

The Biotech Brief

NH Biotechnology Education & Training Center Opens at NHCTC Pease

A new training center to prepare students to enter the biotechnology industry or allow them to further their education opened October 21st at NH Community Technical College's Emerging Technologies Center at Pease International Tradeport in Portsmouth. The ribbon cutting ceremony was attended by Bill Shaheen, husband of Governor Jeanne Shaheen, former NH Governor John H. Sununu, father of NH 1st District Congressman and Senator-elect John E. Sununu, officials from the National Science Foundation, the biotechnology industry and education.

There are two learning segments in the facility—a biomanufacturing suite and a discovery research wet lab. The 5,000 square foot lab was built with a \$315,000 federal grant secured for the college with the help of New Hampshire's congressional delegation. NHCTC is currently seeking additional federal funding to further expand its biotechnology program through the establishment of a biotechnology incubator and the construction of "smart" classrooms at the Emerging Technologies Center.

"Like City Lab, we can offer our facility and faculty as resources for tours and hands-on experience for high school students. In addition,

Photo courtesy of biotech.tec.nh.us



throughout the year, we partner with the Eastern Region to provide professional development to secondary science educators", said Dr. Sonia Wallman, Biotechnology Department Chair.

Carolyn Kelley, Seacoast School of Technology Biotechnology Teacher, Patty Lawson, Biology Teacher at Londonderry High School and Erika Nelson who teaches Microbiology and Biology at Portsmouth High all attended the event.

40 Educators Attend Biotechnology Workshops

Forty high school science educators from around the state gathered recently at NHCTC's Emerging Technologies Center in Portsmouth to discuss creating a science fair system for NH high school students. Topics included the Science Research Program at Mt. Ararat HS, ME and the NH' Junior Science and Humanities Symposium. Clive Beasley, Director of the Massachusetts State Science Fairs talked about creating a New England science and technology open competition.

Back by popular demand, Dr. Ronnee Yashon,

Professor of Genetics and Law at Tufts University delivered a lively presentation on the timely topic of bioethics entitled "Cool Genes: Hot Topics".

Dr. Leslie Barber, Biotechnology Professor at NHCTC presented a hands-on workshop on the new field of Bioinformatics.

The workshops were sponsored by NE Region Bio-Link, Eastern Region Partnership and NH Community Technical College.

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SST Students Working With New England Aquarium to Investigate Genetically Modified Organisms - Cassie Ricard, SST Biotechnology Student

If you read the papers or watch the news, you've heard of biotechnology. It's an exciting field that is relatively new to our world and to our community. However, Seacoast School of Technology (SST) in Exeter saw an opportunity for their students and began a Biotechnology Program last year. It is a three-year program for high school students from around Seacoast.

This year, the Biotechnology II class is running a simulation of an actual biotech company. Their company, Eureka!gen, is utilizing the protein from a Pacific jellyfish, the green fluorescent protein (GFP), to investigate genetically modified organisms by studying a plant that glows by using the jellyfish gene. Eureka!gen will also be designing a display on genetically modified organisms around the jellyfish and the GFP

with the New England Aquarium early next year.

The goal of this simulation is to provide students with the opportunity to learn modern techniques. The company simulation combined with the skills the students are gaining will give the Biotechnology II students intensive on-site training in current scientific practices and in working as a functional group towards a common goal. They will also be learning the 'business of the business' through processes such as applying for grants. All of these skills will help to prepare students for careers in biotechnology, forensics, microbiology, genetics and others.

Aside from preparation for future careers and further schooling, students listed "proving ourselves and the abilities of

young adults to the community", "educating others about the field of biotechnology", and "working to create more educational programs like this one" as reasons for being a part of Eureka!gen and Biotechnology II. Eureka!gen has hit the ground running. They are presently finishing their business plan and grant applications and are looking at "fossils" in their own DNA (prehistoric sequences) in order to develop necessary techniques prior to working with the jellyfish. The Biotechnology II class is looking forward to sharing their successes and their hurdles with the community and hopefully we can all learn along with them. For more information about the SST Biotechnology program, call 775-8580 or visit www.seacoasttech.com

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Nashua High School Offers First Biotech Course



Nashua students research a project on biomolecules.

Eighteen students are enrolled in the first Biotechnology I course at Nashua High School North. This is the first of the two-year sequence of Biotechnology courses offered at the Nashua Technology Program. It is an academic course based in laboratory activities. Students are learning the current theories and technologies of the biotech industry, basic laboratory protocols as well as advanced techniques concerning cell structure, genetic manipulations, medical microbiology, process control design and implementa-

tion and protein production and purification. To the greatest extent possible, "real-world" conditions are simulated. Opportunities will be developed for possible research projects or internships in the industry.

"The students' motivation to research cells, proteins and DNA in the laboratory and through biotechnology on-line resources show their natural interest in this emerging field, which is expected to shape their future in many ways" said Dr. Liane Marciano who is teaching the course.

The Green Team

- Dustin Harroff, Biotech II Student, Milford High School

The Milford High School Biotechnology II class is off to an exciting start. The students, all having completed one year of Biotech I, have set out on an ambitious goal. By the end of the year they hope to make bacteria, CHO cells and plants glow. They have started to do this by isolating the gene for green fluorescent protein (GFP) from the *Aquaria Victoria* jellyfish. The jellyfish were provided by scientists in Washington and were graciously maintained by Stephan Spina at the New England Aquarium. In October the class took a field trip to pick up their jellyfish and at the same time received a behind the scene peak at how jellyfish and other marine life are maintained and studied at the New England Aquarium. Initially they placed the jellyfish on a UV light box so they could observe which tissue was expressing the fluorescent protein in the jellyfish. They then harvested the fluorescent parts of the jellyfish and isolated the mRNA. This allowed them to continue on with making GFP cDNA, the genetic material necessary for

making green fluorescent protein. To get to this step they used the purified mRNA and an enzyme known as reverse transcriptase (RT) in a process called RT-PCR. In RT-PCR the retrovirus enzyme RT is used to produce cDNA from mRNA. This cDNA can then be used to express GFP in a variety of living systems. GFP is interesting to scientist for many reasons. One property of GFP includes its ability to glow green in the presence of UV light. Once the students have completed their efforts cloning the GFP gene they will be looking to progress into large-scale GFP expression, purification, and developing anti-GFP monoclonal antibodies.

In addition to the work being done in the lab the students have created a fictional company they have named PANGEA. The name PANGEA comes from the term used to describe the original content that broke into the seven continents we have today. The students felt it was important to underscore their talents and the power that such a force could carry.

Within the company students have accepted positions which imitate traditional corporate responsibilities. The group holds regular staff meetings to discuss individual expectations and discuss strategic decisions.

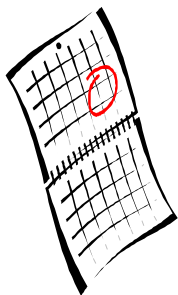
The students participating in this class are receiving college credits through the Running Start Program offered by the New Hampshire Technical Community College. These credits will help them to further their learning in the biotech field.

“Once the students have completed their efforts cloning the GFP gene they will be looking to progress into large-scale GFP expression, purification, and developing anti-GFP monoclonal antibodies.”



Katelyn Harroff and Vickie Zgonis, Biotech Students at Milford High School

Upcoming Events— Save the Dates!!



- March 25: NH Science Teachers Association Meeting
Philips Exeter Academy
- March 31: 8th Annual Symposium on Biotechnology Education
Boston Museum of Science Register on line: www.mos.org/biotech
- June 20–22: BIO 2003 National Biotechnology Teachers' Program
Washington, DC
- June 23- 25: Summer 2003 Biotechnology Institute - Beginner & Advanced Tracks
Seacoast School of Technology, Exeter, NH

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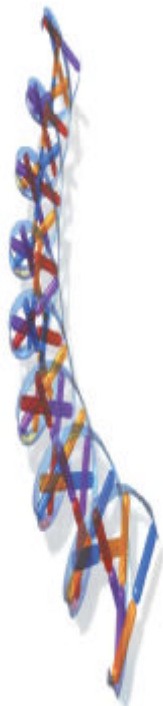
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What is Bioinformatics, Anyway? - Dr. Leslie Barber, Biotechnology Program, NHCTC



Like biotechnology” before it, the term “bioinformatics” is well on its way to achieving buzzword status. It is difficult to open the business pages these days without coming across some reference to bioinformatics as “the next big thing”. But what is it exactly? Defined narrowly, bioinformatics is simply computational biology: the use of mathematical algorithms and computers to analyze and organize large and/or complex sets of biological data.

Computational biology has long been a part of biological research in such subdisciplines as ecology, evolutionary biology and structural biochemistry. Comparatively new is the tremendous demand for

computational tools in the area of molecular biology, this in the wake of the mountains of data generated by hundreds of organismal genome projects. Examples of computational tools developed specifically for the analysis of genome data are: Sequencher (for the assembly of “raw” DNA sequence data), ORF Finder (for identification of likely gene sequences within raw DNA sequence), BLAST (for aligning pairs of DNA or protein sequences), Clustal W and COGS (for the investigation of evolutionary relationships between gene or protein sequences), and INTERPRO (for investigation of sequence: structure: function relationships in proteins).

The good news for teachers is that nearly all bioinformatics tools, and their related databases, are available on-line and free of charge. Want to learn more? The best place to start is the web site for the National Center for Biotechnology Information (NCBI) at:

www.ncbi.nlm.nih.gov. Here you can directly access a broad range of tools and databases. Also available are tutorials, curriculum information designed specifically for educators, and a wide variety of links to related sites. Bioinformatics-based curriculum materials can also be found at the Bio-Link web site at: www.biolink.org.