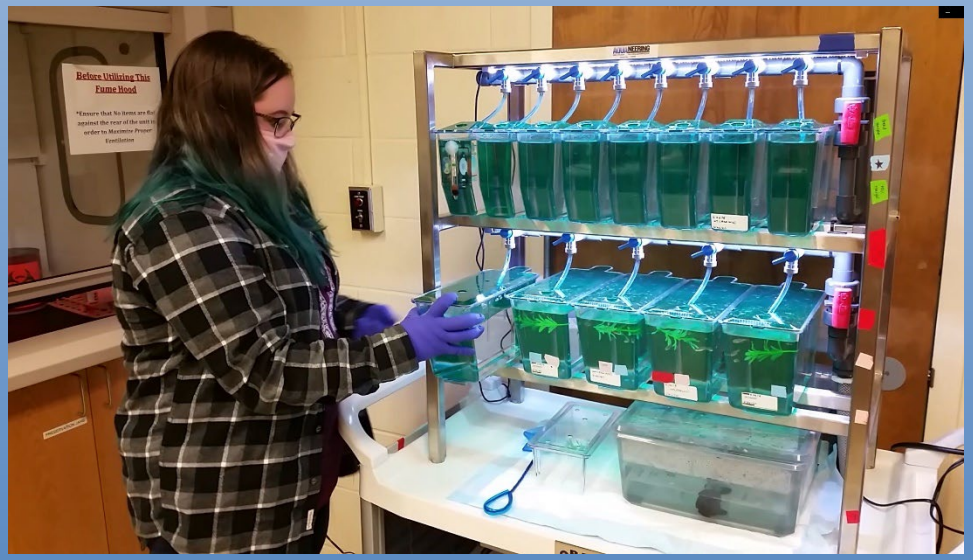
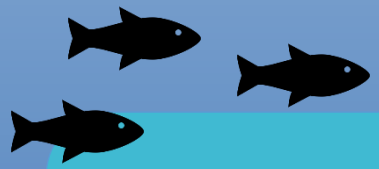
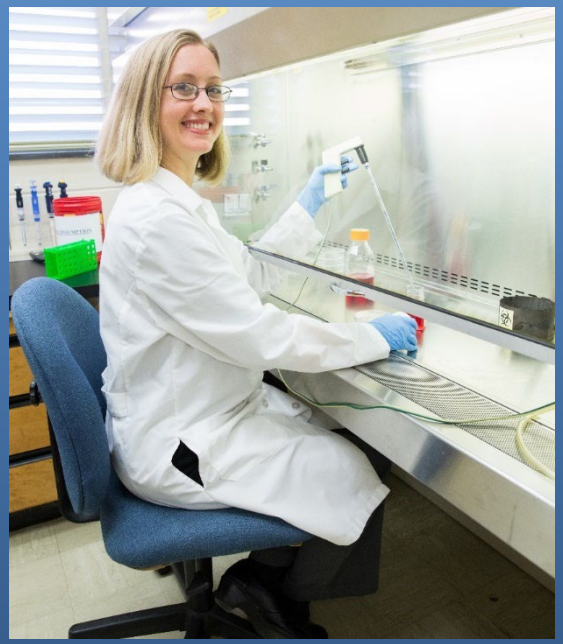
Glial Biology and Development





Research models:

Zebrafish
Cell Culture



- Oligodendrocyte development
- Cell signaling pathways that promote remyelination after injury

Dr. Jennifer Ness-Myers, Biology

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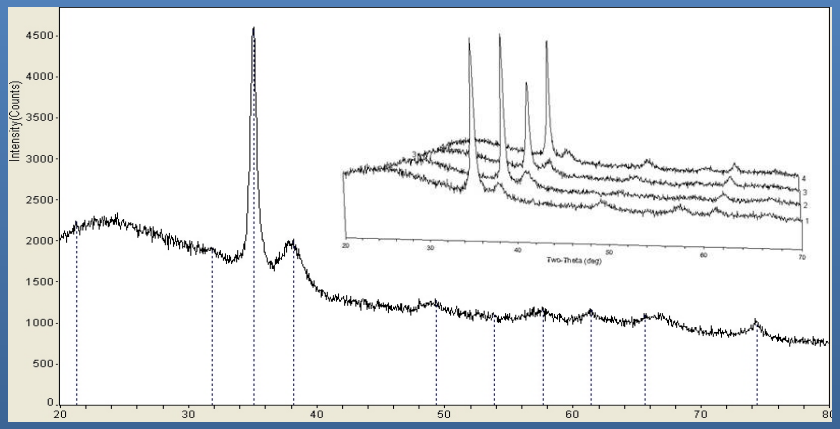
The Synthesis and Characterization of Minerals and Analogs

Double-jet Reactor



Glow-Discharge Plasma as a Synthetic Method for Inorganic Materials

Dr. Richard Schaeffer, Chemistry

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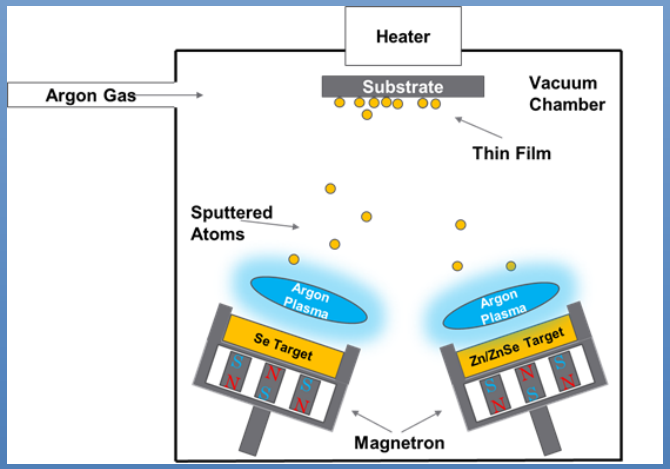
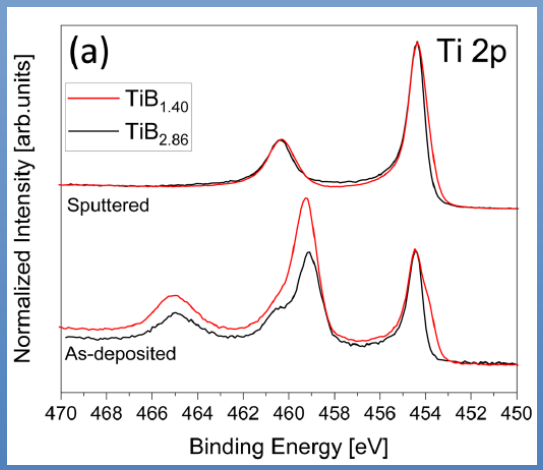
Vacuum deposition of thin films and their characterization





Dr. Niklas Hellgren, Physics

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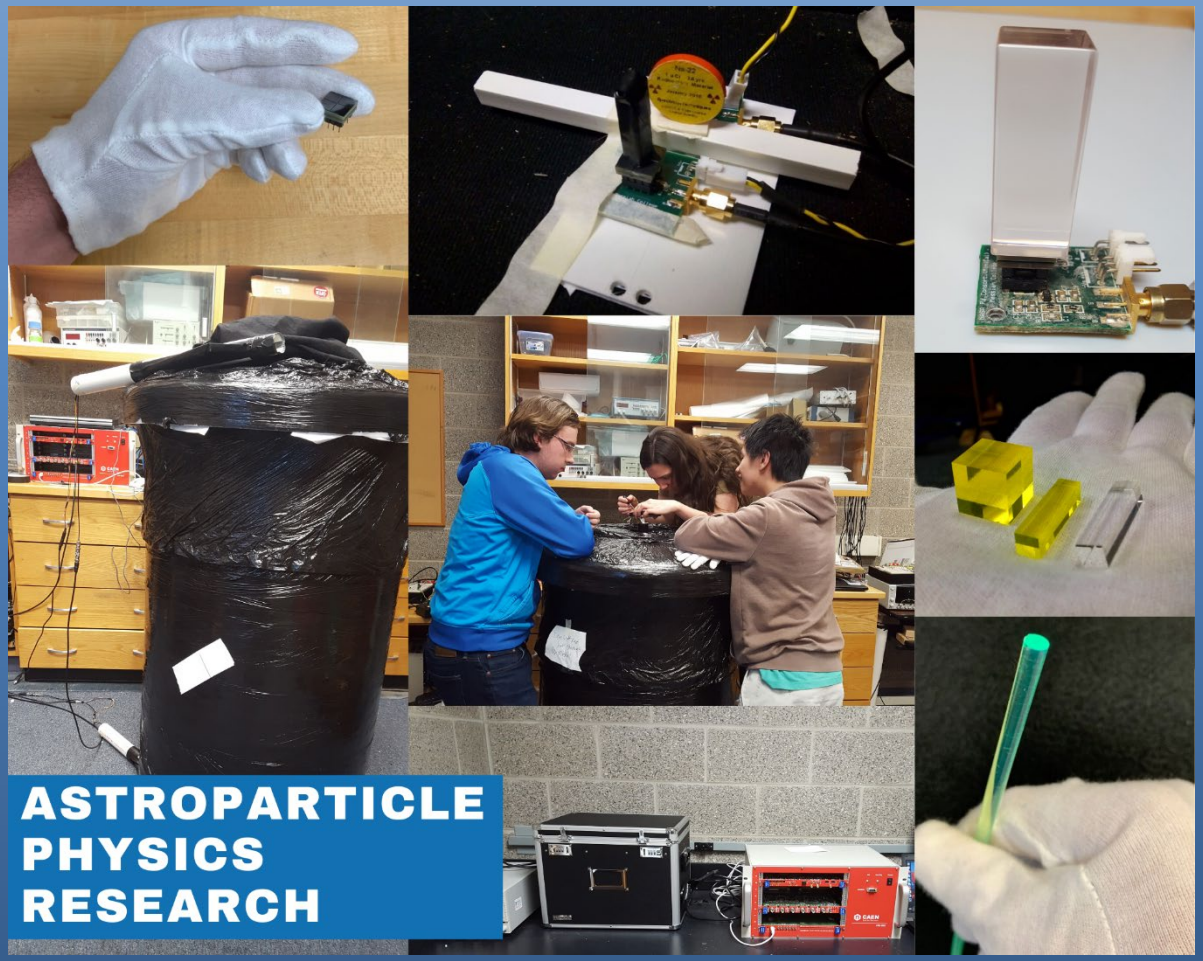
Astroparticle Physics Research



1. What is the nature of the Dark Matter? What particle is it?

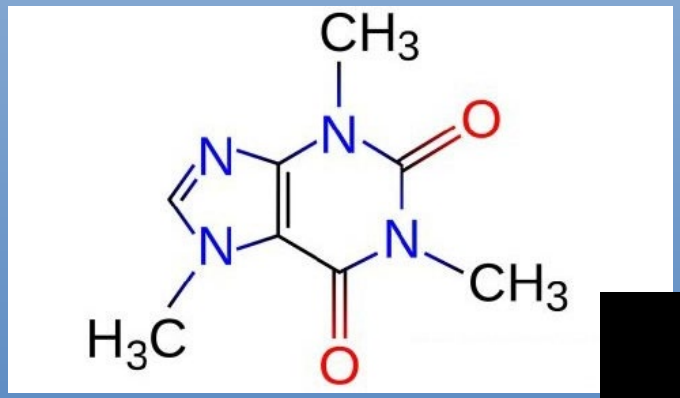
Two experiments at Messiah University:

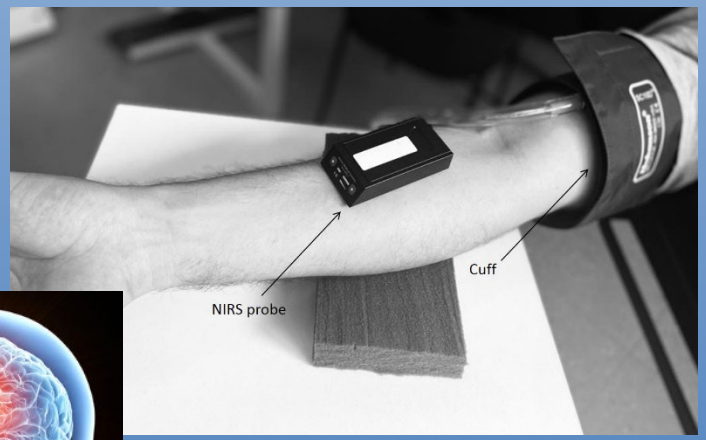
- URIDA experiment (dark photon search)
- SNIPE-HUNT experiment (axion search)

2. What processes in the universe drive the highest energy cosmic and gamma rays?

Dr. Abaz Kryemadhi, Physics

Nutrition and athletic performance





Dr. H. Scott Kieffer, Exercise Science

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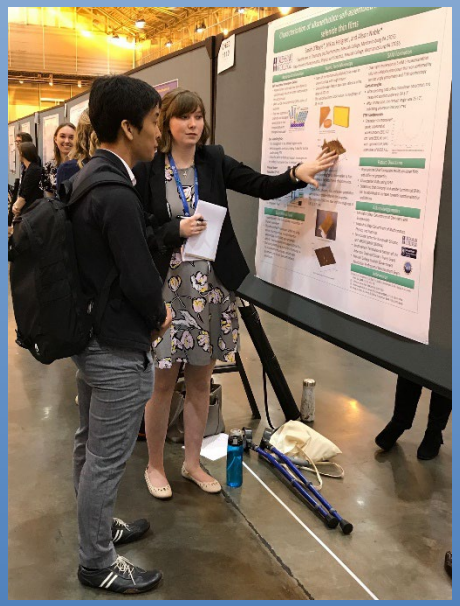
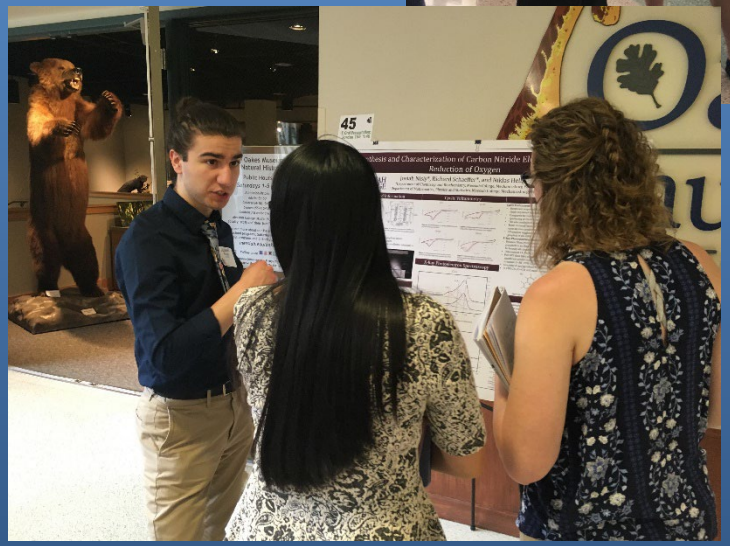
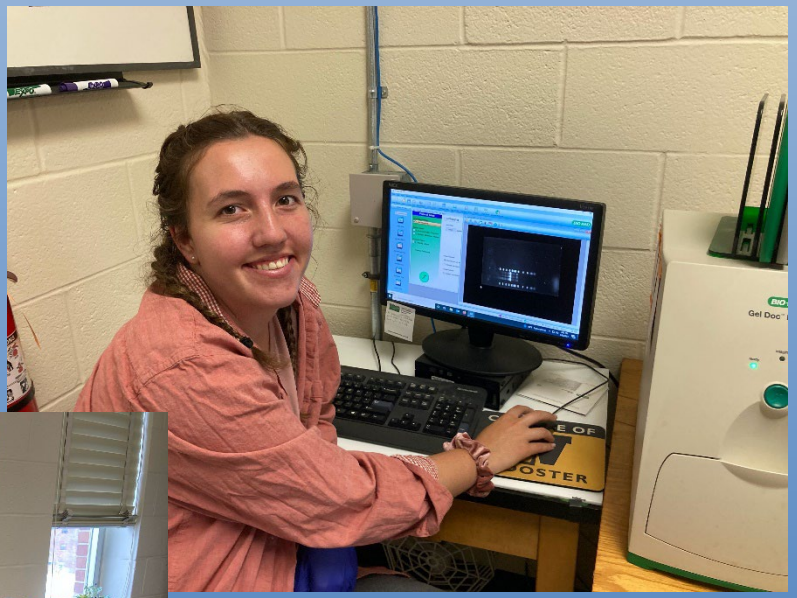
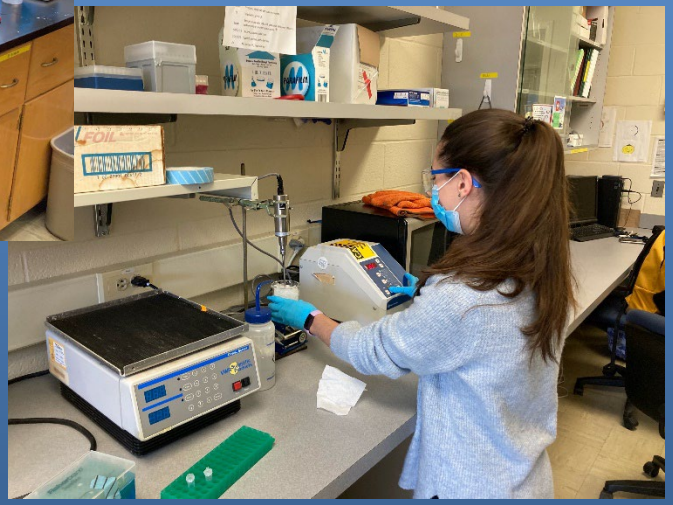
Research Presentations









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