

CORNELL
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BRIEFS

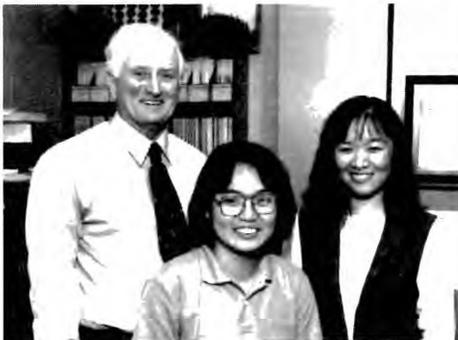
GRADUATE STUDENTS HONORED

Four graduate students in Food Science received awards at the April 25 meeting of the Graduate Field of Food Science Seminar in Ithaca.

Two of Malcolm Bourne's students—Julia Fu and Angela Lim—received Henry and Ruth Herzog Graduate Research awards.

Fu anticipates getting her Master's Degree this summer. When she is finished, she will try to find an internship or go back to Taiwan. "It is really nice to work with Malcolm," she said, "he is always so helpful."

Lim is working on a Master's Degree that she expects to finish in June. She attended Cornell as a graduate student entirely on money she saved working as Quality Assurance Manager for ConAgra in Minne-



(from l-r): Malcolm Bourne, Angela Lim and Julia Fu.

sota. "I knew I wanted to go to graduate school then," she said. "When you have a set goal, it makes it much easier to save. Dr. Bourne has been very supportive and encouraging. It has been a pleasure working with him."

Deborah Roberts, who works with Terry Acree, received the Julian S. Colyer Award for best paper in food chemistry for her

(Continued on page 3)

Preserving Apple Buds in a Deep Freeze



Susan Sheffer, PGRU Science Technician, lifts a storage container where apple bud samples are held for cryopreservation out of PGRU's new liquid nitrogen tank.

McIntosh and Golden Delicious may be popular apples, but they are two very small fish in a very large apple gene pool that includes thousands of varieties. Phil Forsline has been curator of the apple collection at the USDA-ARS Plant Genetic Resources Unit (PGRU) since 1984. He will tell you that libraries, banks, orchards, and liquid nitrogen tanks have more in common than meets the eye when it comes to storing the nation's treasured apple collection.

Up until recently, Forsline's "library" consisted of a 25-acre apple planting where he and his staff maintain some 5,000 apple trees—representing 2,500 different accessions—planted in lots of two. New germplasm is usually seed-propogated, often wild material from centers of diversity like Kazakhstan.

"The collection includes rare varieties, some of which date back to ancient Rome, and some of which come from Kazakhstan, where researchers think apples first evolved," said Forsline. It is the largest living collection of cataloged apple trees anywhere. Forsline has traveled all over the world looking for new and unusual apple varieties to expand the apple gene pool represented in the collection.

"Older varieties of plant material are important to maintain to preserve diversity in the gene pool," said Forsline. If a new strain of disease comes along that decimates current commercial varieties of McIntosh or Golden Delicious, for instance, older varieties might provide the desirable resistant genes for future apple breeding.

Such a collection takes up a lot of space and costs some \$375,000 annually to preserve. "It takes \$75 to \$100 a year to maintain one accession in an orchard," said Forsline. "In addition to space, you have to take into consideration the labor involved in spraying, cultivating, pruning, monitoring, and the costs of distributing 3,000 accessions annually to

(Continued on page 2)

(FREEZE, Cont.)

users as scion wood."

The nation's living library of apple is on the brink of drastic change. Forsline can foresee a not-too-distant future where apple trees will be preserved as live 1 1/2-inch apple buds in five lots of 12 buds each, in airtight tubes, at -150°C (-196°F), in tanks of liquid nitrogen instead of rooted as trees in their entirety in orchards.

"We can preserve 660 accessions in each tank. It is conceivable that we could take out or replace up to five acres worth of orchard with just one liquid nitrogen tank," said Forsline. Cost savings per tree amount to \$74 per year; it only costs \$1 per accession per year to preserve it in one tank, which takes up less space than a round VW Bug. Electricity is only used to monitor temperature probes and fill techniques; nitrogen in liquid form is naturally one of the coldest elements known to man (-196°F).

Forsline has been working closely on the cryopreservation of the Station's apple collection with Leigh Towill, a research plant physiologist at the USDA-ARS Fort Collins, Colorado, laboratory for three years. He also collaborates closely with Norm Weeden, Herb Aldwinckle, and Susan Brown at Geneva on other projects in apple germplasm.

"The first person to successfully freeze woody material was Dr. Sakai, from Japan," said Forsline. Apple was first "frozen" in 1981 by Dr. Cecil Stushnoff, who continues to cooperate closely with research scientists at Geneva and Fort Collins. Currently, 500 samples of apples are in storage in tanks of liquid nitrogen located at the USDA-ARS facility in Fort Collins. One hundred samples are in storage at the tank in Geneva which went on-line in January, 1995. Ultimately, the Station's entire collection of apples will be stored in tanks in the "master" bank at Fort Collins. At least half of the collection will be stored in tanks in Geneva so that only material that is in high demand remains in the field.

Forsline explained cryopreservation technique as it has evolved to date. "Cold hardiness is one of the traits of apples that makes them suitable for cryopreservation," he noted. Live apple buds are collected in the winter after a hard freeze, and cut into 1 1/2-inch, one-bud segments. Then, they are stored at -4°C (25°F) for two weeks to maintain cold acclimation. At the same

time, they are dehydrated to 30% moisture.

The buds are then placed in lots of 12 in sealed plastic tubes where they will maintain 30% hydration. The tubes are labeled, inventoried by computer, and placed 20 to an aluminum box. Put in a programmable freezer in which the temperature drops one degree per hour to -30°C, they are held at that temperature for 24 hours—"a preconditioning treatment.."

At this point Susan Sheffer, PGRU Science Technician, or Forsline don heavy Thinsulate gloves to unlock and open the stainless steel MVE Cryogenic XLC 1830. They gently place the boxes on a lazy Susan located just above the liquid nitrogen in the tank. Neither the apple buds nor the tubes ever touch liquid; they are kept cool in the vapor phase (-180°C).

Among the first group of buds to be frozen at the PGRU were *Esopus Spitzenburg*, an old variety from Thomas Jefferson's day; *Snow*, thought to be a parent of the modern-day McIntosh; and *Lady*, one of the oldest apples on record.

Although being used routinely, some part of the procedure are still in the research and development stage. Since 1988, Forsline and his crew have been participating in a 30-year viability study with the USDA lab in Fort Collins. They rehydrate the frozen samples in moist peat moss, re-graft the buds onto rootstock, and force them in a greenhouse setting to prove recoverability and viability. Variables include season, timing, rates of pre-conditioning and hydration, rehydration, and re-grafting.

"Our research shows that at least 80% of the samples stored have at least a 50% chance of buds producing healthy trees after they're rehydrated and grafted onto rootstock," said Forsline.

Forsline and other curators within the National Germplasm Repository system hope to use the cryopreservation technique to preserve sour cherries and grapes. "So far, we have been successful with certain varieties of cherries, but only the most cold-hardy grapes," said Forsline.

Eventually, Forsline hopes to bring other liquid nitrogen tanks on-line in Geneva. He will be working on storage with other curators and researchers at the Station in the apple, grape, and stone-fruit programs.



**COME JOIN US
FOR AN
OLD FASHIONED
STATION FAMILY
STEAK BARBECUE
TO HONOR
DAVE AND MARY CALL**

WEDNESDAY, JUNE 7, 1995
STATION PAVILION

\$10 per person

Social Hour—6:00 pm
Steak Dinner—7:00 pm

Bring your own table service (including steak knife) and a bottle of your favorite wine or six-pack of your favorite beer or soft drink to share.

Fill out the reservation form below and send to Pat Krauss, Jordan Hall, by Thursday, June 1. Checks should be made payable to "R. E. Krauss".

JUNE 7 STEAK BARBECUE

Name: _____

Department: _____

Number of Reservations: _____

TOTAL ENCLOSED; \$ _____

(BRIEFS, Cont.)

master's thesis entitled: "The Isolation and Identification of β -Damascenone Precursors" (β -Damascenone is an important flavor compound found in apples, grapes and many other fruit). After graduation, Roberts expects to continue in the field of flavor chemistry.

Angela Ichwan, who is from Indonesia and works with Mark McLellan, won the Dr. John E. Kinsella Memorial Award for "outstanding international student." She will receive her Master's Degree in June. She plans to work for a year and then hopes to come back to Geneva to work on her PhD.

RETIREMENT INCENTIVE PROGRAM

Mary Slaght, Benefits Manager in the State Finance & Business Office, will be available Tuesday, June 6, to talk with employees taking advantage of the retirement incentive program. Meetings will be held in the Food Science Conference Room. For an appointment with Mary, call 607/255-4455 or, on the tie-line, 8-5-4455.

FIELD RESEARCH UNIT PESTICIDE REMINDERS

EPOST and EPOST7 are applications that allow you to read pesticide posting data on the Computer Center fileserver. EPOST does not work on Macs with 32-bit addressing enabled, including PowerMacs with more than 8 megs of RAM. EPOST7 does work on 32-bit machines but does not work on any machine with less than 5 megs of RAM. Either version can be accessed by copying the EPOST or EPOST7 folder from CC:SPRAYS onto your hard disk (the first time only). INSTRUCTIONS for the application will be in the EPOST folder on your hard disk.

Please remember applicators cannot always see people in or around the blocks being sprayed. If you are exposed to drift, vacate the area immediately and check the central posting at the F&VRF Pesticide Facility.

If you have problems with EPOST or central posting, please contact Mart Van Kirk at 781-5307.

LAST CALL FOR THE 7th ANNUAL STATION CLUB GOLF TOURNAMENT



Friday, June 9
Big Oak Golf Course
Shotgun start at 5:00 pm

Station Club Member
 \$12.00*/person

Non-tation Club Member
 \$13.00*/person

*Includes Green Fees and Food (Burgers, Dogs, and Salads)

The tournament is open to new or experienced players. Enter as teams, singles, or pairs. Part teams will be put together to form five-somes.

Each player must have his/her own set of clubs. (To make reservations for rental clubs, pull or power carts, call Big Oak at 789-9419.)

To enter, complete the form below and send to Ed Lavin, Food Science, by Friday, June 2. Also include the appropriate tournament fee for each person listed. Checks should be made payable to "Station Club".



The Dairy Barn, long a focal point of the Geneva Station's campus, is shown under construction circa 1904.

7th ANNUAL STATION CLUB GOLF TOURNAMENT FRIDAY, JUNE 9

Team Name _____

1. _____
 (Team Captain)

2. _____

3. _____

4. _____

5. _____

THIS WEEK'S CALENDAR

MAY 19 - 26, 1995

EVENTS • MEETINGS

Monday, May 29, all day
 Memorial Day Holiday
 Station Closed

Wednesday, May 31, 12:10 pm
 Sawdust Cafe
 Aerobics/Fitness Class for all employees

Friday, June 2, 12:10 pm
 Sawdust Cafe
 Aerobics/Fitness Class for all employees

SEMINARS

FOOD SCIENCE & TECHNOLOGY

Date: Wednesday, May 31
Time: 10:30 am
Place: Conference Room, Food Science
Speaker: Yu-Wen Feng, Graduate Student
Topic: The Gas Chromatography-Olfactometry (GCO) of Fresh Soymilk
and
Speaker: Hung-Ju Liao, Graduate Student
Topic: Investigation of Rheological and Calorimetric Properties of Corn Starch-Soybean Protein Isolate Gel System

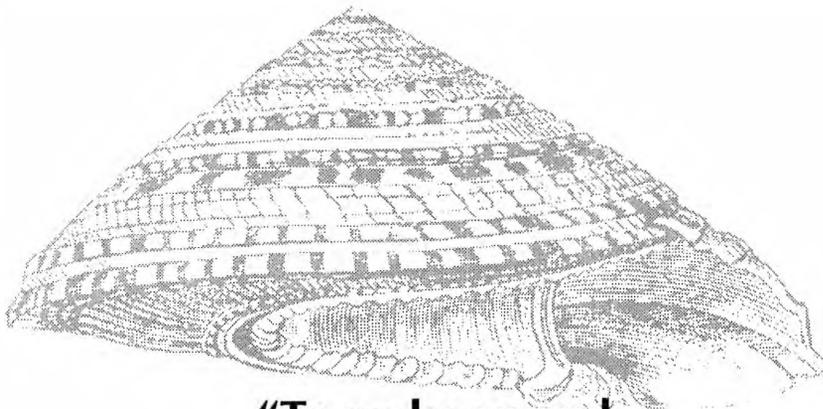
CLASSIFIED

YARD SALE: Chairs, sofa, lamps, house hold items, home made FIMO jewelry. 666 W. North Street, Geneva. May 27, 28. 8:00 am-5:00 pm.

FOR SALE: 1989 Chevy Corsica, 4-door black with gray interior, automatic, ps, pb, air, cruise, new tires, muffler, shocks, and struts. Always well maintained. Asking \$4,800. Call x250 or 789-5368 after 3:00 pm.

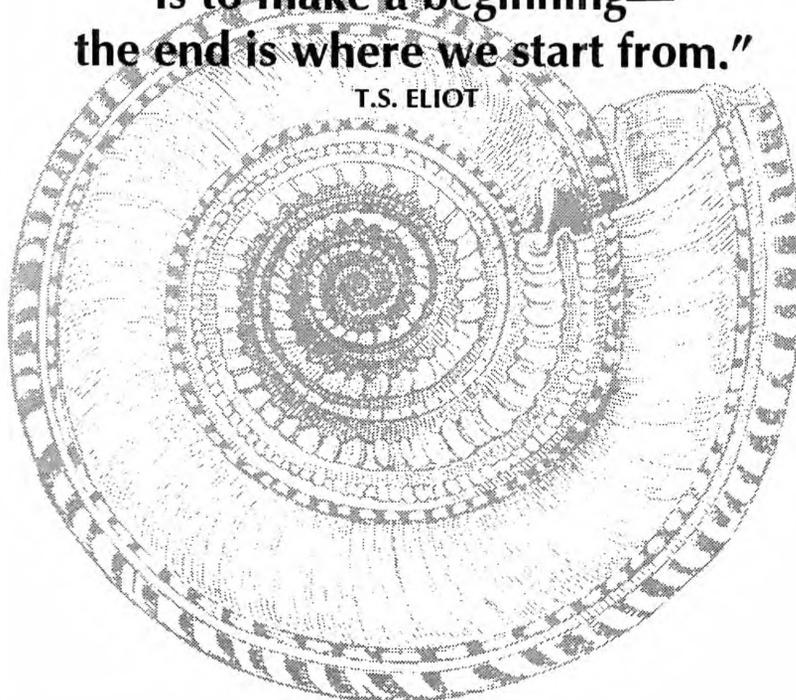
CHILDCARE: Opening for toddler (2 years and up) at licensed family day care provider. Prefer 2-3 days per week. References available. Call Penny at 789-9518.

BEACH HOUSE FOR RENT: It's that time of year again! Why not spend your summer vacation relaxing in the sun and surf at a lovely beach house on Canandaigua Lake? Feel like "getting out of Dodge" for a breather? How about a spring or fall weekend get-away, nestled in the hills on one of our prettiest Finger Lakes? For more information, call Elaine at x253.



**"To make an end
 is to make a beginning—
 the end is where we start from."**

T.S. ELIOT



American Red Cross Blood Drive

Tuesday, May 30, 1995
 11:30 am - 8:00 pm
 Robert A. Bristol Field House
 (Next to Friendly's) Geneva
 *Babysitting provided!
 **Call the Geneva Red Cross at
 789-1522 for a reservation to donate!

