

The Micelle

Spring 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 the first ever Micelle Newsletter. Over the past year we have been setting up the lab and beginning to do many great experiments to learn more about the physical properties of lipids. This would not have gone as smoothly without the hard work, generosity, and support from many students, faculty, staff, and administration at Augsburg.

Research Presented at Argonne National Labs



Hard work pays off at research symposium
November 3, 2006
Argonne, IL

Pictured (L-R):
Dr. Tracy Bibelnicks,
Ben Sonquist,
Alison Heussler, and
Dr. Ben Stottrup

(See Events Section)

Quick Introduction: Lipids are a crucial component of living organisms. Most importantly, lipids serve as the key structural component of cell membranes. It was once believed that lipids were randomly distributed within the cell membrane acting only as a barrier and to localize membrane proteins at this interface. In the past decade several compelling pieces of evidence have forced a paradigm shift. Today we believe that within the 2D system of a cell membrane lipids are actually heterogeneously distributed. This distribution can provide the mechanism with which lipids actively trigger and control cellular processes like cell signaling and vesicle fusion.

Get Involved: Our lab will best accomplish its goals of 1) better understanding the interplay of multi-component lipid systems and 2) training the next generation of scientists with your support. Tour the lab! Find out the latest updates!

Contact us:



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Highlights of Our First 18 Months

Professor Stottrup has joined Professor Xiaoyang Zhu's lab at the University of Minnesota. With the aid of Matt Goertz, he has been learning about force microscopy. They have started studying the mechanical properties of phospholipid monolayers coated on substrates and soon will begin investigating lipid bilayers. This collaboration also provides the opportunity to interact with scientists at one of Minnesota's start-up biotech companies, Microsurfaces.

Dan Forseth (2008) and **Erik Lundberg** (2006) did a great job getting the lab set up. Dan set up protocols for future cholesterol depletion experiments. Erik built a first generation surface potential probe with **Ryan Shea** (2006). With these successes, the lab became ready for research.

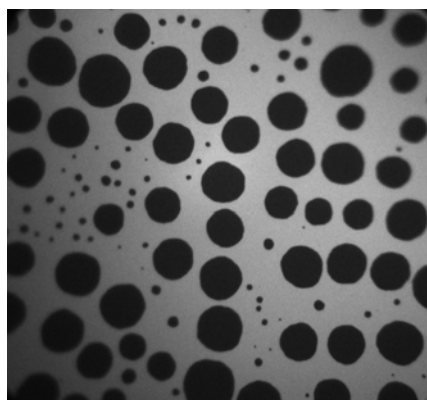
Alison Heussler (2009) has been learning about image processing and Matlab programming. She has discussed her image analysis routines with researchers from North Dakota State University, the National Institutes of Standards and Technology, and our own **Dr. Tracy Bibelnicks**.

Ben Sonquist (2006) has been studying the phase behavior of various hydroxysterols. They seem to exhibit some interesting and novel phenomena. We are excited about the recent acquisition of a camera to continue these studies. *Thanks Augsburg!*

Kyle Sontag (2007) has written a curvature correction program and will be testing it this spring. He is also working on our first externally funded project. Kyle has been accepted to graduate school at Georgia Tech, the University of Florida, and the University of Notre Dame.

We have three new lab members **Cait Kortuem**, **Andrew Nguyen**, and **Rami Saikali** who are all working hard and getting trained in the lab.

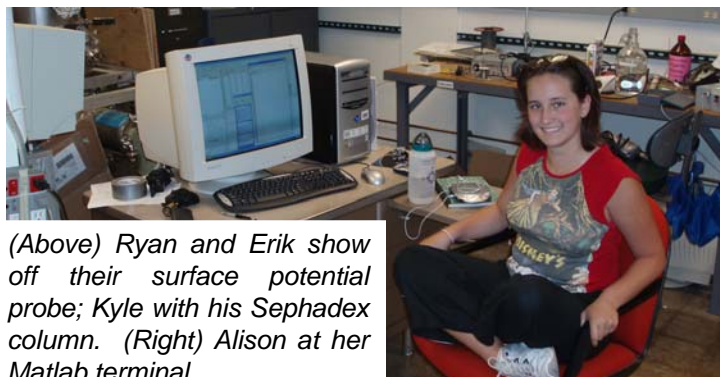
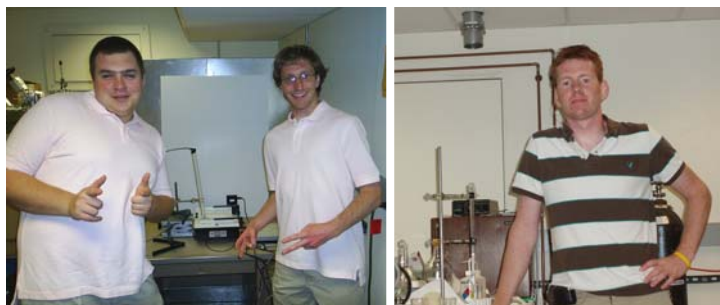
Is it art or it is biophysics?



We are currently studying the bimodal distribution of domains in sterol/phospholipid monolayers. This distribution may be the result of two different orientations of the hydroxysterols within the monolayer. Look for our updates in the next Micelle.

Presentations and Events

Erik Lundberg presented the results of his trough restoration at the 2006 Spring MAAPT meeting. Alison Heussler and Ben Sonquist presented their results at the Annual Symposium on Undergraduate Research at Argonne National Labs. We drove (actually Dr. Bibelnieks did all the driving) straight to Argonne late Thursday afternoon and realized Chicago is really just a southern suburb of the Twin Cities. Alison and Ben gave great talks and the adventure was featured on the Inside Augsburg website, check the archives online.



(Above) Ryan and Erik show off their surface potential probe; Kyle with his Sephadex column. (Right) Alison at her Matlab terminal.

Special Guests: A special thanks to all the interesting visitors we have had over the past year. **Dr. Sarah Veatch** of Cornell spoke to Augsburg students about the raft hypothesis. **Dr. Jeff Buboltz** (Colgate University) described his new Probe Partitioning FRET experiments. **Matt Goertz** (University of Minnesota) presented the results of his studies of interfacial water layers. **Gaurav Saini** (Oregon State University) described his work on upscaling and microbial remediation. This upcoming March **Dr. Erkan Tuzel** (NDSU) will describe his recent work on complex fluids.

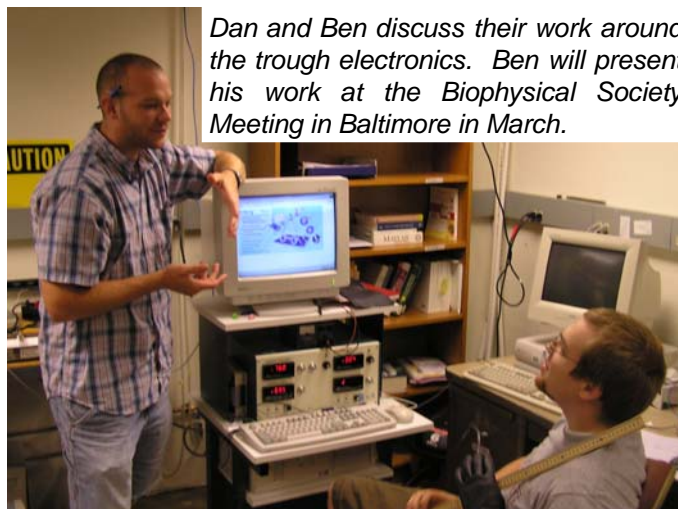
Keeping Track of Former Students

Erik Lundberg (2006): is currently a student at Cornell University studying space physics. He has already found a research group and reports things are going well. **Ben Sonquist** (2006): Ben just finished his student teaching at Minneapolis' Southwest High. He has accepted a position at STARBASE Minnesota.

Funding Successes!

We have been fortunate to receive support from several sources during the past year. This support will ensure good science and the training of future scientists.

- **Augsburg College** has generously supplied us with the equipment necessary to study lipid monolayer phase behavior and the **MN NASA Space Grant** has supplied money for student workers. We are especially thankful for a recent **anonymous** donation of \$6,000.
- In January the lab received a \$22,600 grant from the **Eppley Foundation for Research**.
- A \$3,900 educational cost sharing grant from **Ocean Optics** for a proposal entitled "Spectroscopy and Lipid Biophysics in the Lab and Classroom."
- We were selected for a Pathfinder grant-in-aid of \$5,000 from the **University of Minnesota's Nanofabrication Facility**.
- We also received several gently used but still very useful computers from **First Commercial Bank** to power lab equipment. *Thanks to Tony Wagner!*
- Alison Heussler received \$250 from **Sigma Delta Epsilon** for lab supplies and lipids. *Way to go Alison!*



Dan and Ben discuss their work around the trough electronics. Ben will present his work at the Biophysical Society Meeting in Baltimore in March.

Editor's Comments: Some people might wonder "Why have a newsletter devoted to Augsburg Biophysics?" My question is "With all the cool science we are working on...how could we not share it!" So, if you are looking for great graduate students for your program check out our students. If you are a high school teacher with a student interested in combining biology and physics tell them to check us out. Finally, we greatly appreciate everyone's support for the advancement of Augsburg Biophysics. We especially appreciate the support of the labs of Professors Xiaoyang Zhu and Sarah Keller.