IOWA TEACHERS RECEIVE FREE SUPPLIES FOR BIOTECH EXPERIMENTS

Since the summer of 1994, Iowa teachers have received equipment, supplies, and curriculum materials for classroom biotechnology experiments from the Office of Biotechnology at Iowa State University. Free laboratory supplies and curriculum materials for seven biotechnology experiments are available for the 1996-1997 academic year:

- DNA Extraction from Bacteria
- DNA Transformation of Bacteria
- MacConkey Alternative DNA Transformation Procedure
- DNA Fingerprinting
- Chymosin Demonstration
- Soybean Flavor Demonstration
- Micropropagation of Plants

To obtain free supplies for these experiments, please contact Lori Miller, Office of Biotechnology, 1210 Molecular Biology Building, Iowa State University, Ames, Iowa 50011-3260, phone: 1-800-643-9504 or 515-294-9818, FAX: 515-294-4629, or e-mail: lorimill@iastate.edu.

Each school district in Iowa has been provided with a kit of equipment to conduct DNA extraction from bacteria, DNA transformation of bacteria, and the MacConkey alternative DNA transformation procedure.

To conduct DNA fingerprinting, teachers may check out electrophoresis equipment by contacting their Area Education Agency. If an AEA kit is unavailable, teachers can contact one of the following Extension professionals for the equipment:

Debbie Curry, ISU Extension - E-SET, 32 Curtiss Hall, ISU, Ames, Iowa 50011-1050, phone: 515-294-8417, FAX: 515-294-1047, e-mail: x1curry@exnet.iastate.edu

Sue Delaney, Monroe County Extension, 107 Benton Ave. E, Albia, Iowa 52531, phone: 515-932-5612, FAX: 515-932-5662, e-mail: x1delane@exnet.iastate.edu

Dennis DeWitt, Dickinson County Extension, 1610A 18th St., Spirit Lake, Iowa 51360, phone: 712-336-3488, FAX: 712-336-3498, e-mail: x1ddewit@exnet.iastate.edu
Iowa's biotechnology educators may now telephone the Office of Biotechnology at Iowa State University during the Office's regular hours of 8:00 a.m. to 5:00 p.m. weekdays, except for university holidays at:

1-800-643-9504

Outside of Iowa, the Office of Biotechnology may still be reached at 515-294-9818.

When a teacher or student needs to talk to a biotechnology expert, one is as close as the telephone or computer modem. Maybe a lab protocol failed to work or you can't find a good explanation of a genetic concept. Whatever your biotechnology problem, Iowa State University can help.

Tom Ingebritsen and Gary Polking, instructors for the Iowa State University Public Education Program in Biotechnology, are available to provide help to teachers and their students. Questions can be sent to Dr. Ingebritsen at e-mail address tsingebr@iastate.edu or to Dr. Polking at his e-mail address polking@iastate.edu. Either instructor also may be telephoned toll-free in Iowa at 1-800-643-9504.

Ingebritsen, an associate professor in the Zoology and Genetics Department at Iowa State, has been involved in ISU's biotechnology outreach since 1992. He has taught numerous teacher workshops and youth camps around the state.
Ingebritsen also serves as the "webmaster" who oversees the Public Education Program's homepage on the Internet (see story below).

"Working with teachers and students around the state has been very rewarding for me," Ingebritsen said. "It's exciting to see how willing they are to learn molecular biology techniques."

Polking is an assistant scientist and DNA synthesis specialist in the DNA Facility, one of ISU's Biotechnology Instrumentation Facilities. His involvement with the Public Education Program in Biotechnology began in the summer of 1995 when he taught at workshops for master teachers. He also has developed or fine-tuned many of the procedures in the laboratory protocols distributed by the Office of Biotechnology.

**For Biotechnology Questions:**

Dr. Tom Ingebritsen  
e-mail: tingebr@iastate.edu

Dr. Gary Polking  
e-mail: polking@iastate.edu

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### ISU BIOTECHNOLOGY HOMEPAGE

The World Wide Web homepage of the Iowa State University Public Education Program in Biotechnology is a teacher's ticket to the latest biotechnology information. The homepage address on the Internet is:

http://biotech.zool.iastate.edu/Biotech_Public_Ed.html

When the homepage screen appears, you will see topics that you may explore by pointing and clicking. A brief summary of each of the current choices follows:

**Resources from ISU**

Information about Iowa's master biotechnology teachers, laboratory procedures, PCR activity, tips for teachers, current and back copies of the Iowa Biotech Educator, news releases, pig gene mapping information, other news, and the Biotechnology Information Series:

- Principles of Biotechnology
- Careers in Biotechnology
- Bovine Somatotropin (bST)
- Porcine Somatotropin (pST)
• Plant Disease Diagnostics
• DNA Fingerprinting in Human Health and Society
• DNA Fingerprinting in Agricultural Genetics Programs
• Genetically Engineered Fruits and Vegetables
• Insect Resistant Crops Through Genetic Engineering
• Pharmaceutical Production in Transgenic Animals
• Regulation of Genetically Engineered Organisms and Products
• Products and Applications
• The newest biotechnology developments for animals; plants; food; human health; regulation; careers; and ethical, legal, and social implications

Other Resources
• Newsletters, listservers, news articles, and World Wide Web sites of other institutions
• What's New?
• The latest updates to the biotechnology homepage
• Feedback
• Comments, questions, or suggestions about the Public Education Program homepage
• Conferences
• Biotechnology at ISU
• A directory of biotechnology faculty and their research interests, The Innovator newsletter of the ISU Biotechnology Instrumentation Facilities, information about the Facilities, the Biotechnology Update newsletter, and information about the ISU Public Education Program in Biotechnology
• Project BIO
• Information about a partnership of biology educators and students at ISU, Iowa community colleges and high schools, and selected Iowa industries whose goal is to develop and share biology educational resources via the Internet
• On-Line Biology Courses
• Current ISU biology courses offered via computer network
• On-Line Biology Seminars
• Current ISU biology seminars offered via computer network

What's New?
• Recent postings on the ISU Public Education Program in Biotechnology homepage include:
• Iowa Biotech Educator
  January, March, May issues
• Tips for Teachers
  Teaching biotechnology to adults; Saqib Mukhtar
  Planning a biotechnology fair; Jo Bodeker, Shirley Pantini, and Linda Frisch
• Access Excellence; Jeff Weld
• Fast Plants; Gary Garton, Ron Wilmot, Jay Staker, Deb Wegmann, and Darrin Strike
• Pig Gene Mapping Information
• World Wide Web site resource on current swine gene mapping efforts and new technology to improve the animal industry

News Releases
• New Cell Line May Simplify Gene Transfer and Vaccine Development in Cattle
• ISU Animal Scientists Find Genetic Key to Improving Milk
• Search for Bacteria Could Improve Food Safety
• "Stressed-Out" Bacteria Could Help Protect Plants and Reduce Livestock Waste Odors
• ISU Using Biotechnology to Study Endangered Wildlife
• Ultra-Sensitive Microscope Could Detect Early Stages of Disease
• Reprogramming Fat Cells Could Lead to Low-Fat Meat, Milk, and Eggs
• Gene Cloning Project May Lead to Improved Corn Hybrids
• Research Targets Bacteria Injured by Food Treatments

New Links
• BioMed Net; a worldwide club for the biological and medical community covering all areas of biotechnology and genetic engineering
• National Agricultural Biotechnology Council Web site
• Center for Advanced Technology in Biotechnology at Cornell University
• The University of Wisconsin Biotechnology Center's newly redesigned Web site

In the News
• Biotechnology for the 21st Century: New Horizons; A report describing federal investment in biotechnology and identifying research priorities for the future
• New article on careers in the sciences

Other Resources
National Biological Impact Assessment Program's
Information Systems for Biotechnology Reports:
April: Sheep Cloning by Nuclear Transfer and 10 more articles
May: Access Excellence: A Web Site for High School Biology Teachers and 12 more articles
June: Recombinant Proteins from Milk of Transgenic Animals and 10 more articles
July: Update on field trials approved by USDA-APHIS and 9 more articles

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NATIONAL BIOTECH EDUCATOR CONFERENCE
The national conference Extension's Role in Biotechnology Education will provide youth and adult educators with the knowledge and resources needed to effectively communicate about biotechnology science, products, and issues. Although the conference targets Extension professionals, all youth and adult educators who teach biotechnology are encouraged to attend.

The conference, hosted by Iowa State University on October 20-23, will have more than 40 concurrent workshops emphasizing practical hands-on biotechnology experience. In addition, a bioethics panel discussion and workshops on the basics of biotechnology and how to deal with controversial issues are scheduled. Participants also may attend numerous sharing sessions, displays, and poster sessions.

Keynote Speakers

Tom Zinnen, Biotechnology Education Specialist, University of Wisconsin Biotechnology Center and Univ. of Wisconsin-Extension, Madison, who will focus on Extension's Role in Biotechnology.

Donald Weeks, Director of the Center for Biotechnology, University of Nebraska-Lincoln and a professor in the Department of Biochemistry and in the School of Biological Sciences, Lincoln, will speak on The Future of Biotechnology.

Margaret Mellon, Director, Biotechnology and Agriculture Project, Union of Concerned Scientists, Washington, D.C., will address Society's Concerns About Biotechnology.
Conference Registration
Those with access to the Internet will find a schedule, workshop abstracts, and a registration form they can print and mail on the Iowa State University Public Education Program homepage at http://biotech.zool.iastate.edu/Biotech_Public_Ed.html. Registration materials also are available from the ISU Office of Biotechnology. The registration fee for Iowa educators is $75 for the entire conference or $25 per day. Please register before Sept. 20.

Sponsored By
The conference is jointly sponsored by Iowa State University Extension and the ISU Office of Biotechnology; the U.S. Department of Agriculture Cooperative State Research, Education, and Extension Service; University of Wisconsin-Extension and UW Biotechnology Center; and the National Network for Science and Technology.

Biotechnology Course on the Internet
Persons with access to the Internet can take the ISU course Biotechnology in Agriculture, Food, and Human Health on-line this fall or next spring. The 2-credit undergraduate or graduate course will focus on the scientific principles and techniques of biotechnology; new products and applications; and ethical, legal, and social issues related to biotechnology. Students will "attend" multimedia lectures with audio and visual materials and participate in active learning projects from Project BIO's World Wide Web site. A term paper will be required for graduate credit.

Registration and course details are available on-line at http://biotech.zool.iastate.edu/Biotech_Public_Ed.html or from instructor Dr. Tom Ingebritsen, Zoology and Genetics Department, ISU, Ames, Iowa 50011-3223, e-mail: tsingebr@iastate.edu; phone: 515-294-9432; or FAX: 515-294-8457.

DMACC Adds Two-Year Biotech Degree
The Ankeny campus of the Des Moines Area Community College (DMACC) is starting a new two-year career option program in biotechnology, announces Dr. Beryl J. Packer, Biology Instructor and Biotechnology Program Chair. Upon completion of the program, students are awarded an Associate in Science degree and may enter the workforce or transfer to a four-year institution. The
new program was initiated by DMACC administration in direct response to requests from industry and the Greater Des Moines Chamber of Commerce Federation, Packer says.

The curriculum includes many lab-based courses to help students apply what they learn in chemistry, math and statistics, biology, microbiology, genetics, and molecular biology. Specific skills, such as written and oral communications, critical thinking, problem-solving, computer skills, and small group collaboration, are an integral part of the program. Students also are required to serve an internship with a potential employer.

"We'll be hosting some mini-workshops about the new degree for interested secondary school teachers and their students," Dr. Packer said. "We'll start scheduling them for sometime in October, and they will be available at different times throughout the school year."

Information about the curriculum, prerequisites, specific texts, and course outlines for the new program is available from Dr. Packer. "Anyone who is interested in additional information can be placed on our mailing list," she added. "I'm happy to answer questions from teachers or students anytime."

Beryl Packer may be contacted at the following address: Dr. Beryl Packer, Des Moines Area Community College, 2006 S. Ankeny Boulevard, Ankeny, Iowa 50021, telephone: 515-964-6589; FAX: 515-965-7083; e-mail: bjpacker@dmacc.cc.ia.us.

**DISTANCE LEARNING FOR FOOD BIOTECH**

Montana State University and Colorado State University are offering two food biotechnology courses via computer this fall. The Montana State course, Dining on DNA: An Exploration of Food Biotechnology (HDFN 580), is for science teachers. Exploring the Future of Our Food Supply: Communicating the Technical and Ethical Issues in Genetic Engineering (FN 590) offered by Colorado State is for nutritionists; Extension educators; and public health, government, industry, and other interested professionals. Both courses are scheduled for September 30 to December 13. The courses are partially funded through a grant from the Cooperative State Research, Education, and Extension Service of the United States Department of Agriculture, Cooperative Agreement Number, 95-EFSQ-1-4160.

Participants in HDFN 580 will delve into the history, techniques, applications,
and ethical concerns associated with biotechnology in food production, food processing, and agriculture. All course participants will receive food biotechnology curriculum materials for incorporation into the high school biology classroom. For more details about HDFN 580 and registration instructions, teachers may visit the Web site at: http://www.montana.edu/~wwwnutrdineondna/dna.html or contact Mary Stein, tel: 406-994-5640, e-mail: uhdms@msu.oscs.montana.edu.

The FN590 course is a workshop series. Participants will use their personal computers to interact in weekly group discussions led by guest lecturers. The course is being offered for two graduate credits, three university continuing education units, or 30 professional continuing education hours. For more details about FN590, interested individuals may visit the Web site at http://www.colostate.edu/Depts/FSHN/extension/BIO or may contact Pat Kendall, tel: 970-491-7335, e-mail: pkendall@lamar.colostate.edu or Carrie Puck, tel: 970-482-2788, e-mail: cpuck@lamar.colostate.edu.

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BIOTECH RESOURCES ON THE INTERNET

The Biotech BiblioNet
For a bibliography of recently published biotechnology articles, try The Biotech BiblioNet site on the World Wide Web at http://schmidel.com/biotech.htm. The site was established by Dr. Dyann K. Schmidel of Bloomfield, Conn.


Links to topic categories include nucleic acid, protein, and cell techniques such as detection, PCR, selection, cloning, expression, extraction, sequencing, structure, analysis, modification, gene targeting, and cell culture. The medical and agricultural biotech applications category has links to antisense, ribozymes, gene therapy, enzymes, drug delivery, agriculture, ethics, and other articles of interest.

Of special interest to teachers are the "Protocols" and "Teaching" links. Click
on "Protocols" and you will find laboratory protocols for a variety of molecular biology procedures. The "Teaching" link takes you to biology and chemistry teaching resources, job postings, and other links.

**Biological Data Transport**

Biological Data Transport's Web site at: [http://www.data-transport.com](http://www.data-transport.com) integrates biological science and product information. The TransportSelect link allows easy searching of multiple life sciences resources, such as products, services, and public life sciences Web resources.

Links include the resource section of organized Web resources, news and promotions, vendor services, an auction link for the buying and selling of laboratory equipment, and more.

If you are interested in the business/product aspect of biotechnology, check out this site. All resources are updated before each business day.

**GENTALK**

GENTALK is a source of help for teachers, students, and others interested in genetics and biotechnology. Many GENTALK list participants are high school teachers or students. Students are encouraged to participate by asking questions and giving appropriate opinions. GENTALK is moderated by Doug Lundberg, Air Academy High School, United States Air Force Academy, Colorado. Lundberg, who owns the list, makes sure that information submitted to the network is appropriate before sending it to GENTALK participants.

To subscribe to GENTALK, e-mail only the message subscribe GENTALK Your Name to listserv@usa.net. Substitute your name for Your Name (e.g., subscribe GENTALK John Jones). Do not put a subject in the heading of your message, and turn off your signature before sending to avoid problems.

**BIOTECH Discussion List**

If you can't find curriculum materials, need a source for experiment supplies, or want a better explanation of a molecular biology concept, help is likely waiting on the BIOTECH discussion list. Subscribers to the list, which is maintained on a listserv at the University of Maryland, trade information and help on a variety of topics.
To subscribe, e-mail only the message subscribe BIOTECH Your Name to listserv@umdd.umd.edu. Substitute your name, of course, for Your Name (e.g., subscribe BIOTECH Jane Smith). Do not type anything in the subject heading of your message. If your e-mail program usually attaches your signature at the end of your messages, turn it off or the listserver may have problems reading your subscription message.

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FREE LIFE SCIENCES CAREER PUBLICATIONS

If you have students interested in careers in the biological sciences, these free publications are available from the organizations listed. There is no charge for single copies. If you would like more copies, please contact the publishing organizations for discount information. Depending on their supplies on hand, publishers often will provide 10 or more copies free of charge.

- **Agricultural Chemistry—Chemical Careers in Brief**
  Biotechnology—Chemical Careers in Brief
  These single-page, two-sided monographs are available from the American Chemical Society, Education Division, 1155 16th Street, NW, Washington, D.C. 20036 (phone 202-872-6168).

- **Career Options: Agricultural Engineering**
  This six-panel brochure is published by The Society of Engineering in Agricultural, Food, and Biological Systems, 2950 Niles Road, St. Joseph, Michigan 49085-9659 (phone 616-429-0300).

- **USDA Careers**
  This small folder with inserts on Science and Technology, Business and Industry, and Administration is available from USDA Human Resources Management—Compensation and Employment Division, Rm. 301W, 14th and Independence Avenue, SW, Washington, D.C. 20250 (phone 202-720-6905).

- **Exploring Careers in Agronomy, Crops, Soils, and Environmental Sciences**
  The 27-page, four-color booklet is published by the American Society of Agronomy, 677 S. Segoe Road, Madison, Wisconsin 53711 (phone 608-273-8080).

- **Careers in Biology: An Introduction**
  This 2-page leaflet was prepared by the National Association of Biology Teachers, 11250 Roger Bacon Drive, Suite 19, Reston, Virginia 20190-5202 (phone 703-471-1134).

- **Solving the Puzzle: Careers in Genetics**
  The 24-page booklet is available from The Genetics Society of America, The American Society of Human Genetics, 9650 Rockville Pike,
This booklet features 10 genetic challenges ranging from proving the identity of kidnapped children to determining genetic disorders. Accompanying each challenge is a story about a real-life person whose genetics career relates to the challenge.

- **Unlocking Life's Secrets: Career Opportunities in Biochemistry and Molecular Biology**
  
  This 16-page, four-color booklet was prepared by the American Society for Biochemistry and Molecular Biology, 9650 Rockville Pike, Bethesda, Maryland, 20814-3996 (phone 301-530-7145).

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**TIPS FOR TEACHERS**

Tip by Diane Den Herder, Physiology teacher at Sioux Center Community High School, Sioux Center Community High School, 550 9th Street NE, Sioux Center, Iowa 51250 (phone: 712-722-2981; FAX: 712-722-2986; e-mail: denherdi@martin.luther.edu or sxcenterhs@netins.net).

English, desktop publishing, or humanities students can join science classes in an annual forensics activity that is fresh and original each year. The forensics activity is part of a larger biotechnology unit in my physiology classes. Prior to the actual activity, I cover the basics of DNA, genetic engineering, and bioethical issues.

As scheduling permits, I ask another class to collaborate on a crime scenario—complete with local names and school locations. The first year I did the unit, the desktop publishing teacher (Jodee Esser) and I wrote the general scenario about a murder. The "culprit" was known only to us. Teams were constructed that mixed the students of both courses. The general role of the desktop students was to investigate the crime, while the physiology students contributed results of lab tests. In order to "rig" evidence to fit the crime, I used the protocols of the laboratory exercises listed below. Basically, the only modification was to label the evidence with numbers or letters so only I would know the identity of the culprit. The sample numbers were then written into the original storyline of the crime scenario.

On the day of the forensics activity, students discovered the "crime" as they arrived at school. The scene was taped off with yellow police tape. We chalked a body outline on the floor and left possible evidence around it. The general,
written scenario was given to the students. The desktop publishing class then interrogated staff members for clues that we had pre-planted with them, while the physiology students began the lab testing of evidence. The tests consisted of simulated hair, blood, standard fingerprints, and DNA fingerprinting. Representatives of state and local police discussed crime investigation. The unit concluded with a cross-curricular class period in which teams from both courses used their interrogation and laboratory evidence to determine the guilty party. The correct conclusion required accurate lab results and problem-solving. An "arrest" was made by the local police and the successful investigating team was rewarded.

The students absolutely loved this unit! They consistently said that it was their favorite activity of the entire year. An additional benefit was the interest created in the whole student body. Nearly every hour of the day I had students from all grades begging me to reveal the culprit. Months afterward, students asked if I would do a similar unit again. Best of all, because a different scenario must be used each year, the activity is always "new."

Sources of Protocols:
- Simulated Blood Typing Kit, catalog # 3-400
  Kemtec Educational Corporation
  9889 Crescent Park Drive
  West Chester, Ohio 45069
  Ph. 1-800-733-0266
- Hair Analysis Kit, catalog # 69-9870
  Carolina Biological Supply Company
  2700 York Road
  Burlington, North Carolina 27215
  Ph. 1-800-334-5551
  Fax 1-800-222-7112

Standard Fingerprinting Lab:
- From the book Learning Under the Sun by William J. Klein, Iowa State University Press, copyright 1988, ISBN 0-8138-1038-8. The ISU Library has this book. For purchasing information, contact:
  M. B. Learning Systems
  P.O. Box 1841
  Sioux City, IA 51102.

DNA Fingerprinting Lab:
- Office of Biotechnology
  1210 Molecular Biology Building
ABOUT THE ISU PUBLIC EDUCATION PROGRAM IN BIOTECHNOLOGY

The Public Education Program in Biotechnology is supported by the Iowa Soybean Promotion Board; Pioneer Hi-Bred International, Inc.; the Roy J. Carver Charitable Trust; West Central Cooperative; and the Iowa Farm Bureau Agricultural Leadership and Promotion Foundation.

To Contact the Program
Phone: 515-294-9818 or, toll-free in Iowa, 1-800-643-9504
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