Department of Biochemistry & Microbiology Newsletter
Cook College

# The Lipman Log

Volume 1, Issue 2
Max M. Häggblom and Kathy Maguire, Editors

January, 2004

## *Greetings from the Chair:* Alan D. Antoine

I send you my greetings and best wishes. Happy New Year 2004! Since the last issue of *The Lipman Log*, the department has celebrated many special events, awards and anniversaries. This fall marked the occasion of the 30th Anniversary of Cook College and the Graduate School-New Brunswick's 50th Anniversary with special receptions for alumni, graduate students and faculty. The first Dennis Fenton (Ph.D '77) Distinguished Alumni Awards were conferred to nine alumni at the Cook College Annual Awards celebration. The department awarded the third annual H. Boyd Woodruff Microbiology Award to Ms. Hisako Masuda, a new microbiology graduate student. Our newest Assistant Professor, Dr. Elizabetta Bini, has now joined us as the most recent addition to the Genomics and Proteomics Initiative at the college, and our recruited position in Microbial Genomics. The department faculty continue to receive awards and grants and these are listed later in this newsletter. Dr. Gerben Zylstra was appointed Director of the Center for Biotechnology in Agriculture and the Environment. Dr. Keith Cooper is now serving as Acting Dean of Cook College and Director of the NJ Agricultural Experiment Station. At the undergraduate level, Dr. Theodore Chase and I continue to coordinate the college majors in Biochemistry and Biological Sciences, respectively. The college has recently approved a new major in Microbiology for us to oversee beginning next year. This academic year, the department faculty taught or are currently teaching a total of 34 courses at the undergraduate/graduate level. After two long years of dirt and noise, the renovation of Lipman Hall is complete and at a cost in excess of $8 million. While this major project included roof, window, electric, elevator, ventilation system and security upgrades, the highlight event included the construction of a modern 20-student teaching laboratory and lecture room on the second floor. This facility went online in September for use in biochemistry instruction. The New Jersey State budget continues to be tight for us, but we continue to push for additional resources to renovate more spaces in the building. In particular, our plan this year will be to renovate one or two research laboratories in Lipman Hall. To this end, we are constantly on the lookout for donors to help us with these projects.

## The Department of Biochemistry and Microbiology Welcomes Dr. Elisabetta Bini

The Department of Biochemistry and Microbiology welcomes Elisabetta Bini the new Assistant Professor of Microbial Genomics. She spent the past two years at Tufts University with the Department of Biomedical Engineering after obtaining a Ph.D. degree at the School of Biological Sciences, University of Nebraska. Before moving to the U.S., she earned a Doctoral degree at the University of Pisa, in Italy. As a result, her scientific background spans from molecular biology to microbiology and biotechnology. The main goal of her research at Rutgers is the study of the regulation of gene expression in archaeal prokaryotes by using a genomic approach. Archaea are often found in extreme environments (high salt, pressure, extremes of temperature and/or pH). The model system employed in this project is the archeon *Sulfolobus solfataricus* that grows optimally at pH 3 and 80°C (in other words, in almost boiling acid).

Elisabetta will take advantage of its completed genome sequence to generate DNA microarrays. Priorities in her lab are the analysis of processes related with heavy metals resistance, resistance to toxic chemicals and characterization of thermostable enzymes with potential biotechnological and industrial interest.

If any of this sounds interesting to students, they are welcome to come and visit the Bini Lab in Foran Hall!

### Inside this issue:

# Faculty Laboratory Profile

**Dr. Tamar Barkay** Research in my laboratory is focused on the microbial ecology of the interactions of microbes with toxic metals. Specifically, we are looking at microbial transformations of metals and how they affect metal toxicity and accumulation patterns in the environment and at the genetics and physiology of metal resistance and transformations in bacteria. This research supports efforts in bioremediation of metal contaminated environments. Two on-going research projects are focused on the role of microbes in the formation and accumulation of methylmercury in aquatic environments. Methylmercury is the most toxic form of mercury which is accumulated and biomagnified in fish and shellfish posing a risk to predators (including humans) that rely on the aquatic food chain for sustenance. A third project examines the role of horizontal gene transfer among bacteria in the evolution of metal resistance in microbial communities that inhabit metal and radionuclei impacted subsurface (below the root zone) soils. Such genetic spread might facilitate microbial survival and activities in metal contaminated environments. Our research relies heavily on the application of molecular tools, such as cloning, gene probing, mRNA transcript analysis, sequencing and PCR amplification, in microbial ecology.
http://aesop.rutgers.edu/~barkay/

**Dr. Max Häggblom** Research in our laboratory focuses on the biodegradation of environmental pollutants, especially halogenated aromatic compounds. Our specific interests are in understanding how microbes degrade toxic chemicals, such as halogenated aromatic compounds, and how microbial communities can be stimulated to degrade soil, groundwater and sediment contaminants.

Our laboratory is examining the diversity of aerobic and anaerobic processes in the degradation and transformation of environmental pollutants, such as halogenated flame retardants, dioxins, PCBs, MTBE and PAHs. Our research is seeking novel bioremediation strategies for degradation of these compounds in soils and sediments. Our long term research objectives involve examining the diverse catabolic activities of microbes and how biotransformation and biodegradation affect the fate of anthropogenic contaminants. A central objective in these studies is the physiological characterization of the microorganisms involved in contaminant degradation and transformation and the identification of degradation mechanisms and pathways.

The work in our laboratory is currently focusing on identification of degradation mechanisms of halogenated aromatic compounds under different redox conditions, including a biochemical and molecular characterization of the degradation pathways. In addition, we are also examining the population structure and dynamics of anaerobic dehalogenating communities. Another area of interest is the characterization of rhizospheric bacteria involved in biodegradation of organic contaminants and developing their use in bioremediation. The aims of these research projects are to provide a basic understanding of the environmental fate of anthropogenic pollutants as well as to serve as a base for developing novel bioremediation or biocatalytic processes.
http://aesop.rutgers.edu/~haggblom/

**Dr. Paula Marie Ward** was re-appointed Assistant Research Professor in the Department of Biochemistry and Microbiology through 2004/5, where her research centers on the land application affects of recycled waste materials, antimicrobial affects of nutraceuticals, and organic waste conversions to energy and other marketable products. She was named Director of Biomaterials Research by AMIPP (Rutgers Center for Advanced Materials via Immiscible Polymer Processing) researching synthetic hard and soft tissue replacement materials, and appointed Assistant to the Dean for Environmental Collaboration at Cook College.
www.cook.rutgers.edu/~dbm/pmward.html

## FACULTY NEWS

### FACULTY HONORS AND AWARDS

Congratulations to Drs. Tamar Barkay and Max Häggblom for receiving an Undergraduate Curriculum and Teaching Grant for $5000. This award is for their proposal entitled *"Experiences in Applied and Environmental Microbiology"*.

### Grants:

January 1, 2004 - December 31, 2006. NSF RIDGE Collaborative Research: Integrated studies of biological community structure at deep-sea hydrothermal vents. Total amount awarded: $887,622. Lutz, R. A. (PI), Luther, G.W., Shank, T., and **Vetriani, C.** (Co-PI's)

Rutgers University, Research Council Grant "Isolation of Anaerobic Thermophilic Bacteria from Hydrothermal Vents". $1,229. **C. Vetriani** (PI).

Rutgers Undergraduate Research Fellow Program. "Isolation of Thermophilic, Chemolithotrophic, Nitrate-Reducing Bacteria from Deep-Sea Hydrothermal vents. $1,500. **C. Vetriani** (PI), Susan Ellor (student).

Institute of Marine and Coastal Sciences/ Rutgers University Summer Research Program "Microbial oxidation of n-alkanes: isolation of organisms from deep-sea vents and cold seeps, and identification of alkane hydroxylase genes". $2,500. **C. Vetriani** (PI), Ronald Wong (student)

**Lori White** received an NJAES Research Grant. "Generation of a Human Keratinocyte Cell Line Lacking Expression of Id-1 Using RNA interference (RNAi)." ($5000)

### Conferences:


The Arctic Microbiology Research Consortium is organizing an **International Conference on Arctic Microbiology**, in March 22-25, 2004 in Rovaniemi, Finland The Conference, chaired by Dr. Max Häggblom, will bring together scientists working on the physiology, ecology and genetics of psychrophilic and psychrotolerant microorganisms, and their role in biogeochemical cycles and environmental and remedial processes in the Arctic. Conference themes include: Diversity and physiology of psychrotolerant microorganisms, Microorganisms and the biogeochemical cycles of nutrients, Biodegradation of toxic environmental pollutants, Bioremediation of contaminated arctic environments, Ecology of arctic, boreal and alpine soils, and Impact of global climate change on the ecology in the Arctic.

The Conference will be held in the Arktikum Conference Hall in Rovaniemi. Rovaniemi lies on the Arctic Circle, and as the "gateway to Lapland" is an important tourist centre providing excellent facilities and services. Rovaniemi is the provincial capital of Finnish Lapland and is situated on the banks of the largest river in Finland, the River Kemijoki. The University of Lapland and the Arctic Centre are located in the town. For more information on the conference visit www.rovaniemi.fi/armi

# Department News

## Seminars:

**Tamar Barkay** "The mer operon: Old paradigms, new frontiers" was presented on Nov. 11, 2003 to the Dept. of Biology at Georgia Technical University in Atlanta.

**Tamar Barkay** ""Microbe-Metal Interactions" was presented at Fairleigh Dickinson University on Sept. 25, 2003.

**Tamar Barkay** "A seminar on "The interactions of bacteria with mercury or how microorganisms modulate the toxicity of this highly toxic metal" was presented at West Point on Nov. 14, 2003

**Douglas Eveleigh** 2003. "How the Watson Crick model for DNA changed industrial microbiology: Streptomycetes." Symposium marking the 50th Anniversary of the Discovery of the Structure of DNA. Society for Industrial Microbiology Annual Meeting, Minneapolis, MN.

**Douglas Eveleigh** 2003. Application of hyperthermophilic enzymes from *Thermotoga* species - xylanase, alpha-galactosidase and Glucostat. Royal Thai Biotechnology Conference, Pattaya, Thailand.

**Douglas Eveleigh** 2003 "Waksman's discovery of streptomycin cured tuberculosis and spurred the development of the antibiotic industry." Senior Chemists North Jersey Section of the American Chemical Society, held at the Waksman Memorial Laboratory, Martin Hall, Cook College).

## New in Print:

**Barkay, T.**, S. Miller, and A.O. Summers. 2003. Bacterial mercury resistance from atoms to ecosystems. FEMS Microbiol. Rev. 27:355-384.

Benyehuda, G., J. Coombs, P.M. Ward, D. Balkwill, and **T. Barkay**. 2003. Metal resistance among aerobic chemoorganotrophic bacterial isolates from the deep terrestrial subsurface. Can. J. Microbial. 49:151-156.

M.J. Benson, J.D. Gawronski, **D.E. Eveleigh** and D.R. Benson. 2004. Intracellular symbiots and other bacteria associated with deer ticks (*Ixodes scaplaris*) from Nantucket and Wellfleet, Cape Cod, Massachusetts. Appl. Environ. Microbiol. 70: 616:620

McCarthy J. K., C. E. O'Brien and **D. Eveleigh.** 2003. Thermostable continuous coupled assay for measuring glucose using glucokinase and glucose-6-phosphate dehydrogenase from the marine hyperthermophile *Thermotoga maritima*. Analytical Biochemistry 318:196-203.

**Eveleigh, D.** 2003. Use of two pronged needles for simultaneous streaking two Petri plates. April 1, 2003. American Society for Microbiology Education Website

**Eveleigh, D.** 2003. Cellulolysis canards – misconceptions. Amer. Soc. Microbiology News 69:161, ( A letter).

Ravit B, Ehrenfeld JG, **Häggblom MM.** 2003. A comparison of sediment microbial communities associated with *Phragmites australis* and *Spartina alterniflora* in brackish wetlands of New Jersey. Estuaries 26:465-474.

Ahn Y-B, Rhee S-K, Fennell DE, Kerkhof LJ, Hentschel U, **Häggblom MM.** 2003. Reductive dehalogenation of brominated phenolic compounds by microorganisms associated with the marine sponge *Aplysina aerophoba*. Appl. Environ. Microbiol. 69:4159-4166.

Kourtev PS, Ehrenfeld JG, **Häggblom MM.** 2003. Experimental analysis of the effect of exotic and native plant species on the structure and function of soil microbial communities. Soil Biol. Biochem. 35:895-905.

Turpeinen R, Kairesalo T, **Häggblom MM.** 2004. Microbial activity and community structure in arsenic, chromium and copper contaminated soils. FEMS Microbiol. Ecol. 47:39-50.

**Vetriani, C.**, Speck, M.D., Ellor, S.V., Lutz, R.A., and Starovoytov,V. 2004. *Thermovibrio ammonificans* sp. nov., a thermophilic, chemolithotrophic, nitrate ammonifying bacterium from deep-sea hydrothermal vents. Intl. J. Syst. Evol. Microbiol. 54:175-181.

**Vetriani, C.,** Tran, H.V., and Kerkhof, L.J. 2003. Fingerprinting microbial assemblages from the oxic/anoxic chemocline of the Black Sea. Appl. Environ. Microbiol. 69:6381-6488.

Koblízek, M., Béjà, O., Bidigare, R.R., Christensen, S., Benetiz-Nelson, B., **Vetriani, C.,** Kolber, M.K., Falkowski, P.G., and Kolber, Z.S. 2003. Isolation and characterization of *Erythrobacter* sp. strains from the upper ocean. Arch. Microbiol. 180:327-338.

## Our Graduate Students

We have three students who successfully defended their dissertations:

**Gavin C. Swiatek** Ph. D. 2004. Cloning, expression and characterization of beta-galactosidases and a mixed-function glycosidase/aminopeptidase from *Thermotoga neapolitana* NS-E. (Advisor: Douglas Eveleigh).

**Margie Wintermeyer** Ph. D. 2003. The development of an aquatic bivalve model for evaluating the toxic effects on gametogenesis following 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) exposure in the eastern oyster (*Crassostrea virginica*). (Advisor: Keith Cooper)

**Anna Cardosa** MS 2003. Effects of 2,3,7,8,-tetrachlorodibenzofuran on gene expression in two human melanoma cell lines. (Advisor: Lori White)

## Awards/ Publications Scholarships/ Seminars

Congratulations to **Kritee** (Graduate student in Dr. Barkays's Lab) this year's recipient of the New Jersey Water Resources Research Institute graduate student award.

Congratulations also to **Beth Ravit** (Graduate student with Drs. **Häggblom** and Ehrenfeld) this year's recipient of one EPA Star Graduate Fellowship.

**Jeffra Schaffer** (Graduate student in Dr. Barkays's Lab) presented a talk titled "Mercury contamination in Berry's Creek and downstream ecosystems" at a conference held at the Meadowlands Environmental Research Institute in Oct. 2003.

## Visiting Scientists at the Department


Chulalongkorn University, Bangkok, Thailand: The Department hosted an Educational Exchange Visit with five faculty, Professors Nantana Angkinand (Chairperson), Tuenchai Kosakul, Teerada Wangsomboondee, Pongtharin Lotrakul and Hunsa Punnapayak from the Department of Botany, Chulalongkorn University, Bangkok, Thailand during the first week in December. The visitors were welcomed by the University (Seth Golpin, Albert Ayeni and Richard Merritt) and Cook College (Dean Daniel Rossi). They toured the High Throughput Screening and Nucleic Acid Sequencing (Gerben Zylstra); the Electron Microscope (Lee Simon), the FAME Microbial Identification (Max Häggblom) and the Structural Biology Computational (Peter Kahn) Facilities. They had detailed discussions with John Dighton (Pinelands Institute), Douglas Eveleigh, Bradley Hillman, Donald Kobayashi, Lena Struwe and James White, and also with Michael Braverman, USDA IR-4 Project at Rutgers. The Thai team had lively interaction with the Departmental graduate students including Thai students Sehanat Prasongsuk (Chulalongkorn University) and Piyapawn Somsamak (Kasetsart University). Mr. Prasongsuk is studying black yeasts and pullulan production in Dr. Eveleigh's laboratory. The Thai team rounded out their visit by honing their molecular biological skills through isolation of fungal ITS DNA sequences used to identify new black yeast isolates. Mariusz Tadych took the team for a tour of the recently renovated Library and Herbarium of the New York Botanic Gardens.

The visit was part of an on going co-operative research venture of The Thai Research Fund and was aided through the Fenton Research Fund. As a result of the visit, further co-operative research studies have been arranged.

## Fall 2003 NJAES Distinguished Lecture Series:

**September 11 - Margy Wintermyer**
Department of Biochemistry & Microbiology
Cook College, Rutgers University
**"The effects of 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) in the gonad of the Eastern Oyster (*Crassostrea virginica*) during gametogenesis"**

**September 25 - Jonna Coombs**
Department of Biochemistry & Microbiology
Cook College, Rutgers University
**"Evidence for lateral transfer of metal homeostasis genes among isolates of the deep subsurface and in completed microbial genomes"**

**October 23 - Paula Marie Ward**
Department of Biochemistry & Microbiology
Cook College, Rutgers University
**"Organic Energetics: A new approach to waste disposal, energy production, and environmental stewardship"**

**November 20 - Douglas Eveleigh**
Department of Biochemistry & Microbiology
Cook College, Rutgers University
**"Cellulase and the demise of the dinosaurs"**

**December 4 - Patricia Sobecky**
Dept. of Biology - Georgia Institute of Technology
**"Microbial Plasmids: traits, triggers and untapped diversity"**

# Alumni Connection

**By Kathy Maguire**

Many told us they enjoyed reading about old friends and colleagues! If you haven't already, send us your email so we can keep you posted… Have a great year!

**Douglas Beecher,** Ph.D, 1990 (advisor: James MacMillian, Emeritus). Received the distinguished FBI Director's Award for Advancement in Science or Technology for his work on development and implementations of forensic microbiology at crime scenes.

**Dolph Klein**
**kledolph@acpub.duke.edu** After 53 years of continuous employment in microbiology at sundry institutions, I retired emeritus from Duke University as of July 1, 2003, I enjoyed reading the premier issue of "*The Lipman Log*". May this publication have a successful and long-term run.

**Tom Jeffries (Ph.D )** was awarded this year's prestigious Charles D. Scott Award of the Biotechnology for Fuels and Chemicals Symposium, a particular honor in that this was the Quarter Century Award. Tom's training was under James Macmillan working on yeast cell-wall-degrading enzymes (1975), also having had a graduate student mini-sabbatical with Elwyn Reese and Mary Mandels studying cellulose transformations at the US Army Natick Laboratory, MA. His post-doctoral studies were with Harry Gregor, Columbia University, on anaerobic cellulose fermentation for production of short chain fatty acids. He joined the US National Forest Products Institute, Madison, WI in 1979 to work on means to utilize forest and agricultural biomass resources. His early accomplishments were on the regulation of microbial pathways in the transformation of lignins. Pentose sugars are an alternative Biomass Feedstock which, unfortunately, brewer's yeast cannot ferment. In order to convert these pentoses to alcohol (Gasohol), Tom has developed recombinant yeasts such as Pichia stipitis; he is a world authority on these fermentations. Tom is now Director of the Institute and a Professor of Microbiology at the University of Wisconsin. In reviewing his achievements, Tom emphasizes the love and encouragement from Giovanna and their three grown daughters, Angelica, Carla and Francesca. What a career, that began as he emerged with his new doctorate fully clothed from Jim Macmillan's swimming pool! Congratulations Tom.

**Martin J. Lee, Ph.D.**
**Chief Executive Officer, Savyon Diagnostics**
**martylee@inter.net.il** I did both my undergraduate and graduate work at Rutgers and was Jim Macmillan's first graduate student. Starting my freshman year in 1961, during my senior year I took Might Taylor's (may he rest in peace) biochemistry course. Let me tell you he taught a great course and it really excited me. I enrolled in the Ag school Dept of Biochemistry just in time to see it change names to the Dept of Biochemistry and Microbiology. As I mentioned I became Jim Macmillan's first graduate student… Also, I had studies in Soil Microbiology with Dave Pramer who I also miss... In any event whether by luck/ sheer accident or whatever, I received my Ph.D. In January of 1969. I remember 3rd floor of Lipman Hall very well. When I close my eyes it could be yesterday. I often visit my sister in Springfield, and would be glad to stop in when I am in the area.

**Dante Mott**
**dante.mott@roche.com** Clinical Research/Clinical Study Auditing-Hoffmann-La Roche Inc., Hi! Just received the Lipman Log and it brought back fond memories. I received an MS from Cook in 1976. My advisor was Dr. Alan Antoine and I was elated to see his name again after all these years! Congratulations to him on his well deserved Academic Professional Excellence Award. I can vouch for the fact that he is the best advisor anyone could ask for! Wonderful! Best regards, Dante J. Mott

**Humberto Trimiño**
**Centro Plycem**
**humberto.trimino@amanco.com** Uberto Trimino graduated with Dr. Eveleigh and Chase in 1982, writes from Costa Rica. He recently moved from academia (Universidad Nacional) to a fiber cement company, noting how biochemistry encompasses all walks of life. Jenny has her own "Senior Citizens Day Care Center" and she specializes in depression and Alzheimer's disease. Diana, whom we knew in the Department as a baby, is finishing Law School, and is also a great dramatic soprano, plus the "new trove" folk ballads a la Joan Baez, Bob Dylan or Cat Stevens. Beto a new addition of 17 years of age, is in High School with eyes set on Electromechanical Engineering. Umberto has now spent five years in Centro Plycem, an R&D center for Plycem, a fibercement product. He writes: Who would believe that a biochemist could end-up working on construction products? Nevertheless, I keep teaching nightly courses in Biochemistry. I am also tutoring two thesis for Licenciatura right now.." Two students continue his research studies with cellulase.

**Joe Menetski,** B.A. 1983, known to many as *Joe Zymomonas* from his research topic with Dr. Chase, has been at Pfizer in Ann Arbor, MI since 1993, after a Ph.D. at Northwestern University Medical School (1988) and post-doctoral work at NIH with Martin Gellert. However, he would like to get out of industry and into teaching.

Dr Ted Chase heard from **Rob Sandoli**, B.S. in Biotechnology, 1991, who is now a Program Examiner in the Office of Management and Budget, Executive Office of the President, Washington, DC.

**Alumni Connection**
**Please pay us a visit and share your thoughts takes a few minutes to connect!**
http://www.cook.rutgers.edu/~dbm/aboutus.html
Or email me (Kathy) maguire@aesop.rutgers.edu

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## What's *Shaking*?

A special welcome to the newest members of the Department: Hisako Masuda - graduate student and Woodruff Fellow; Heather Wiatrowski, a post doc in Tamar Barkay's Lab, Aspasia Chatziefthimiou a graduate student in Tamar Barkay's Lab; Zhanpeng Yuan a post doc in Keith Cooper's Lab and Leslie Wickam a graduate student in Max Häggblom's lab.

An Undergraduate Biochemistry Club has been formed and has had several meetings, including demonstrations of gas and high performance liquid chromatography by Dr. Häggblom. Contact: biochemclubofcookcollege@hotmail.com.

**Doug Eveleigh** turned 70 on December 6, and the Department honored him with a "**70th Birthday Brunch**" fun was had by all… Dr. Eveleigh is learning to play the 'bag pipes'

**Jedd Hillegass** (Dr. Cooper's Lab) and Wendy Myers were engaged on October 25, 2003.

Harmen Fennell Both was born on Tuesday, January 20 at 7:59 am. He weighed in at 8.06 lbs, 21 inches long ! Both Harmen and his parents **Donna Fennell** (Post doc with Max Häggblom, now a professor in Environmental Sciences, Cook College) and AJ Both are delighted.

Congratulations to **Arleen and Michael Nebel** who welcomed their first grandchild Brianna Nicole Procaccini on January 26th. Brianna weighing in at $7^{lbs}1^{oz}$, and 19 inches long, is the daughter of Cory and Paul Procaccini.

**Theo and Olwen van Es** report from "*Down under*!" From December 2003-January 2004 the family visited Australia. The visit was partly a family reunion, Olwen's two brothers live in the country about 120 miles North of Sydney. Lots of wallabees, monitor lizards, parrots, lorakeets and not to forget the mosquitoes ("mossies") and flies. Dr. van Es spent quite a lot of time with his co-researcher, Dr. Ben Staskun, who has recently moved to Sydney. He holds an honorary visiting professorship at Macquarie University and visited there on a number of occasions to use their excellent library facilities. They were able to put the final touches on two research papers which had been in the works for some time.