HELP US MAKE SURE THE "IOWA BIOTECH EDUCATOR" IS GOING TO THE CORRECT PERSON

We added a special page at the end of this month's Iowa Biotech Educator to make sure this publication is going to the right person. You must complete the information and send it back to us in order to continue receiving this publication. Thank you for your cooperation in helping us get the publication to only those who want to receive it.

PSInet (PEOPLE SHARING INFORMATION) PROVIDES VALUABLE LINKAGE FOR IOWA SCIENCE TEACHERS

In September, the public education program in biotechnology moved into a new phase of activity, electronic communication among science teachers in Iowa. The kickoff for the initiative took place at Drake University where master biology teachers met to learn the use of PSInet.

PSI, a national computer conferencing network for students, teachers, and other educators, is housed at Drake University. The system uses a network of dedicated computers (servers) that manage communications among users, each at a local personal computer (workstation).

The following information explains what is needed for Iowa teachers to get on and use the system: (1) A computer system with a minimum of a 20 mega-byte hard drive and a modem. Nearly any IBM compatible or Macintosh Plus or better personal computer can be a PSInet workstation. (2) A phone line to hook up to the modem is required, but this does not have to be a separate line. Many servers are accessible through a toll-free telephone number. (3) Computer software produced by INFINET, Inc., must be used with PSInet. The Roy J. Carver Charitable Trust funds the training and purchase of software for Iowa schools, coordinated through participating Area Education Agencies. Individuals should contact Linda Espey, Director of IOWAnet, at 1-800-444-DRAKE, ext. 3913 or 515-271-3914 for information on the project in Iowa.

PSInet users need to attend a training session. Individuals should contact Espey to arrange for training either at Drake University or at another Iowa location. At the session, users learn how to install and use the system. Users will be hooked to one or more servers in Iowa. Information on the hookup will be provided at the training session.

No fees are involved in joining PSInet. Schools pay for a computer, a modem, and a phone-line or use ones they already have. The system is inexpensive to use because the user enters data and executes commands while disconnected from the phone. The material is sent to the server or received from the server at the time selected by the user. Typically, this is at night when phone lines are more available and rates are lower (if a long distance call is involved.) Many of the regional servers that will be called have established toll free telephone numbers.

The PSInet system uses a conference/session structure. A user joins and participates in selected sessions that are part of a conference. This is analogous to physically attending selected sessions at a conference in a host city. After users install the software, a list of conferences that are available appear on their system. One of these conferences is BIOTECH. This conference enables educators to exchange information and ideas about topics in biotechnology. The following sessions have been set up under BIOTECH:

*QUESTIONS: This session is for questions from educators and students about biotechnology. All PSInet participants are encouraged to answer any of the questions.

*PROCEDURES: This session contains laboratory procedures suitable for K-12 students.
Procedures that are added to this session should have been tested in a classroom setting. Comments on the procedures should be entered in the session titled NEWS. *NEWS: This session contains information about upcoming events or additions made to other sessions that the sender wants to bring to the attention of others. *RESOURCES: This session contains literature that relates to biotechnology. When adding information to this session, users are asked to give as complete a reference citation as possible. *CHIT-CHAT: This session is for informal dialogue among the biotech conference participants. *PHONEBOOK: This session is used to list information about the participants, including address, phone number, PSInet address, fax number, and e-mail number. *BIOETHICS: This session contains resources on bioethics. When adding information to this session, users are asked to give as complete a reference citation as possible.

Communication among science teachers on the BIOTECH conference has already begun. This newsletter has been entered in the RESOURCES session of the conference. The Office of Biotechnology at Iowa State University regularly adds information to the conference sessions and monitors the QUESTIONS session on a daily basis. We hope to talk to many of you soon on PSInet. GENTALK IS ON-LINE FOR BIOTECH TEACHERS An increasing number of electronic networks and bulletin boards now provide biotechnology information on the INTERNET. Those that the Office of Biotechnology finds useful for teachers will be described in future issues of the Educator. Please let us know if you use one that should be featured. The network featured in this issue is GENTALK.

GENTALK was designed so teachers and students could discuss classroom problems in genetics and biotechnology. It provides a forum to discuss genetic problems, laboratory protocols and current issues in genetics and genetic engineering. It was designed as a place for students to ask questions about and give appropriate opinions on biotechnology. It enables people interested in genetics and biotechnology to exchange private mail, post public mail, and, to a limited extent, share documents.

The service is moderated by Doug Lundberg, Air Academy High School, United States Air Force Academy, Colorado. Lundberg makes sure that information submitted to the network is appropriate before sending it to GENTALK participants. BIOTECH EDUCATOR Page 3 To subscribe to GENTALK, e-mail a message to listserv@usa.net. Do not put a subject in your message, but in the body of the message type: subscribe GENTALK your-first-name your-last-name (e.g., subscribe GENTALK Jane Doe). To participate in discussions, e-mail a letter to GENTALK@usa.net. Participants are encouraged to communicate directly with each other if their discussion is not relevant to everyone subscribing to GENTALK. TIPS FOR TEACHERS TIP 1. At the end of this newsletter, we have tips from Anne Bakke, Larry Vold, and Rod DeVries, who teach a course in biotechnology to tenth through twelfth grade students. The successful course they team teach at Forest City High School includes biotechnology laboratory exercises, current events, and applications. Bakke is a home economics teacher, Vold teaches agricultural education courses, and DeVries teaches biology courses. "Because we represent different disciplines, we reach a wide variety of students with different interests, including those students who normally would not take advanced science classes. The biotechnology class has proven to be a challenge we readily welcome. We have a great time in class with them as they learn about science and how it applies to their lives," says DeVries. TIP 2. We have provided tips on extracting DNA from onion for those of you who may be experiencing difficulty. UPCOMING PUBLIC EDUCATION PROGRAMS
DATE: November 9-10, 1994 LOCATION: Spirit Lake, IA
TARGET AUDIENCE: Northwest and North Central Extension Area Staff
CONTACT PERSON: Paul Kassel, Field Specialist, Crops, ISU Extension, 110 W. 4th St., Suite 100, Box 3021, Spencer, IA 51301-0321 Phone or FAX: 712-262-2264

DATE: November 14, 1994 LOCATION: Molecular Biology Building, Iowa State University, Ames, IA
TARGET AUDIENCE: Extension Youth Specialists CONTACT PERSON: Chuck Morris, Associate Director to Youth and 4-H Programs, 33 Curtiss Hall, Iowa State University, Ames, IA 50011 Phone: 515-294-1017 or 1-800-262-0015, ext. 1017; FAX: 515-294-4715

OUTREACH CONSORTIUM The Public Education Program in Biotechnology is supported by the Iowa Soybean Promotion Board, Monsanto Company, Penford Products Company, Pioneer Hi-Bred International, Inc., Roy J. Carver Charitable Trust, West Central Cooperative, and the Iowa Farm Bureau Agricultural Leadership and Promotion Foundation. The program is available to all without regard to race, national origin, religion, sex, age or disability.

Sheila Lacy, Editor Walter R. Fehr, Director of Biotechnology Thomas Ingebritsen, Biotechnology Instructor Lori Miller, Program Assistant

TIPS FOR TEACHERS TIP 1 by Rod DeVries In 1989 Larry Vold, agricultural education teacher, and Anne Bakke, home economics teacher, asked our administrators for permission to team teach a course called Food Science after Vold finished graduate work in vocational education. Last year, they convinced our administrators there was a need to infuse bioscience with vocational education and agriculture and I joined the team of teachers.

We have found numerous advantages in team teaching. Vold and Bakke know the applications of biotechnology well. There are numerous ag., home ec., and health applications and it takes a lot of time to keep up with the new developments. These developments are obviously linked to the science and principles of genetics and molecular biology that are behind them. Team teaching makes us more creative and productive in getting the message across. Team teaching works well because we bring different strengths to the class. My strength is in teaching the principles and basics of biology and genetics and in conducting laboratories with the students. Last year, our administrators helped with the team concept by giving us a common preparation time to work on the class. This provided an important time for us to collaborate and to generate new ideas. We also were given the freedom to move around from the greenhouse, to the ag. science area to the biology lab, to the home ec. room, allowing for flexibility in activities.

Over a two- to three-year period, there was an increased push in our area of the state to prepare students for the technical world they would face upon graduation. Our Area Education Agency purchased a program on Applied Biology and Chemistry and held workshops to teach more about it. These materials, often referred to as CORD materials, include lesson plans and videos. Our course, mainly for 11th and 12th grade students, is called Biotechnology, Food Science. It is offered during the winter trimester (12 weeks of school from November to February). A prerequisite for the course is biology or chemistry. Some 10th grade students are allowed into the course because biology is taught the first trimester of school.

This is our course description: "Biotechnology is one of the fastest growing career opportunities available to motivated young people today! Learn about the blueprint of life. DNA structure, tissue culture, cloning, embryo transfer and genetic engineering are lab topics. Food safety, product development, irradiation and fermentation are examined with a class field trip to
Our students are prepared for future situations that could affect their lives. They learn about responsibilities and challenges of everyday life, including information on the economics, career possibilities, and ethical aspects of biotechnology. One of our students said, "Bioethics creates a questioning attitude and brings alive some real life issues."

We base the grading for the class on six major tests, six quizzes and hands-on laboratory procedures. Students are required to make oral presentations on weekly news articles they find that deal with biotechnology. We have lively discussions about these presentations and they provide an excellent way to help both the teachers and the students keep up-to-date with some of the new biotechnology information that is out there. Among the resources we found helpful in setting up the course were the workshops conducted by the Iowa State University Public Education Program in Biotechnology. We not only learned about applications of biotechnology, but learned how to conduct laboratories for our students. We were provided a wealth of information on biotechnology, laboratory supplies and equipment that we could not have purchased with the funding we had available. The Principles of Technology and CORD Workshops offered by our Area Education Agency also provided excellent information. We take field trips to visit laboratories and facilities of Trans Ova and NOBL in Sioux Center Iowa, veterinary medicine and molecular biology at Iowa State University in Ames, the Mayo Clinic in Rochester, Hormel Research Food Institute in Austin, and General Foods in Mason City. We have found the following articles and resources helpful: "Bacteria: Teaching Old Bugs New Tricks," National Geographic, August 1993, pp. 36-61. Cheesemakers Bulletin/Chymax, published by Pfizer, Inc. This is now out of print, but the Office of Biotechnology at Iowa State can send you a copy. The Biotechnology Information Series available from Extension Distribution Center, Iowa State University, 119 Printing and Publication Building, Iowa State University, Ames, Iowa 50011-3171. Overheads and lab exercises, published by the ISU Public Education Program in Biotechnology. "Bovine Somatotropin Teaching Module," Monsanto Ag. Company, St. Louis, Missouri. "Biotechnology Notebook and Resource Kit," Mathematics and Science Education Center, 800 Natural Bridge Road, St. Louis, Missouri 63121. (This includes role playing activities, laboratories, vocabulary, lesson plans, and videos.) "Careers in Genetics, Solving the Puzzle," the Genetics Society of America, the American Society of Human Genetics, 9650 Rockville Pike, Bethesda, Maryland, 20814-3998. "How Biotechnology Works - Explained in Barnyard English," Farming, March-April 1990, pp. 16-17. "Biotechnology Resources for Teachers, Biotech: The Technology for Life," 1992 Education Resource Directory, One Innovation Drive, Worcester, Massachusetts (phone: 508-797-4200). African Violet Tissue, DNA Kit, and Venus Fly Trap supply kits from Carolina Biological Supply Company, 2700 York Road, Burlington, North Carolina 27215 or Box 187, Gladstone, Oregon 97027. "Could Dinosaurs Return: Behind Jurassic Park - The Science of Cloning," Newsweek, June 14, 1993. "Bio-Related Technology Textbook," 1993, Delmar Publishers, 3 Columbia Circle, Box 15-015, Albany, New York. "Applied Biology/Chemistry," ABC CORD CURRICULA, IES, Inc., 7320 NW 45th, Bethany, Oklahoma 73008 (phone 405-495-7252 or 1-800-687-7768) (Please note, some Iowa Area Education Agencies have these materials.) These are some of the activities we do with the students: Laboratories to isolate and transfer DNA, DNA fingerprinting, and DNA extraction from onion from the procedures developed by the Public Education Program in
Biotechnology at Iowa State University. Discussions of biotechnology and the food industry while the teacher wears an apron that says "You eat DNA every day." This includes an introduction when we discuss new foods that have appeared on the market and decide if they were products of bioengineering. We talk about pork production and pST. We have students taste samples of soybeans being developed by researchers at Iowa State University. We discuss the role of chymosin in cheese making and demonstrate its use by making cheese in the classroom. The students sample this cheese. To get the students' attention, we discuss the history of cheese making starting 2,000 years ago in the Middle East when milk was stored in goats' stomachs or animals skins and have them sample Feta cheese as a historical cheese. As we link the present and the past, students understand the purity of chymosin as a product for making cheese and the significance of this biotechnology product to the food industry. We make DNA models by using fabric stiffener or Elmer's glue to stiffen 9" zippers. When the zipper is completely soaked, we wrap it around a broom handle and then let it dry completely. We end up with two "strands" of "DNA" that unlock in the shape of a "DNA molecule." We recommend zipping and unzipping the "strands" before unwrapping them from the broom handle. We teach about bST and then have the students conduct a "town meeting" so they understand its importance to rural America. Consumers, dairy farmers, environmentalists, governmental regulatory agents, and bST developers are all represented by students. The students ask each other questions about topics like bST's effects on milk production and purity, animal health, profits, consumers, herd stress, by-products, government regulation, milk price supports, and the need for public education. We took this activity from the Biotechnology Unit for Secondary Students developed by the Biotechnology Education Project sponsored by the Monsanto Fund and the National Science Foundation. It is sold by the Mathematics and Science Education Center, 8001 Natural Bridge Road, St. Louis, Missouri 63121 (Phone: 314-553-5650).

We also use the "Genetic Engineering Film" unit from the Biotechnology Unit for Secondary Students. After the unit, the students are able to list ways biotechnology benefits society and explain how bacteria is used in the laboratory to produce drugs, such as insulin. The students benefit from seeing actual scientists at work. The film, "Genetic Engineering: The Nature of Change," is 17 minutes long. We use the film as an introduction to the course, terminology, and basics behind biotechnology. To keep the students focused on the film, we utilize a fill in the blank worksheet provided with the unit.

For further information, you may reach the Forest City High School teachers at Forest City High School, Forest City, IA 50436 (phone 515-582-2324; FAX 515-582-5021). TIP 2 DON'T CHOP THAT ONION UP TOO MUCH;

DNA EXTRACTION FROM ONION

If you are experiencing problems extracting DNA from onion, here are some tips to consider that a number of persons have shared. (1) Do not chop the onion too finely. It is better for the pieces to be too large than too small. A blender tends to chop the pieces too small. A food processor or hand chopping works well. (2) Press the onion-soap mixture against the measuring cup with a spoon throughout the time it is in the hot water and the ice baths. (3) After the onion-soap mixture is filtered through a coffee filter or cheesecloth, stir the solution frequently while pouring it in the test tubes for students. (4) Try dispensing alcohol to students in screw top test tubes. Preparing these in advance and storing the tubes in a freezer will make them easy to hand out and keep them extremely cold. (5) After the alcohol is added to the onion solution, wait a couple of minutes for the DNA to come out of the solution.
This procedure for DNA extraction from onion was revised on 3/94. Contact the Office of Biotechnology if you do not have the procedure with this date on it.

TO: The Office of Biotechnology
1210 Molecular Biology Building Iowa State University
Ames, IA 50011 (e-mail x1lacy@exnet.iastate.edu) FROM:

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RE: Iowa Biotech Educator

Yes, I would like to continue to receive The Iowa Biotech Educator. If my mailing address is incorrect, I have indicated necessary changes below.

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No, I do not wish to continue to receive this update.

Please send this update to the following appropriate person(s) or additional person(s) in the future.

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