MBL Neurobiology Course Imaging Section - June 25 to July 13, 2006

Faculty

Katie Commons, Harvard Medical School
Neurochemical organization of circuits in the brain stem / EM immunocytochemistry

Jim Galbraith, NIH; Cathy Galbraith, NIH
Squid axonal transport, actin in lamellipodia / DIC video, Zeiss 5 Live ultrafast confocal

Kristina Micheva, Stanford
Zebrafish synapse development / new method for immunocytochemistry

Thomas Misgeld, Tech U Munich; Leanne Godinho, Munich; Sascha Allwein, Munich
Plasticity at NMJ, spinal cord; retina / live imaging of transgenic GFP mice & zebrafish

Thomas Oertner, Frederich Miescher Institute, Switzerland; Niklaus Holbro, FMI
Imaging of Ca in dendritic spines / build a two photon microscope

Tom Reese, NIH; Jorge Moreira, Ribeirao de Preto, Brazil; Joe DeGiorgis, NIH
Organization of the post synaptic density / electron microscopy

Stephen Smith, Stanford; JoAnn Buchanan, Stanford; Gordon Wang, Stanford
Zebrafish retinotectal circuit development / live confocal imaging

Mark Terasaki, U Connecticut; Peter Lenart, IMP, Austria; Petronella Kettunen, UCLA
Plasma membrane repair; multiphoton ablation

Wes Thompson, University of Texas Austin
Glial cell function at the NMJ / live imaging of transgenic GFP mice

Josh Zimmerberg, NIH; Sam Hess, Univ Maine; Travis Gould, Univ Maine
Membrane domain; construction of a "live" PALM microscope

Yi Zuo, University of California Santa Cruz
In vivo imaging of cortical neurons and glia in mouse

<u>Locations</u>
Room 25 (Main Lab)
A - Smith / Micheva
B - Oertner
D - Misgeld
E - Thompson
F - Zimmerberg
Room 27 - Reese / Commons / Micheva / Buchanan / Moreira / DeGiorgis
Room 2 - Terasaki; Galbraith

Revised Imaging Section Lecture Schedule - with the correct dates!

Monday, June 25	Jeff Lichtman	Introduction to light microscopy
Tuesday, June 26	Jeff Lichtman	Introduction to light microscopy
Wednesday, June 27	Thomas Oertner	Fluorescence
Thursday, June 28	Tom Reese	Electron microscopy
	Katie Commons	Immunocytochemistry
Friday, June 29	Stephen Smith	Contrast generation and light detectors
Saturday, June 30	Winfried Denk	Non-linear microscopy
Monday, July 2	Kristin Harris	Serial section EM and LTP
Tuesday, July 3	Yi Zuo	In vivo neural imaging
Wednesday, July 4	--- Holiday ---	July 4th Parade
Thursday, July 5	Thomas Misgeld	Labeling neurons: old dyes and new tricks
Friday, July 6	Thomas Oertner	Light stimulation techniques
	Mark Terasaki	Membrane resealing and Ca
Monday, July 9	Wes Thompson	Glia, especially Schwann cells
Tuesday, July 10	Ryohei Yasuda	FRET and FLIM
Wednesday, July 11	Jim Galbraith	Actin and integrin dynamics in lamellipodia
	Boris Slepchenko	Modeling of cellular processes: why and how
Thursday, July 12	Josh Zimmerberg	Membrane fusion
Friday, July 13	Students	Student presentations

<u>Special Event</u>
Saturday evening, Jume 30 - Extreme 3D Festival. Tom Reese, moderator. Winfried Denk, Stephen Smith, Jeff Lichtman.
<u>Afternoon lectures</u> (4 pm)
Friday, July 6 - John Hammer - "How the ER gets into spines"
Monday, July 9 - Laurinda Jaffe - "Measuring cAMP by FRET"
Tuesday, July 10 - Leanne Godinho - "Retinal development in vivo"
<u>Evening lectures</u>
Monday, June 25 -- Karl Deisseroth
Thursday, June 28 -- Josh Zimmerberg / Sam Hess - "Membrane microdomains"
Monday, July 2 -- Bill Spain
Thursday, July 5 -- Thomas Oertner - "All optical investigation of synpatic function"
Monday, July 9 - Gordon Fishell
Thursday, July 12 - Guoping Feng - "Novel optogenetic methods"

First week rotations

Monday

1:30 to 4:30 -- Students split into 4 groups of 3. Rotations are 45 min
a) Assemble a microscope, koehler illumination (Jim Galbraith)
b) Fluorescence microscopes (Thomas Misgeld)
c) Immunofluorescence (Wes Thompson)
d) Sample preparation (Kristina Micheva, Katie Commons)
4:30 -- "How to get out on the water" - a presentation by various members of the faculty
5:30 -- Dinner
7 pm -- Abbe back focal plane demonstration (Rudi Rottenfusser)
8 pm -- Monday night lecture (Karl Deisseroth)

Tuesday - Friday

Rotations - Students in groups of two will rotate through eight light microscopy rotations and one day of EM. The light microscopy rotations will be ~2.5 hrs each, from 1:00 - 3:30, 3:30 - 6:00, and 7:30 - 10. Six students will take the EM rotation on Thursday, and the other six on Friday.

Light microscopy rotations: Galbraith, Zuo, Misgeld, Oertner, Smith, Terasaki, Thompson, Zimmerberg

Independent projects

By tradition, the imaging section devotes the 2nd and 3rd weeks to independent projects. As the first week progresses, you will start forming opinions about what kinds of experiments are feasible, who you would like to work with, what kinds of techniques or systems are interesting, etc, and you should start discussing ideas about what you would like to do with the faculty. We will meet on Saturday morning to settle on projects. At the end of the section, you will give a 10-15 minute talk on what you did.

Some guidelines and thoughts for independent projects:
There is a good deal of flexibility in what is acceptable as a project. Every student must be associated with at least one faculty member - this is to ensure that no student wanders off too far! Aside from that, it is up to the faculty and student as to how much structure and supervision will be involved. The ideal project addresses a important neurobiological question by using the techniques and expertise available in the course.

It is perfectly fine to have two or three projects. For instance, electron microscopy projects often have a lot of down time during which you can work on another set of experiments. It's also fine to work with another student (and it is also fine for one faculty to be involved with several projects!) Be mindful of the time involved (and to some extent the cost) in obtaining reagents, getting animals / mutants sent from "back home".

Because of the flexibility of choice, you may feel some pressure to think of an original project on your own. In fact, it may be more useful to you in the long term to learn a technique or preparation, rather than get your own result. It is very reasonable to choose one of the projects that one of the faculty has proposed. Remember that any good project can branch out into unexpected directions.

During the third week, as you approach the end of the section, you may be worried that "nothing has worked". This is actually not an uncommon experience. It's probably true that the very best learning experience is to finish a successful project, but a great deal of learning is somehow related to "trying" - you learn a lot by planning experiments, setting up equipment, getting reagents, dealing with the unexpected occurrences, figuring out why something did not work, adapting to limited resources and time, etc.

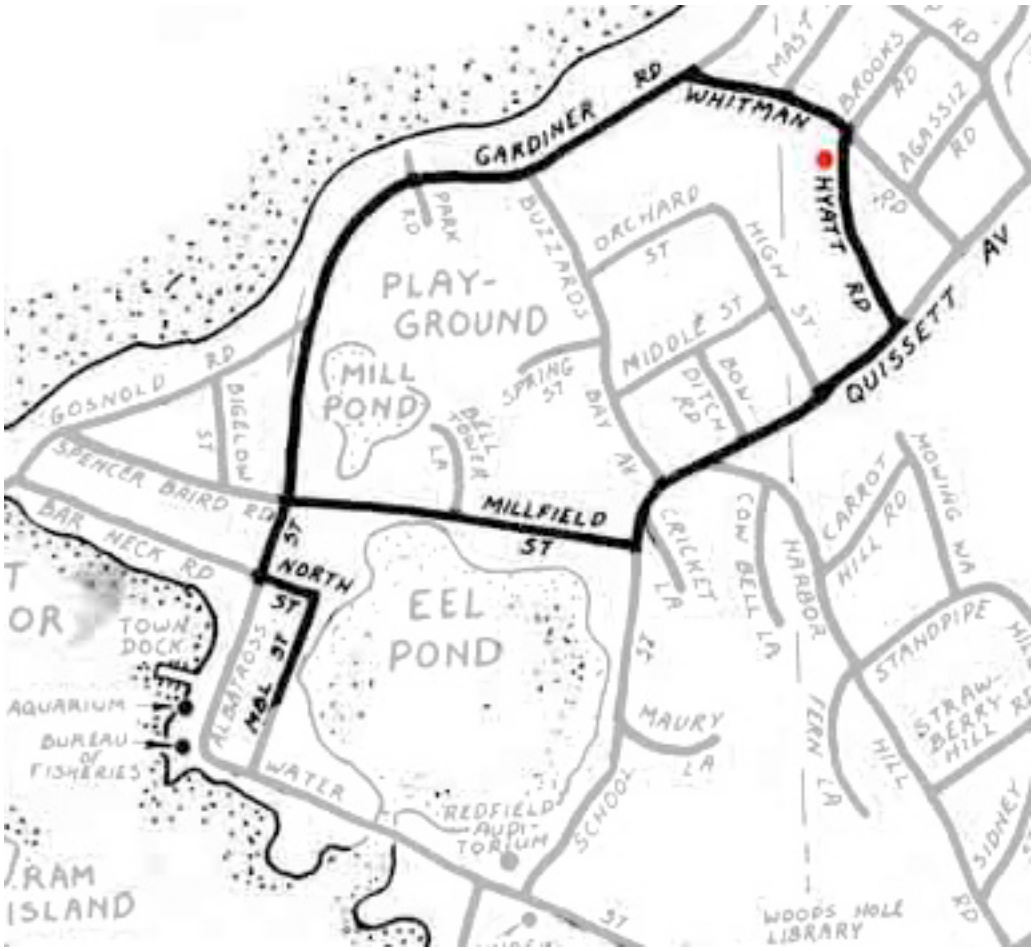
So
- find something that is fascinating to you,
- make use of the expertise around you,
- watch how people with more experience approach things,
- keep track of what your fellow students are doing,
- don't be too discouraged if your brilliant idea goes up in smoke
- keep your eyes open and be alert,

and you should get a lot out of this independent project period!

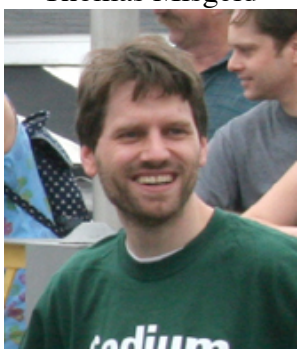
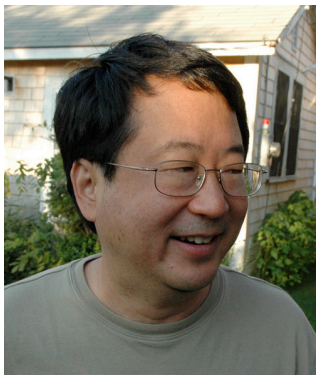
Pre-Imaging Section Barbecue

Sunday, June 24
~7 pm

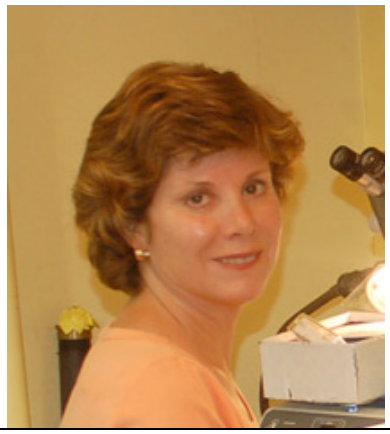
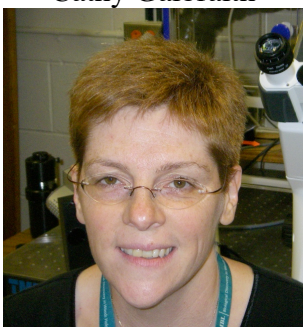
28 Hyatt Rd (red dot on map)
You can walk there two different ways, see solid black lines



Neurobiology Faculty 2007

Katie Commons 	Jim Galbraith 	Kristina Micheva 
Thomas Misgeld 	Thomas Oertner 	Tom Reese 
Stephen Smith 	Mark Terasaki 	Wes Thompson 
Josh Zimmerberg 	Yi Zuo 	

Neurobiology TAs 2007

Sascha Allwein	JoAnn Buchanan 	Joe DeGiorgis 
Cathy Galbraith 	Leann Godinho 	Travis Gould
Sam Hess	Niklaus Holbro 	Petronella Kettunen
Peter Lenart 	Jorge Moreira 	Gordon Wang