

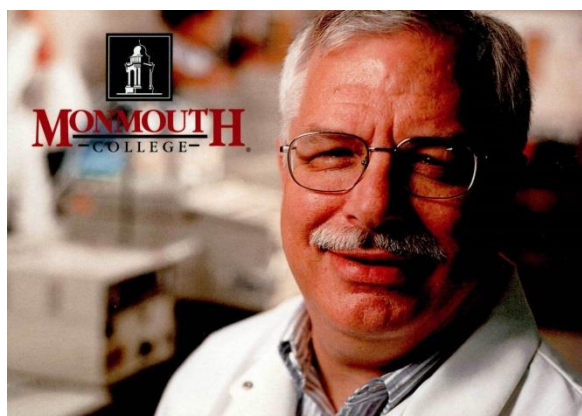
Doc Kieft Summer 2015 Research Program
Undergraduate Research Talks

July 17, 2015

Pattee Auditorium

Monmouth College

8:45am-2:10pm



Mohanad Ahmad (MC '17) – Chemistry Major – Moore Lab

Antonetta Axup (MC '18) – Biochemistry Major – Sostarecz Lab

Kayla Cherry (MC '16) – Chemistry Major – Moore Lab

Khdr Eskander (MC '17) – Biochemistry Major – Moore/Sostarecz Lab

Yejun Park (MC '17) – Biochemistry Major – Moore/Sostarecz Lab

Ahmad “Matt” Pauzi (MC '16) – Chemistry Major – Sturgeon Lab

Ian Salveson (MC '17) – Chemistry Major – Sturgeon Lab

Al Walker (MC '18) – Biochemistry Major – Sturgeon Lab

Ashley Winters (MC '18) – Biochemistry Major – Moore Lab

Brandi Yoder (MC '18) – Biochemistry Major – Sostarecz Lab

Schedule of Events

8:45am-9:00am – Talk Setup - Refreshments

9:00am-12:00pm – Morning Session of Talks *There will be 5 minutes between talks for questions

9:05am-9:15am – **Brandi Yoder**

“Introduction to the Langmuir Monolayer Technique”

The Langmuir Monolayer Technique is used to simulate a cell membrane. Langmuir monolayers demonstrate cohesion and molecular interactions. These interactions can be observed through compression isotherms that depict surface pressure as a function of molecular area, and analyzed through compression modulus.

9:20am-9:30am – **Antonetta Axup and Yejun Park**

“The Extent to which Temperature and Compression Rate Affect the Organization of Molecules at the Air/Water Interface”

The interactions of molecules at an air/water interface differ depending on experimental conditions. This aids the use of Langmuir Monolayers as model membrane systems.

9:35am-9:45am – **Yejun Park**

“A Model System to Investigate if Furfural Affects Bacterial Growth?”

In this research, *E.coli* lipid extract was used as a model Gram-negative bacterial membrane to investigate the antibacterial properties of furfural. Furfural was mixed in subphases with different concentrations.

9:50am-10:00am – **Antonetta Axup**

“Essential Oils: Is it all hype or do they work as antibacterial agents?”

Using the Langmuir Monolayer technique, the interactions between *E. coli* lipid extract and sweet orange oil were investigated to determine the possibility of essential oils being used in future medicinal applications.

10:05am-10:15am – **Brandi Yoder**

“Designing a Model Cell Membrane to Investigate the Absorption of Nanoparticles in our Skin” and “Fabrication of Langmuir-Blodgett Films for Atomic Force Microscopy Analysis”

Part 1: The cosmetic industry has developed products that utilize particles on the nanoscale for their increased solubility, transparency, color and penetration. Penetration can be useful in long lasting lotions and eye creams. A model skin cell membrane was investigated to, in the future, determine at what level these metal nanoparticles, particularly zinc oxide and titanium dioxide, become toxic.

Part 2: Langmuir Blodgett (LB) films create a technique in which single layers of lipids can be deposited onto a solid substrate. Mica, an anatomically flat surface, was used as the solid substrate in this LB trial during the deposition of arachidic acid in a multilayer structure. Three layers of this 20 carbon fatty acid were deposited onto the mica for analysis with Atomic Force Microscopy (AFM).

10:20am-10:40 – **Khdr Eskander**

“Theory of Atomic Force Microscopy and Analysis of Biological Samples”

Atomic Force Microscopy (AFM) is an instrument that shines light on the nano world. It has the capability of measuring extremely fine surface features to the nanometer scale. Images of biological cells and macro-molecules are taken via AFM and analyzed to determine their features' properties.

10:45am-11:00am – **Kayla Cherry**

“Mutation of the FNR Transcription Factor”

FNR Transcription Factor is what regulates the replication of DNA without the presence of oxygen. In the presence of oxygen, the [4Fe-4S]²⁺ complex dissociates and cannot be investigated. In this research, the mutation of this complex is attempted to see if it will be more stable in the presence of oxygen so it is easier to study.

11:05am-11:20am – **Mohanad Ahmad**

“Site-direct Mutagenesis and Isolation of the CRP protein for AFM studies”

The goal of this research is to study DNA-CRP interactions and to measure the binding force between DNA and CRP protein using Atomic Force microscopy (AFM). Working towards this goal, the CRP protein was isolated and attached to an AFM surface using a linker protein, or His tag. Alternatively, Mutagenesis of CRP protein can be performed in order to attach the protein to the surface without the use of linker proteins. Therefore, His Tag was removed from CRP protein and set ready for the Mutagenesis reaction. AFM was also used in an approach to get images of DNA.

11:30pm-12:30pm – Lunch in the Nutrition Lab

12:35pm-12:40pm – Group Picture in front of CSB

12:45pm-2:10pm – Afternoon Session of Talks *There will be 5 minutes between talks for questions

12:45pm-1:05pm – **Ashley Winters**

“Testing the Antimicrobial Properties of Monolignols”

Cellulose is needed to produce biofuels; however it is surrounded by a bulky large molecule called lignin. When lignin is broken down to get to the cellulose, monolignols are produced. The Kirby Bauer test and measuring the growth Rate of bacteria in liquid culture in the presence of monolignols were done to see if these monolignols had antimicrobial properties. This is important because if these lignin breakdown products inhibit bacterial growth, they can hinder biofuel production.

1:10pm-1:35pm – **Ahmad “Matt” Pauzi**

“The chemical oxidation of biophenols”

In this project, free radical intermediates formed during the oxidation of biophenol (Butylated Hydroxyanisole) are detected using High Performance Liquid Chromatography (HPLC). BHA is a type of food preservative and a free radical scavenger that terminates oxidation to give stability to the system. However, studies have shown that BHA to be carcinogenic after long term administration. BHA gives a one electron oxidation to form a BHA radical and the radical will recombine together in a couple of different ways.

1:40pm-2:10 – **Al Walker and Ian Salveson**

“A proposed mechanism for acetaminophen induced liver injury”