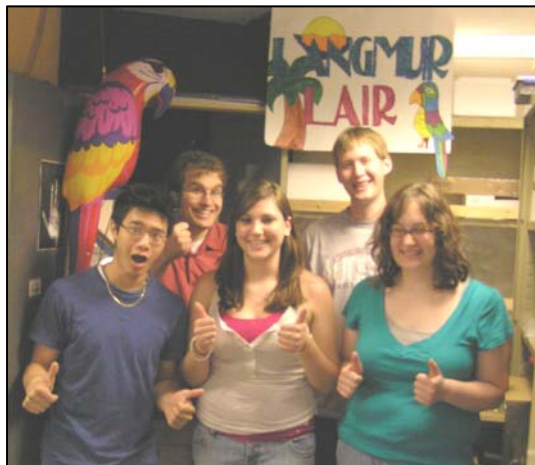


The Micelle

Fall 2007

Micelle: (pronounced: my-cell) 1) Unit of structure built up from polymeric molecules as a molecular aggregate that constitutes a colloidal particle. 2) **The Newsletter of Augsburg Biophysics**

Welcome to another exciting edition of Augsburg College's Biophysics Newsletter! The summer 2007 crew has made good progress on their projects. We also had a lot of fun and even decorated the lab renaming it the "Langmuir Lair." Read on to find out what we are up to.



*Pictured
(left to right):
Andrew Nguyen
Ben Stottrup
Christine Staloch
Ben Hoffmann
Cait Kortuem*

Christine Staloch (2009): Christine has started to measure the transbilayer diffusion rate for various lipid compositions using a sodium dithionite assay. She is a chemistry and physics major who wants to join the FBI. Christine also participates in cheerleading, orchestra, and figure skating.

Andrew Nguyen (2010): Andrew has been working extensively with MatLab, Java, and image processing to track domains and model Brownian Motion. Andrew is a physics major and spends most of his free time rock climbing.

Ben Hoffmann (2010): Ben has been working with MatLab and ImageJ to analyze live cell data provided by Dr. Michael Halter (NIST). Ben has also been designing and constructing a trough for further lipid research. He is a math and physics major and is in track and basketball.

Cait Kortuem (2010): Cait has been using fluorescence microscopy as well as pressure-area isotherms to see what effect salt has on lipid monolayers containing cholesterol. She has also been programming in MatLab. Cait is a physics major and spends her free time reading and listening to indie rock.

DEPARTMENTAL NEWS

There is a lot going on in the Physics Department. Two things are of particular note. 1) The department will be conducting a search for a second Biophysicist to start in the fall of 2008. This new position will help Augsburg become a center for the intersection of biophysics and liberal arts education. 2) We have received generous donations from alumni working in industry. Dr. Jason Heffelfinger facilitated the donation of a laser profilometer from Medtronic where he works. Brian Teschendorf donated test equipment from his lab at Boston Scientific. These donations will be used in the Comprehensive Laboratory courses. **Augsburg physics is grateful to both Jason and Brian for their assistance and generosity** (see pictures on page 2).

* This edition of the Micelle was prepared by the Summer 2007 Crew

RECENT NEWS

- The lab was fortunate to receive ~\$30k of funding from Research Corporation for transbilayer diffusion experiments.
- This December Dr. Michael Halter (National Institute for Standards and Technology) will present the results of our summer's collaboration on live cell image processing in Washington DC at the 47th Annual Meeting of The American Society for Cell Biology.
- Professor Stottrup and collaborators at the University of Minnesota had a paper accepted to the Journal of Physical Chemistry C. *Density Dependent Friction of Lipid Monolayers* will be published later this year.

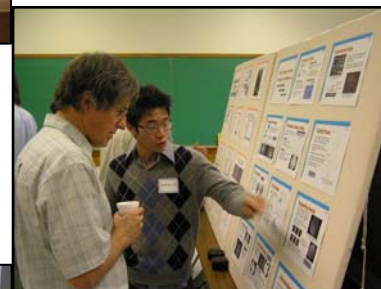
STUDENT RESEARCH PROJECTS

With all the projects going on in the lab, it's important we share our progress with others. This spring, last summer's crew gave presentations on their projects at Minnesota Area Association of Physics Teachers (MAAPT) and the Minnesota Academy of Science. This summer's crew traveled to North Dakota State University.



Dan, Kyle, Ben, and Alison pose after presenting their posters at the MAAPT Spring meeting. Alison's poster took first place.

Andrew Nguyen describes his tracking software to Dr. Dan Kroll (NDSU Physics Department Chair).



Dr. Ka Yee Lee (U of Chicago) discusses Ben Sonquist's work on hydroxycholesterols. Dr. Lee is an international expert on lipid monolayers and lung surfactant.

Irving Langmuir, born in 1881, contributed greatly to the field of biophysics. With Katherine Blodgett, he did some of the first research on lipid monolayers. Thus the summer '07 crew renamed the Lipids Lab the Langmuir Lair. Among his many accomplishments, Langmuir received the Nobel Prize in Chemistry in 1932 for his research in surface chemistry.



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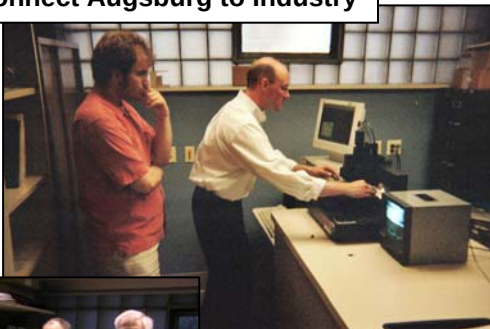
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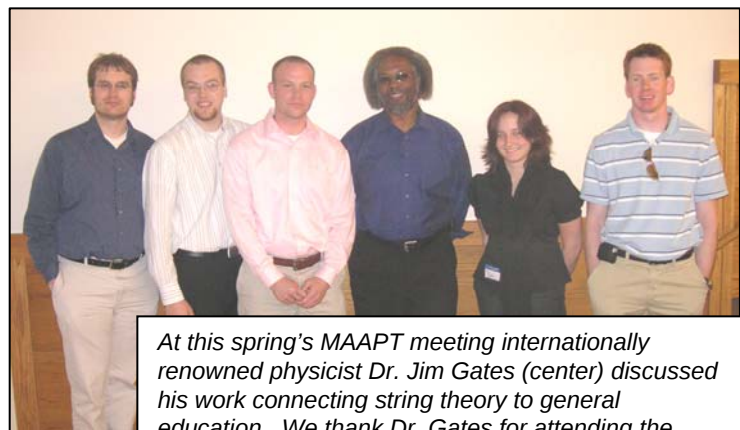
KEEPING TRACK OF OUR ALUMNI: As former Lipid Lab members graduate and spread their wings, we find out what they have been doing. **Ben Sonquist** is working at STARBASE Minnesota and is building an additional trough for the lab. We appreciate Ben's support of the lab. This fall **Kyle Sontag** will begin his graduate work in physical chemistry at the University of Georgia. **Dan Forseth** studied at Itasca State Park this summer and is currently working in Augsburg's library. Dan will do his student teaching this upcoming year and get married next spring. **Erik Lundberg** is making great progress at Cornell towards his PhD in electrical engineering. This year his research will have him traveling around the world.

Alumni Connect Augsburg to Industry

Dr. Heffelfinger (Medtronic) demonstrates how to use the laser profilometer to Professor Stottrup.



Brian Teschendorf (Boston Scientific) and Professor Engebretson pose in front of Augsburg's new function generators.



At this spring's MAAPT meeting internationally renowned physicist Dr. Jim Gates (center) discussed his work connecting string theory to general education. We thank Dr. Gates for attending the MAAPT meeting and for posing in a picture with us.

GET INVOLVED! We have many great projects and students here in the lab. If you're interested in becoming involved, please contact:

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STUDENT PROFILE: Alison

Heussler is a junior physics major/German minor. After her first year she spent the summer programming in the Lipids Lab. This summer she worked with Professor Zhu at the University of Minnesota studying low-voltage electrowetting on a novel dielectric.

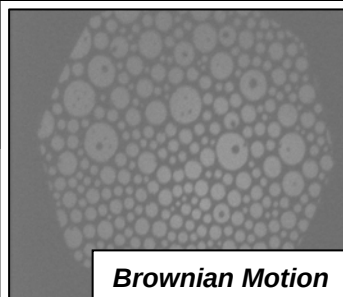


Christine and Cait caught up with Alison to learn about her project and her off campus research experience. Here is what they found out: The aim of electrowetting is to change how a bead of liquid sits on a surface using an electric field. The problem is that it takes large amounts of voltage to see a large contact angle change. This is impractical for applications such as bioarrays and microfluidics.

In Alison's research, she worked with ionic liquids infused into a polymer to make an ion-gel. She hoped that ions would flow through the dielectric and lower the dielectric constant resulting in a lower voltage needed for electrowetting. However, electrochemistry occurred before electrowetting so Alison tried a OTS monolayer on a SAN Dielectric because it polarizes quickly. This resulted in electrowetting along with electrochemistry. Alison presented her research at MRSEC SURE (Materials Research Science and Engineering Center Summer Undergrad Research Expo).

The program Alison did her research through is MRSEC at the U of M. This is a program designed for undergraduate science majors. MRSEC strives to provide a mentoring environment in which students participate in research experiences and build other skills necessary for graduate school such as presentations and writing. The website for the program is <http://www.mrsec.umn.edu/index.shtml>.

When asked if she had any advice for incoming physics majors Alison said **"Get to know the professors. One of the advantages of going to a small college like Augsburg is that it is possible. Not only can they help with class work but they also can help you find out about scholarships and summer programs."**



Brownian Motion

Brownian Motion: The random movement of domains, is an excellent example of the interdisciplinary science of biophysics. First discovered by the botanist Robert Brown, our own Andrew Nguyen, physics major, is currently investigating it in lipid domains.

SPECIAL THANKS TO: Professor Zhu and members of his lab for their continuing support, Erkan Tuzel, Sylvio May, and the rest of the NDSU biophysicists, Mike Halter and his colleagues at NIST, Augsburg College and URGO, Dean and Amy Sundquist, Research Corporation, The Eppley Foundation for Research, and MN Space Grant Consortium.