ConnMS
The Connecticut Microscopy Society Newsletter
HTTP://www.ConnMS.org April 2007

From the Vice President

It has been an honor and a pleasure to serve as the Vice President of the Connecticut Microscopy Society this year. Each time our society meets I am reminded of why I love microscopy – something I think we all hold in common – a fascination with the visualization of structures smaller than the eye can discern. Since I've joined ConnMS, my knowledge of microscopy instrumentation, techniques and applications has significantly broadened and in the process I've come to realize the common denominator of our members. Whether we are imaging the architecture of a complex tissue, revealing the structure of sub-cellular organelles, or defining the molecular composition of a substance, the process of resolving the details is what intrigues us.

Spring meeting

This year's spring meeting will be held Tuesday May 8th at the Peabody Museum of Natural History. The atmosphere should prove to be spectacular, as we will be dining in the Great Hall amongst the fossilized remains of dinosaurs! Is it ironic that a group that focuses on the minute structures of cells, and molecules should meet amidst the remains of earth's largest creatures? We have two excellent speakers whose talks have some elements in common: the study of molecular interactions by microscopy. Bill Mohler from UConn will speak on multiphoton laser scanning microscopy and second harmonic generation in the study of highly organized arrays such as myosin in

Continued on page 4

Bill Mohler

Dr. Mohler obtained his A.B. in Biochemical Sciences from Harvard University and his PhD in Pharmacology from Stanford University. After a postdoctoral fellowship at the University of Wisconsin in Madison, he joined the faculty at the University of Connecticut in 2000. He is currently an Assistant Professor in the Department of Genetics and Developmental Biology on the Farmington campus.

Aurélien Roux

Dr. Roux obtained his undergraduate degree at the Ecole Normale Superieure, in Lyon, France and his Ph.D. at the Curie Institute in Paris. He is currently completing a post-doctoral fellowship with Pietro De Camilli at the Yale School of Medicine. He will soon join the faculty of the Physico-Chemistry Department at the Curie Institute in Paris.

Inside this issue

Spring Meeting Schedule

Bill Mohler, PhD, University of Connecticut, Farmington CT
"Optical Imaging Through Multiple Dimensions"

Aurélien Roux, PhD, Yale School of Medicine, New Haven, CT
"Visualization of protein Mediated Membrane Tubulation"

Date: Tuesday May 8, 2007
Peabody Natural History Museum

5:00-5:45 PM - Registration and Reception

6:00-6:45 PM - Bill Mohler, Ph.D.

6:45-7:45 PM - Dinner

7:45-8:30 PM - Aurelien Roux, Ph.D.

Pre-registration is prefered by April 30th

Meeting registration fee: regular members $20
students $15
guests/non-members $25

To register: please either return the enclosed registration page or contact Robert.Roorda@yale.edu. Additional registration pages can be found on our webpage at: http://www.connms.org

Directions to the Peabody Museum of Natural History:

Peabody Museum of Natural History is located at 170 Whitney Avenue, New Haven, CT..

From Hartford and points north:
Take I-91 south to Exit 3 onto the Trumbull Street connector. Turn right at the second intersection onto Whitney Avenue and follow the posted signs to the Peabody Museum. The museum is 2 blocks north on the left hand side at the corner of Sachem and Whitney.

From New York and points south:
Take I-95 north to I-91 north to Exit 3, then follow the directions listed above.

From Waterbury and points west:
Take I-84 east to exit 27 to Routes 691 east. Merge onto I-91 and follow the directions listed above for individuals traveling from the North.

A map of the area can be found at the following website: http://www.yale.edu/peabody/visit/directions.html Click on the "Visitor and Bus Parking Map" link in the middle of the page for a detailed map of the suggested parking lot.

Spring Meeting Abstracts

Bill Mohler, PhD

Optical Imaging Through Multiple Dimensions

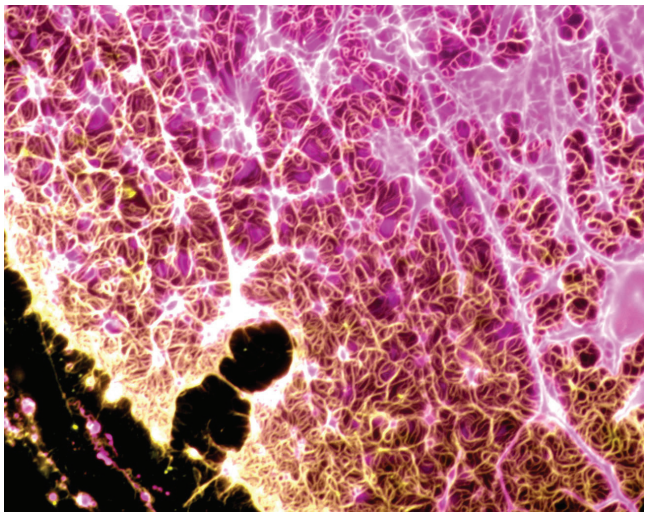
We are pursuing two projects that focus on extracting different kinds of information from large sets of light microscope images. Second-harmonic generation (SHG) arises in the actomyosin lattice of striated muscle, in collagen fibrils, and in microtubule arrays. This non-linear optical effect produces bright contrast from the endogenous unlabeled proteins themselves, yielding a digital 3-D profile of the arrangement and internal structure of live tissues. We are currently developing mathematical analyses of pattern within SHG images to measure the effects of degenerative muscle diseases. We are also working to create an integrated data archive of gene expression and protein localization for the nematode C. elegans. This tiny yet complex animal is remarkable for both its transparency and the cell-by-cell invariance of its developmental program. We use 3-D timelapse confocal microscopy to record the dynamics of expression and localization of fluorescently tagged gene products within live embryos. Several approaches are being developed to analyze the microscope image data, making associations between genes and proteins that work together in the formation of differentiated cell

---

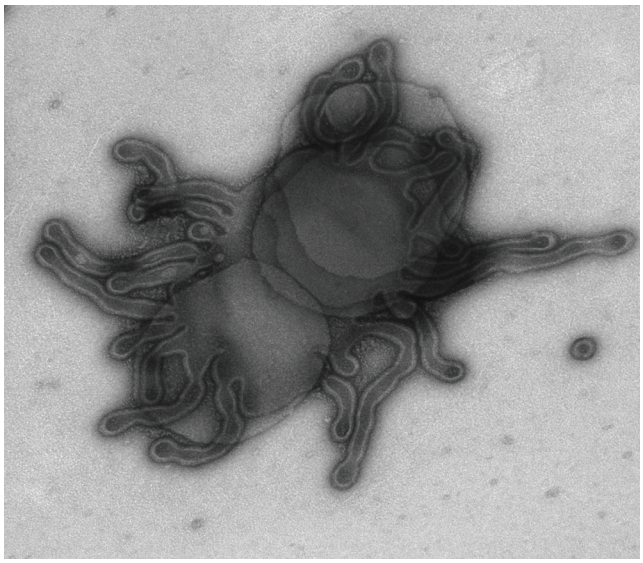
Aurlien Roux, PhD

Visualization of protein Mediated Membrane Tubulation

A large number of proteins is involved in the remodeling of membranes during membrane traffic in cells. Among them, an increasing subset of these proteins is implicated in deforming membranes into cylindrical structures called tubules. Several mechanisms of tubulation have been proposed. It was first proposed that proteins form a scaffold that forces the membrane to adopt its shape. This is the case for dynamin, a protein that wraps its helix around the necks of endocytic buds in order to sever them, and probably also for dynamin-associated proteins that contains a BAR domain. Recently, several small GTPases involved in recruiting coats for the bud formation have been shown to induce tubulation through the insertion of an amphipathic alpha-helix in the outer leaflet. A third mechanism is the extraction of tubules through the local force exerted by molecular motors on a membrane. I will review some recently developed microscopy techniques used to obtain structural and quantitative data in studies of tubulation mechanisms.



Fluorescent dynamin-coated tubules (yellow) are imaged after their growth out of a fluorescently labelled lipid membrane (purple).



Arf1 tubulates protein-free liposomes in the presence of GTP and GGA1 that stabilize binding to the membrane.

From the Webmaster

Over the last few months I have made a concerted effort to revamp the Connecticut Microscopy Society website. The result, and I hope you agree, is a more vibrant site that should better serve the Connecticut Microscopy Community. I've tried to create a site that is informative, current, visually appealing and at the same time easy to update and maintain. I would very much like your feedback on this. I would appreciate it if everyone could take a look, and let me know what you like, and especially what you think should be changed or improved.

By no means is the work is done. Our society contains a large pool of very skilled members with access to a huge range of instrumentation facilities. I think we stand to gain a great deal by publicizing our resources. I would like to begin a "Resource" page on our website. Please let me know if you would like to list your facility or laboratory on this page.

Let me know what you think of this, and also any other ideas you have. I hope to see everyone at the spring meeting.

Best regards

Robert Roorda

from the vice president continued . . . .

muscle. He will also discuss a second project involving time lapse imaging of fluorescently tagged protein dynamics within the nematode C. elegans. Aurélien Roux will speak to us about his research on clathrin and dynamin in Pietro De Camilli's lab at Yale University that combines several methods including real time microscopy at the optical level as well as EM.

Yale Microscopy Workshop

I would like to take this opportunity to draw your attention to another event to be held June 19th-21st at the Yale School of Medicine, co-organized by myself and Derek Toomre. The Yale Microscopy Workshop provides investigators from the regional research community access to cutting edge optical microscopy instrumentation as well as expertise in advance microscopy techniques. In the associated daily morning symposia, talks will be given by academic researchers that employ emerging techniques in optical microscopy such as TIRF and in vivo imaging using multiphoton laser scanning microscopy.

Throughout the 3-day Workshop, we will have at least 10 microscopes available and fully functioning from over 4 different vendors, including Zeiss, Leica, Nikon, Olympus. Attendees are invited to bring samples or just peruse using samples available on site. These microscope vendors will be bringing many of their newest instruments, including those employing spinning discs, laser capture, structured illumination and of course laser scanning optical microscopes. Last year's event was extremely successful and we invite you and your colleagues to attend all or part of this free workshop. Registration is required: www.microscopy.med.yale.edu (currently under construction) or contact Ann Haberman at ann.haberman@yale.edu .

Many Thanks to Those Who Contributed and a Call for Officers

I'd like to express my gratitude to the many people who have contributed to the society this year. First and foremost, I'd like to acknowledge the strong work of our President Marc Pypaert who unfortunately was unable to write this newsletter. Marc has served as a ConnMS officer for many years, and his substantial experience in representing this society has strongly influenced its growth and development. Many thanks are also due to our Past President, Larry Altman. Larry single-handedly created the ConnMS website, one of

from the vice president continued . . . .

the best of the regional societies, and invested considerable time into the smooth transfer of society and website documents, tutoring us in the process. Robert Roorda has put in tremendous efforts, having taken on several roles this year as secretary, treasurer and webmaster! He describes some of the artfully designed changes that have been made to the website elsewhere in this newsletter.

Finally, I would like to invite you to consider serving as a society officer this upcoming year. We are very fortunate in that David Knecht of UConn has offered to serve as vice president. Unfortunately, however, Robert Roorda will not be able to continue in any of his many roles. Helping to run the ConnMS is not burdensome and it is a great service to our community. Plus, frankly, it is fun to choose speakers and topics for our meetings. Please consider taking a leading role!

Best Regards,

Ann Haberman, Vice President

We would like to thank all our sponsors:

Platinum level

Electron Microscopy Sciences

gatan

SPI SUPPLIES

ZEISS

Gold level

BAL-TEC RMC

FEI COMPANY Tools for Nanotech

OLYMPUS

IXRF SYSTEMS

Leica MICROSYSTEMS

HITACHI Inspire the Next

Silver level

Andor • Brucker AXS Microanalysis • EDAX Inc.
4pi Ananlysis • JEOL • USAMicrostar Technologies
Nanotech Consulting • Scanning/FAMS, Inc.

Patrons

Lawrence Altman, Thomas Burrage, Linda Chicoine, Frank Dye, Margaret Grunnet
Becky Hohman, Margaret Ianiello, Marc Pypaert