

BIO BIZ

A publication of the
Athens Tech Biotechnology Program

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This month, Bio Biz is taking a look at The importance of Bacteria & Viruses in Biotechnology.

Bacteria Eating Virus Approved As Food Additive
Adapted from an article By Linda Bren

(FDA Consumer magazine [January-February 2007](#))

Employment opportunities

Athens Research & Technology Inc are looking for Research scientists.

Pilgrim's Pride is hiring a full time microbiology technician
www.pilgrimspride.com

Avigenics currently has positions available. Full time and student workers. (contact: Lisa Haskins 706-227-1170 or haskins@avigenics.com)

Merial currently has 1 R&D and 6 industrial operation positions open. (us.merial.com/careers)

GBI crime lab associate
www.ganet.org/gbi/
JOBS/

Recently, the FDA approved a mixture of viruses as a food additive to protect people. These viruses which are known as bacteriophages, can be sprayed onto beef and poultry products to protect consumers from the potentially life-threatening bacterium *Listeria monocytogenes* (*L. monocytogenes*) which can cause listeriosis.

Listeriosis is rarely serious in healthy adults and children, but can be severe and even deadly in pregnant women, newborns, older people, and people with weakened immune systems. According to the CDC, about 2,500 people become ill with listeriosis each year in the United States.

Humans are routinely exposed to bacteriophages which are found in soil and water, and they are part of the microbial population in the human gut and oral cavity. Bacteriophages infect only bacteria and not plants, people, or other mammals. Bacteriophages are very specific and each strain infects only one type or a few types of bacteria. The particular phages approved as a food additive are very specific to *Listeria* and only thrive if *Listeria* is present.

The type of phage that was approved is lytic, which means that the phage takes over the metabolic machinery of the bacterium, forcing it to produce hundreds of new phages until the bacterium breaks open. This process kills the bacterium and releases many new phages, which seek out other bacteria to invade and the cycle repeats itself. When the bacteria are all destroyed, the virus will gradually become inactive.

Bacteria Eating Up Oil Spills

Biotechnology Online School Resource For further information contact the Gene Technology Information Service on www.biotechnology.gov.au

Humans find that ingestion of oil is toxic to them but to certain bacteria, oil can be manna from heaven. Crude oil is a very complex mixture of carbon compounds some of which are cyclic like Benzene while others form straight chains like heptane. Some common strains of soil living bacteria and fungi use enzymes to break up these carbon complexes. Some of these bacteria digest the big hydrocarbon molecules of oil, generating much shorter chains of carbon; other bacteria consume these shorter chains. At the termination of this teamwork, the oil has been completely digested to water, carbon dioxide & alcohol.

To increase the efficiency of these bacteria, some biotech companies have, genetically modified these bacteria to secrete more of the important enzymes. One product on the market is BIO-SYSTEMS B350. B350 was developed for use in the biological wastewater treatment of refinery and petrochemical wastes. Great for breaking down hydrocarbon based oils. B350 is made up of aerobic and facultative anaerobic microorganisms which have a greater resistance to the effects of organic inhibitors present in refinery waste waters and are thus able to perform more effectively than the naturally occurring organisms.



La Brea tar pit yields oil-eating bacteria.

GeoTimes July 2007

Crowley says the bacteria may be very used to clean up oil spills through bioremediation, the process by which bacteria's enzymes dissolve pollutants the bacteria can then digest. The bacteria bioprocess impurities out of oil or animal waste to energy-producing also aid in the production of new petroleum-based products like plastics, or



useful. For example, they may be used for bioremediation, the process by which bacteria's enzymes dissolve pollutants in soil and water into a solution that bacteria can then digest. The bacteria could also enhance oil recovery from tar sands, or converting heavy oil or methane, he says. The bacteria may also be used to produce petroleum-based products like plastics, or

Additional information about the Biotechnology & Pharmaceutical Manufacturing technology programs is available at:

www.athenstech.edu/gabiotechinst

This publication was funded by a:
Community Based Job Training DOL grant

Biotechnology Program Department of Labor Grant Scholarship

A student must be enrolled in a biotechnology/bioscience program major to be eligible for this financial support. Recipients must have completed 25 Associate level credit hours including CHM 191, MAT 191, and BIO 197. Funding will cover tuition, books, and supplies not covered by any other financial assistance such as HOPE, Pell, or WIA.

Web	www.athenstech.edu/gabiotechinst
Amount of Award	This financial support may be used for books, supplies, and tuition. The maximum amount of financial support is \$2,250.
Application Deadline	Midterm of the preceding quarter, Deadline for winter quarter is Oct 30th.
Contact	Dr Jeff Rapp jrapp@athenstech.edu

This assistance is available through a federal grant from the U.S. Department of Labor. Recipients must be a U.S. citizen and agree to comply with U.S. Department of Labor reporting guidelines.

Biotechnology terms:

Microbial fermentation: A form of bioprocessing that has been used for thousands of years to brew beer, make wine, leaven bread & pickle foods. Today, companies rely on naturally occurring microorganisms to manufacture a variety of items such as antibiotics, vitamins, pigments, pesticides & industrial solvents.

Stem Cells: are primal undifferentiated cells which retain the ability to differentiate into other cell types. Medical researchers believe stem cell research has the potential to change the face of human disease by being used to repair specific tissues or to grow organs.

Genetically modified organisms (GMO): are organisms whose genetic material has been altered using techniques in genetics generally known as recombinant DNA technology. Recombinant DNA technology is the ability to combine DNA molecules from different sources into the one molecule.

Biotechnology programs at Athens Technical College:

Associate Of Applied Science Degree Programs

Biopharmaceutical Manufacturing Technology
Biotechnology

Technical Certificates of Credit

Analytical laboratory technician
Aseptic Fill Technician
Molecular Biology Technician
Quality Assurance & Validation Technician

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