

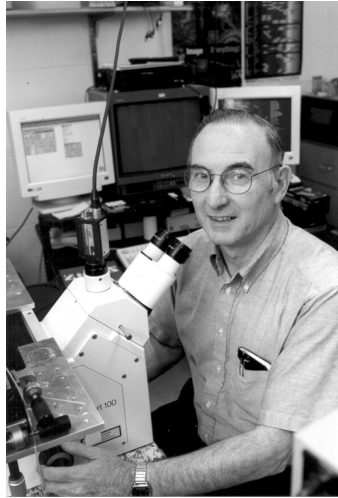
Squid Giant Axon Provides Clues to Nerve Cell Repair

Understanding how cells heal after injury may lead to treatment for spinal cord injuries and diseases of the nervous system.

“Cellular repair is the fundamental first step in the repair of nervous systems,” says Harvey Fishman, a biophysicist at the University of Texas Medical Branch and summer investigator at the Marine Biological Laboratory. By studying how individual nerve cells naturally heal, Fishman’s research at the MBL begins to answer questions about why nerve repair is possible and how scientists may eventually augment the process.

Fishman developed a model of nerve cell repair by studying the giant axon of the Woods Hole squid.

The giant axon is a large nerve cell as thick as a pencil-lead and extending the entire length of a squid’s body. By injecting fluorescent dyes into the membrane of the squid axon, Fishman can visualize what occurs when an axon is injured. Fishman saw the membrane of the axon near the injury reduce in diameter as bubbles of membrane, called vesicles, broke off from the area. Fluorescently labeled vesicles then traveled to the injury site and plugged the hole in the cell membrane.



Harvey Fishman

Research in giant axons also showed that vesicle accumulation at the injury site created a complete barrier at

the injury site. Dyes injected into the cell before an injury would flow out for only an hour after the cell was damaged. By then vesicles could be seen plugging an injured nerve cell. “It’s like plugging a dike with your finger,” says Fishman.

Continued, page 2

Science News

From the Marine Resources Center ...

Publication:

Clay, J.R., and A. Kuzirian. 2002. Trafficking of axonal K⁺ channels: Potential role of Hsc70. *J. Neurosci. Res.* 67(6):745-752.

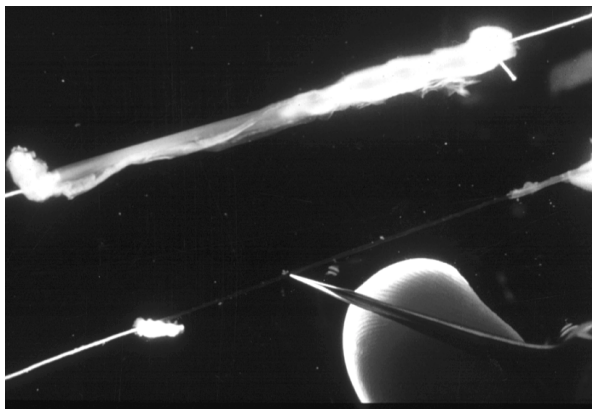
From The Ecosystems Center...

Garcia-Montiel, D.C. 2002. El legado de la actividad humana en los bosques neotropicales contemporáneos. In: M. R., Guariguata and G. H. Kattan (eds.), *Ecología y Conservación de Bosques Neotropicales*. Libro Universitario Regional, Cartago, Costa Rica.

McKane, R.B., L.C. Johnson, G.R. Shaver, K.J. Nadelhoffer, E.B. Rastetter, B. Fry, A.E. Giblin, K. Kieland, B.L. Kwiatkowski, J.A. Laundre, and G. Murray. 2002. Resource-based niches provide a basis for plant species diversity and dominance in arctic tundra. *Nature* 415: 68-71.

Please place your 2002 parking sticker(s) on your vehicle(s) as soon as possible to avoid the cost and inconvenience of a tow.

Stickers are available in the Swope Front Office, x 7247.



The much-studied squid giant axon

MBL Scientists Provide Expertise at Community Science Fairs

Traditionally, March is science fair month in Falmouth. Come rain or come shine (or snow or sleet, or whatever March brings us), Falmouth Public Schools and Falmouth Academy hold their annual science fairs in mid-March. The events are well attended and provide local schools the chance to “show their stuff” to the larger community.

While the actual fair days are exciting for Falmouth students, teachers, and parents, it’s what goes on before the public demonstrations that interests the MBL science community. In addition to serving as expert judges for both fairs, many MBL scientists are called to arms weeks, and sometimes months, before the fairs. They volunteer their time to serve as student mentors and advisors—generously opening their minds and sometimes their labs to students who want help with designing their projects. Many of the students who receive help with their projects from MBL scientists win the local fairs and go on to win regional fairs.

This year, MBL scientists helped 7th to 12th grade students with projects ranging from determining the best floor surface for tap dancing to toadfish shipping methods; dog breed sensory differences to photosynthesis; and from music’s effect on memory to calculating nitrogen levels in Waquoit Bay.

The following MBL scientists and staff donated their time and knowledge to the 2002 Falmouth community science fairs:

Michele Bahr
Marci Cole
Lenny Dawidowicz
Jeff Evans
Ben Felzer
Hap Garritt
Joshua Goldstein
Susan Goux
Heather Haas
Sam Kelsey
Louie Kerr
Alan Kuzirian
Pat Micks
Hilary Morrison
Roxanna Smolowitz
Martin Sommerkorn
Jane Tucker
Ivan Valiela

Vesicles play another role in neuron repair. While healthy nerves can send electrical currents through their axons, damaged nerves are unable to carry these signals. Fishman tested the axons to see if vesicle formation at the site of an injury restored the function of the nerve. He found that vesicles created membrane continuity that allowed electrical activity to return. The whole process worked a lot like skin repair: when your finger is cut, a blood clot forms to protect the finger while new skin forms below the scab. Vesicles plug holes in nerve cells while a new membrane forms.

Fishman is now investigating how to forecast nerve cell survival after a spinal cord injury. He is also expanding his research to look at axon injury, repair, and survival in the neurons of mammals. Understanding these cell membrane repair processes may help lead to therapeutics that will prevent nerve cell damage or death. And this, along with an understanding of how vesicles form and aid in cell repair, may eventually help doctors treat spinal cord injuries and diseases that destroy the nervous system.

—Jennifer Teece

Recent Gifts and Grants

The Grass Foundation awarded a grant of \$225,000 for renewed support of the Neurobiology and Neural Systems and Behavior courses over three years. They also provided \$1500 in support of the East Coast Nerve Net meeting.

Pharmacia Upjohn awarded \$102,000 for "Sponsored Research Agreement." Orian Shirihai is the principal investigator.

NASA awarded \$97,511 for "Modeling the Biogeochemical System of the Terrestrial Amazon: Issues for Sustainability." Jerry Melillo is the principal investigator.

U.S.G.S. (with Cornell University) awarded \$64,809 for "A Watershed-Scale Biogeochemical Loading Model for Nitrogen and Phosphorus." Robert Howarth is the principal investigator.

The Catherine Filene Shouse Foundation provided renewed support of \$51,000 for a summer research fellowship, three scholarships for the educational program, and a scholarship for the Semester in Environmental Science.

Intel Corporation donated a computer system (worth \$41,434) to the Laboratory of Michael Cummings.

The Irving Weinstein Foundation awarded an additional grant of \$25,000 in support of Advances in Genome Technology and Bioinformatics, a new course that will be offered at the MBL starting in October 2002.

National Science Foundation(NSF) awarded the following grants:

• \$54,428 for "A Tropical Microbial Observatory: Collaborative Research on Microbial Diversity in Caterpillars." Linda Amaral Zettler is the principal investigator.

• \$6,000 for "LTER CROSS SITE: Interactions between Climate and Nutrient Cycling in Arctic and Subarctic Tundras." Gus Shaver is the principal investigator.

• \$51,715 for "The Arctic LTER Project: The Future Characteristics of Arctic Communities, Ecosystems, and Landscapes." John Hobbie is the principal investigator.

• \$16,790 for "Distinguishing the Evolutionary Mechanisms Shaping Endosymbiont Genomes." Jennifer Wernegreen is the principal investigator.

• \$15,000 for "Workshop in Molecular Evolution." Michael Cummings is the principal investigator.

NOAA (with WHOI) awarded \$3,000 for "Digitization of the Herbarium Collection of Marine Algae and Terrestrial Plants." Cathy Norton is the principal investigator.

ONR awarded \$5,000 for "Combating Uncertainty with Fusion." Diana Blazis is the principal investigator.

Employee News

Please welcome our new employees:

Dennis Miller, Custodian
Barbara Stackhouse, Front Office Assistant, Housing and Conferences

Benefits Buzz

Special Offer For MBL Employees!

Open a Fleet WorkPlace Banking Checking Account — Sign Up for Direct Deposit — And Pay No Monthly Fee For One Year (new customers)!

Other benefits of the program are:

- Free Fleet Total Access Card (ATM card with debit card feature)
- Reduced Rates on Installment Loans
- No Annual Fee Credit Card with Low Introductory Rate
- Up to 10% Discount on Quick & Reilly Brokerage Services
- \$250 off Mortgage Closing Cost
- 24-hour Mortgage Approval Free Online Banking with Optional Bill Payment through homelink at www.fleet.com

Take advantage of this special offer today! Just call 1-800-CALL-FLEET (1-800-255-5353), 24 hours a day, or visit the Village Green Fleet Branch at 84 Main Street. Be sure to mention that MBL participates in the WorkPlace Banking Program. The WorkPlace Banking Employer ID # for MBL is 888885396.

Restrictions apply. For more detailed information contact Human Resources for a Fleet Bank information sheet. *(Employees may want to ask other banks if they offer a work place banking program. Fleet is just one option.)*

Can't Find a Parking Space?

Relax. An MBL van is on the way.

The pre-season voluntary shuttle program began on Monday, March 25.

The shuttle runs from Devils Lane to the Lillie building and includes an evening trip to Stony Beach.

The schedule below will remain in effect until June 7th. On June 10th, the Summer Shuttle Program will begin. (Mandatory off-campus parking for red stickered vehicles.)

Everyone is encouraged to use the cycle shed at Devils Lane and bike in to work! (Ask about our new on-campus bicycle facility as well.)

2002 Pre-season Shuttle Schedule Monday-Friday ONLY, March 25-June 7

Morning Runs.....

Leave Devils Lane, 8:15 AM
Continuous runs (with passenger(s) only.)
Last departure, 10:10 AM

Noontime runs.....

| | |
|--------------|-------------------|
| Leave Lillie | Leave Devils Lane |
| 11:40 AM | 11:50 PM |
| 12:00 PM | 12:10 |
| 12:20 | 12:30 |
| 12:40 | 12:50 |
| 1:00 | 1:10 |
| 1:20 | 1:30 |

From 11:40 AM- 1:20 PM, the bus will run with or without passengers. The 1:30 PM runs with passenger(s) only.

Evening runs.....

Leave Lillie, 4:30 PM
Continuous runs (with passenger(s) only.)
Last departure, 6:25 PM



Recycling Update

If you have electronic equipment such as computers and monitors that you would like recycled, please contact Joe Hayes, x7530, jhayes@mbl.edu.

April 2002 Calendar

For updates, please check our website, <http://www.mbl.edu/weekly/>

Monday, April 1

BUMP Thesis Defense

"Growth, condition, reproductive potential, and mortality of bay scallops, *Argopecten irradians*, in response to eutrophic-driven changes in food resources"

Andrea Shriver, Candidate, MA Degree
Loeb 32, Noon

Thursday, April 4

WHOI Distinguished Lecturer Series

"Recent explorations of the upper ocean boundary layer"

David Farmer, University of Rhode Island
WHOI, Clark 507, 4:00 PM

Thursday, April 4

New England Oceanography Seminar Series

"Understanding the association between plankton distributions and physical and hydrographic features using optical imaging techniques"

Scott Gallagher, WHOI
UMass Dartmouth, SMAST Room 204,
4:00 PM

Friday, April 5

The Bay Paul Center Seminar Series

"Analysis of Genotype-Phenotype Relationships"

Michael Cummings, MBL
Candle House 104/105, 4:00PM

Monday, April 8

BUMP Research Discussion

"The distribution and abundance of harbor seals (*Phoca vitulina concolor*) in the Woods Hole region"

Pieter A. P. deHart, Research Masters
Candidate
Loeb 32, Noon

Tuesday, April 9

The Ecosystems Center Seminar Series

"Nutrient uptake estimated by ecosystem budgets and by root measurements (they don't agree)"

Ruth Yanai, State University of New York
Candle House, 12:15 PM

Wednesday, April 10

MBL / BUMP Spring Seminar Series

"Neuronal calcium channels and disease"

Erika S. Piedras-Renteria, Loyola
University, Chicago
Candle House 104/105, Noon

Monday, April 15

MBL Holiday

Tuesday, April 16

The Ecosystems Center Seminar Series

"Variability in the response of treeline forests in Alaska to warming: Insights from tree rings, experiments, and models"

Andrea Lloyd, Middlebury College
Whitman Auditorium, 12:15 PM

Wednesday, April 17

MBL / BUMP Spring Seminar Series

"Lessons from a worm about fusing cells and fusing photons"

Bill Mohler, University of Connecticut
Health Center
Candle House 104/105, Noon

Friday, April 19

The Bay Paul Center Seminar Series

"Mobile Introns: Structure, function, evolution"

Marlene Belfort, New York State
Department of Health, Albany
Candle House 104/105, 4:00PM

Monday, April 22

BUMP Research Discussion

TBA

Gabby Tomasky

Loeb 32, Noon

Tuesday, April 23

Sea Grant Program of WHOI Oceans Alive

"Family Night: Young scientists present winning science fair projects"

Redfield Auditorium, 7:00 PM

Tuesday, April 23

The Ecosystems Center Seminar Series

"Arctic climate variability"

Andrey Proshutinsky, WHOI
Candle House 104/105, 12:15 PM

Wednesday, April 24

MBL / BUMP Spring Seminar Series

"Synaptic signaling in CNS glia"

Dwight Bergles, Johns Hopkins University
School of Medicine
Candle House 104/105, Noon

Friday, April 26

The Bay Paul Center Seminar Series

"Anaerobic methane oxidation in marine sediments: New culture-independent techniques characterize microbes at work"

Kai Hinrichs, WHOI
Candle House 104/105, 4:00PM

Monday, April 29

BUMP Research Discussion

"A stable isotopic determination of nitrogen preferences by phytoplankton and nitrogen transformations in estuaries"

Joanna York, Ph.D. Candidate
Loeb 32, Noon

Tuesday, April 30

Sea Grant Program of WHOI Oceans Alive

"Return of the osprey: Author David Gessner on his recent book"

Redfield Auditorium, 7:00 PM

Tuesday, April 30

The Ecosystems Center Seminar Series

TBA

Whitman Auditorium, 12:15 PM

MEETINGS AND CONFERENCES

April 5 - 7, East Coast Nerve Net

April 7 - 9, Estuarine Research Federation

April 12 - 14, Eastern Regional

Photosynthesis

April 19-21, Northeast Regional

Developmental Biology

April 21-23, Mass General Hospital

April 28-May 1, ImmunoParasitology

For information about meetings and conferences at the MBL, please call (508) 289-7214.

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