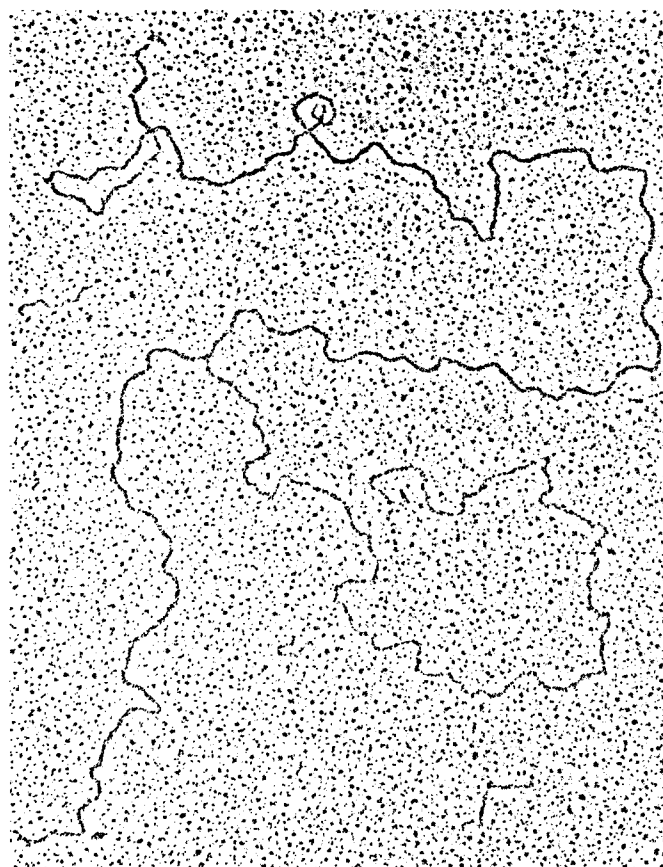


A Little Something Extra

"In the beginning there was mitosis." With this introduction Jack Van't Hof recently began a seminar in which he discussed the discovery by BNL biologists of an extrachromosomal DNA in higher plant cells.

In order to fully understand this discovery one must first have a good comprehension of the way in which a root grows. At the tip of a root there is a section called the meristem in which cells are constantly dividing, leaving fifty percent of each full set of cells behind as the root grows, so that the meristem has a constant size and number of cells. The cells that are left behind either begin to differentiate immediately, while they still have a

2C amount of nuclear DNA in what is called the G1 phase, or they can replicate each chromosome so that they have a 4C amount of DNA and proceed to the G2 phase before they begin to differentiate. Over the course of several days, these newly differentiated cells expand in size, contributing to the actual growth of the root, and it is this expansion which pushes the root tip through the soil. During the course of taking sedimentation profiles of newly replicated DNA from cells in the expanding portion of the root tip in pea plants, it was discovered that after several days a small and previously unnoticed amount of DNA began to appear in the results.



Electron micrograph of replicating extrachromosomal DNA prepared by Dora Krimer of the Biology Department.

"One day we decided that in order to fully understand the system we had to explore that extra bump in the sedimentation profile," Van't Hof said.

Through labeling studies with radioisotopes it has been discovered that the extrachromosomal DNA segment is only found in cells which are in the G2 phase, and then only in about twenty percent of the G2 cells. "We know that a piece of DNA is broken off from the chromosome, it has a molecular weight of about 25×10^6 daltons and once free of the chromosome it will replicate smaller single-stranded pieces of DNA. Cells which have this phenomenon occurring within their nuclei don't divide again, making the development of the extrachromosomal DNA segment a terminal event in the cells' reproductive cycle," Van't Hof said.

How the extrachromosomal segment is actually excised from the chromosome, and what the effects on the cell of this excision are, is still unknown. "There are no observable effects on the plant. It (the extrachromosomal DNA) just happens to be there, and we're going to find out why. A similar phenomenon occurs in rat brain cells when they differentiate and we believe it's definitely a non-random phenomenon," said Van't Hof.

Deciding that the extrachromosomal segment does in fact have a purpose and determining what that purpose is are two different matters. There are several theories as to the origin of the phenomenon. One is that, "It's a process of amplifying certain DNA sequences of the type that is replicated from the extra piece," Van't Hof said. Another possibility is that it is a mechanism by which a gene sequence can be expressed when a cell is differentiating but not when it's dividing. The cell may not need to use particular genes when dividing and simply carries within its DNA the genes for differentiation. Later it turns on these differentiating genes. One method of hiding the gene sequence this way



Mort Rosen

One of the difficulties involved in DNA research in plant cells is finding a way to rupture the cell walls without damaging the nuclei. A major turning point in Van't Hof's research came when it was found that this could be accomplished by simply squeezing tissue between two microscope slides. "It seems silly but it works," Van't Hof said, "It took us a long time to discover that."

would be to modify it, with the elaborate mechanism of extrachromosomal DNA production serving to reactivate the sequence. "The simplest answer is that the system doesn't want the cell to divide anymore, so it removes these genes from the chromosome rendering the cell sterile," Van't Hof said.

The long range implications of this discovery are varied, but it may "reveal how genetic expression is modified when the cell goes from proliferating to differentiating. It may also help us understand how genetic information is controlled, the alteration of genetic information in higher plants, and provide basic information for understanding the host cell for different biological phenomena," said Van't Hof.

—Derek McCalmont

Tunnel Has Powerful Tenants

The Power Supply Group of Project ISABELLE moved recently. And with that move, technical associate John Dunning, engineer Bob Edwards and technical supervisor Mike Iwantschuk became the first people to be assigned to the accelerator tunnel on a regular basis. "Lots of people are working out there," Edwards said, "but we're the only ones living out there."

The group moved to the Wide Angle Hall in order to facilitate completion of the power supply system needed for the full cell test scheduled for the spring. At that time, a string of prototype superconducting magnets—six dipoles and two quadrupoles—will be tested, along with many of their support systems.

Some of the power supplies that will be used in the full cell test are prototypes of those that will eventually be installed at 19 locations around the accelerator tunnel to provide two types of power for the superconducting magnets. First, the main magnet power supplies must be capable of ramping the magnet current up to 4,200 amperes at 600 volts dc (over 2.5 megawatts). When ramping is completed and the magnets level off to steady-state operation, the supplies must hold the current to less than 10 parts per million. To prevent excessive ripple current, a phenomenon which can result in an undesirable increase in beam size, the main mag-

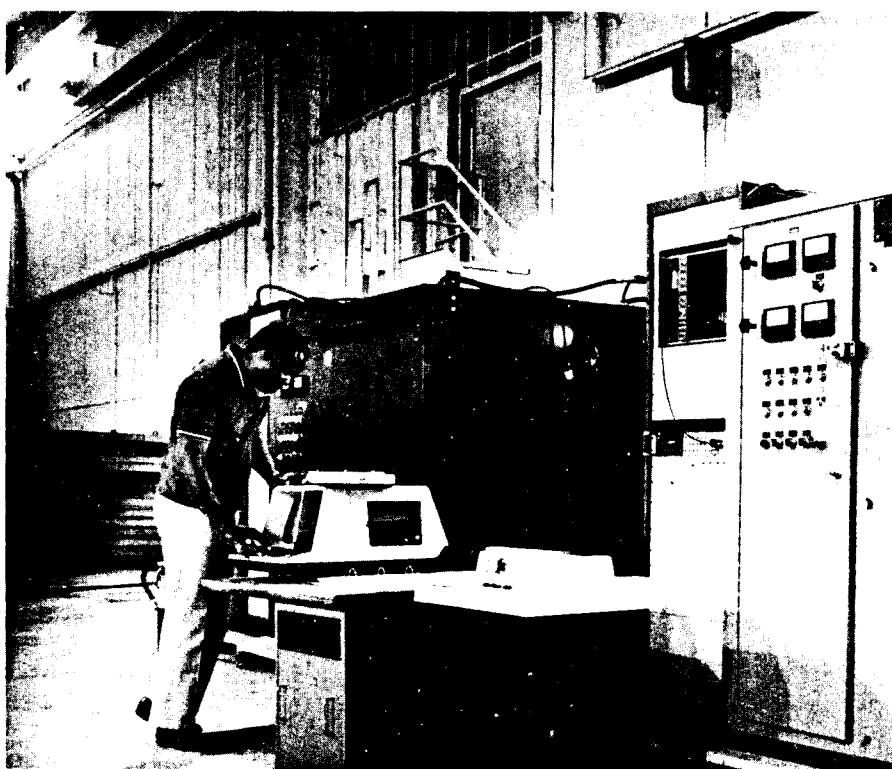
net power supply system has been designed for a maximum ripple current of one part in 10^7 .

Overall, these specifications require a precision which, Edwards said, "is at least an order of magnitude tighter than the magnet power supplies at the ISR [intersecting storage rings] at CERN." These tight tolerances are necessary to control the working line and higher level resonances associated with a proton-proton colliding beam accelerator.

Early testing has shown that the main magnet power supply is reliable and stable over the short term to approximately one part in 10^6 . Two of these supplies are being used to test superconducting magnets. While operating for the past 24 months and running 50 hours a week, these supplies are producing impressive performance statistics—averaging over 5000 hours without a failure.

In addition, the accelerator will require over 400 magnet correction coil power supplies with power ratings from 1000 to 50,000 watts, some with precision specifications similar to those of the main supplies.

By the time these power supplies are completed, the Group will have been joined in their headquarters in the Service Building by many other groups. But for now they are alone in the tunnel. With only a pocket pager for one-way communication with other



Mort Rosen

In the Wide Angle Hall, Bob Edwards, head of the Power Supply Group, checks the control computer for the two main magnet power supplies that will be used in the upcoming full cell test.

parts of the Lab, they are looking forward to the day when telephones are installed and a real road winds its way to the Wide Angle Hall.

Still, the group members feel that being in the tunnel has many compensations. Dunning calls their unique setting "a new frontier" and finds that working at the accelerator site is

"an adventure."

On the practical side, Edwards explained that moving the group to the tunnel "solved a space problem. Since we were preparing to set up the power supply system, it was a natural thing to move out here." Then he added, "And we wanted to be the first ones here anyway." — Anita Cohen

The Summer Of '82

They come in search of science, sun, and something to put on their resumes. They're the summer students, seventy-eight in number, who have been working in many of the departments at Brookhaven since June 7, and will be leaving on the 20th of August. This year marks the 30th anniversary of the Summer Student Program and participants have been drawn from fifty-eight colleges and universities across the United States. Now that the summer is almost over these students have had a chance to form impressions of the Laboratory and the type of work they've been doing.

Bruce Haimowitz has been working in the Applied Math Department on a computer program for techniques for numerical multiple integration. This is an abstract mathematical formula which, when programmed into the computer, will permit calculations in as many as ten dimensions at a time. "It's been a real incentive for me to go on to grad school as I've become increasingly interested in the field," Bruce said. "The stuff you learn in school was done fifty years ago, but here you're working at the frontier of the field."

Judy Clarke is here as a part of the National Consortium for Graduate Degrees for Minorities in Engineering Inc. program and has been working in the Medical Department. She has been involved with the Universal Nuclear Construct (UNICON) project doing data analysis of positron and gamma emission tomography, or imaging. "I've had a terrific time. I really enjoy the people I'm working with, they're close to my own age and through them I can see where it is I'm going. I'm sure now that I want to continue in nuclear medicine in either the instrumentation side, or in medicine itself," Judy said.

The Solar and Renewables Division of DEE has had **Joe Marciano** working on several projects this summer, the most important of which was the processing of performance data from the Arkansas House, one of the Division's ground coupling projects. "It's been amazing for me to see what's going on in this field from the bottom up. I've read a lot of reports since I'm going into the field but this is my first chance to see how those reports get started," Joe said. "A lab like this falls between a corporation and a university. Research for the sake of research is going on but there's always an eye on the economic end of things."

Paige Perry is in her second summer at Brookhaven, working in the Biomedical and Environmental Assessment Division of DEE. Paige has been researching occupational and public health hazards associated with different energy technologies, specifically the oil and natural gas industries. Eventually her work will go towards a compilation of data that will provide a figure for risk per unit of energy produced, in order to compare

different energy technologies. "The best part of working here is that my work is used and I get credit for it where credit is due. I enjoy the responsibility I'm given," Paige said.

Steve Montzka has been working on combustion kinetics in the Chemical Sciences Division of DEE. His group is attempting to determine the biomolecular rate constants for the reaction of OH and formaldehyde, an important reaction in atmospheric and hydrocarbon chemistry. Steve often works till eight o'clock, but says he doesn't mind because, "I appreciate the fact that the people I work with stop and explain things as they go along, because I'm really just jumping on in the middle of their research."

"You learn other ways of doing things than by the book. The atmosphere is really conducive to creative thinking," said **Winston Worrell** who has been working with the Program Controls Group (PCG) on project ISABELLE. Winston's overall project has been the adaptation of citizen's band radios to make them compatible with the Relway data transfer system on ISABELLE so that the same lines used for data transfer between machines can be used for communication between experimenters.

Ira Abels has been working in the Biology Department on spectrophotometer interfacing. He has been writing computer programs designed to store data taken directly from the spectrometer, manipulate this data and plot it on graphs. The purpose of this is to improve the efficiency of the system and reduce the number of man hours spent recording data and plotting data points. When asked for a comment now that the end of summer is approaching, Ira, who has already graduated from college, expressed a common concern among students in today's bleak economic times when he said simply, "Hire me!"

Working on the calibration of gas flow controllers at the AGS for most of the summer has been **Suzanne Keilson**. At the moment she is also engaged in the construction of a digital milliohm meter. "I got what I wanted out of my summer. I had a chance to see experimental physics first hand and I realized the changes that have recently taken place in the field. There is a lot more interaction between physicists today than in the past, and you have to worry much more about the hardware side of experiments."

The students' summers weren't all work. Along with the BNL sponsored activities and mixers under the direction of Renee Flack the students organized their own luau, Christmas, and swing parties, barbecues and beach trips. "I think we all took Mr. Anderson's advice at the beginning of the summer and worked hard and played hard," said Marciano.

—Derek McCalmont

—photos by Humphrey

Dancing To A Spanish Beat



Maria Benitez

Maria Benitez is one of the world's great Spanish dancers, a performer of extraordinary flair and intensity. Maria Benitez will bring her exuberant display of flamenco dance to Berkner Hall on Thursday, September 9. The performance of the Maria Benitez Estampa Flamenca Spanish Dance Company will begin at 8:30 p.m. and will include a variety of all aspects of Spanish dance.

Since Maria Benitez and her husband, Cecilio, formed their touring company in 1972, they have appeared throughout the U.S. and Europe. They have performed in such diverse situations as the New York City Delacorte Dance Festival in Central Park, as guest artists with the Milwaukee Symphony Orchestra, and at a command performance for Princess and Prince Rainier of Monaco. In May 1981 they became the first American-Spanish group in recent memory to be invited to appear at Berlin's prestigious Academy of Arts, when critics wrote, "Maria is a phenomenon; what she can do, what her dancing evokes, is fascinating." And, simply, "...absolute perfection."

Born in New Mexico, Maria Benitez began studying dance at age 10. At 19, she left for Spain where she joined the Maria Rosa and Paquita Rico dance companies and perfected her Spanish dancing techniques. When New York Times dance critic Anna Kisselgoff

reviewed the Company this past March, she observed that, "There are however, several serious exponents of Spanish dance in the United States and among these Spanish-trained Americans, Maria Benitez commands total respect."

Commenting on various aspects of Miss Benitez's performance, the critic observed, "She gave a thoroughly enjoyable concert....Her own style is extremely controlled, exceptionally concentrated....No gesture is wasted....Her rhythms were always clear in her precise footwork, her emotional pitch never in doubt....she offered a brilliant virtuoso display of heelwork....When this reviewer once suggested there was a masculine element in her dancing, the idea was not to deny her the sensuality expected of a female flamenco dancer. Rather it was to describe the extraordinary force of her technique...."

For the performance at Berkner, Miss Benitez will appear with the Trio Fantasia, dancers Sandra Jimenez, Rafael Torres Moreno and Joaquin Ruis. The Company will dance to the music of guitarist Pedro Cortes.

Tickets to the September 9th performance are \$6 each. Only 500 tickets are available on a first-come, first-served basis. They can be purchased at the BERA Sales Office or from Gail Williams, Bldg. 460, Ext. 3338. Checks should be made payable to BERA.

Benefit Statements Mailed Next Week

The annual statement of each employee's present insurance and retirement benefits will be mailed next week to the home address of all regular full-time and eligible part-time employees.

The statement reflects each individual's various group insurance coverages (premiums, beneficiaries, disability benefits), and AUI and employee contributions (including current allocation) to the retirement plan.

The purpose of this statement is to provide employees and their families with a better understanding of their AUI benefits and to insure that their insurance coverages and beneficiaries are correct and up-to-date.

In order to reduce cost, the statements are being mailed at the third class bulk rate charge. Therefore, some employees may experience a delay in receiving their statements.

Special Train Trip

In addition to the regular Wednesday LIRR trip to New York City, the Hospitality Committee will sponsor a group trip to the city on Saturday, August 28. Departure will be at 8:31 a.m. from the Patchogue LIRR station. Round-trip fare for adults is \$3.50, children under six years ride free.

Reserve a ticket by sending your fare through the U.S. mail to BNL Hospitality Committee, P.O. Box 322, Upton, New York 11973, no later than Friday, August 20. Please make checks payable to "Brookhaven National Laboratory," and put the date of the trip, your telephone number, and your BNL life number on your check. Reservations will be accepted on a first-come, first-served basis. Your tickets will be given to you on the train.

Refunds will be made only if cancellations are received by the Monday morning preceding the trip.

**BROOKHAVEN
BULLETIN**

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At The Post Office

Effective Monday, August 30, the Upton Post Office announces a new 4:45 p.m. deadline for money order business. Also, the last dispatch of mail leaving the BNL site, including Express Mail, will be at 4:45 p.m. Postmaster Marianne Vitale suggests that all Express Mail be at the Post Office by 4:35 p.m. to allow time for handling before the dispatch.

In Appreciation

Thanks to the considerate person who came to the aid of our son, Randy, injured in a fall while biking home from an afternoon at the pool on August 2. Even though you were no doubt as anxious as anyone else to get home from work, you took the time to take him back to the Lab clinic for medical assistance before continuing on your way. His injuries were not serious and he is doing fine thanks to the care and concern of medical personnel at the clinic, who also went beyond the call of duty.

— Ron and Dorothy Clipperton

Chester Dolinski wishes to sincerely thank all BNL friends who offered their condolences to him since the death of his beloved wife, Wendy, on Thursday, August 5.

Record Cold

Scientists spending the winter at the South Pole have reported the lowest temperature ever recorded there—minus 117 degrees Fahrenheit, the National Science Foundation has reported.

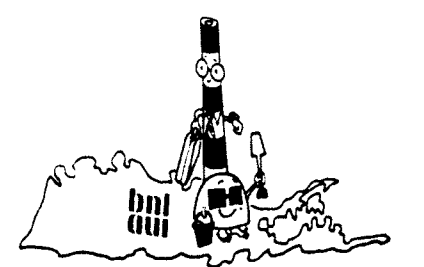
The bone-chilling temperature was recorded at the Amundsen-Scott South Pole Station on June 23 under clear skies and with a light wind blowing. The previous record cold there was minus 113 degrees measured in July, 1965.

Cold as it was, it was not a record low for the Antarctic continent. That distinction belongs to the Soviet Station at Vostok in Wilkes Land—about 730 miles from the Indian Ocean—where the mercury tumbled to minus 127 degrees on August 24, 1960.

T-Shirts On Sale

The BERA contest winning T-shirt is now on sale at the Film Service Office in Berkner Hall. Adult sizes are priced at \$5.00 and youth sizes at \$4.00.

Please note that these shirts are not BERA participation awards. They are available for purchase by all on-site employees.



Nursery School

The Upton Nursery School will hold an enrollment day at the cafeteria on Thursday, August 19. A teacher and the enrollment chairperson will be available from 11:45 a.m. to 12:45 p.m., to answer questions and supply applications for the school term which begins September 13.

The school is a cooperative and the teachers are certified professionals in early childhood education. Located in the housing area on site, the school accepts children whose parents, or other relatives, are BNL employees. Classes are offered two or three mornings a week for three and four-year-olds. The children participate in a varied and stimulating program including art, music, outdoor activities and field trips.

Arrivals & Departures

Arrivals

Kamal J. Araj Nuclear Energy
Ahovi E. Kponou Accelerator
Daniel J. Spandau Energy & Env.
Rajeshwar S. Yadav Plant Engrg.

Departures

This list includes all employees who have terminated from the Laboratory, including retirees:

David R. McCarthy Biology
Michael G. Shepard Energy & Env.

Notice to Visitors

The Public Relations Office has a limited supply of The Long Island Guide available for summer visitors. The Guide is published by Newsday and gives comprehensive information on where to go and what to do on Long Island. For your copy, call Ext. 2345, or stop by Public Relations in Bldg. 134.

PSI News

The monthly meeting of the Upton Chapter, PSI, will be held on Monday, August 16, in Room C, Berkner Hall. Dinner will be at 5:15 p.m., followed by the meeting at 6:00 p.m. For a dinner reservation send a check for \$6.50, payable to Upton Chapter, PSI, to Susan Carlsen, Bldg. 535A, by August 13. The evening's program will feature a film, "If The Shoe Fits," by the New York Telephone Co., and PSI business.

Swimming Races

Winners of last Friday's Pool Special were:

Cup Races

Ages 4,5 — 1st, Jennifer Johnson; 2nd, Kerry Parsons; 3rd, Karen Bebon.

Ages 6,7 — 1st, Robert Rechkemmer; 2nd, Debby Tighe; 3rd, Mike Wanderer.

Ages 8,9 — 1st, Garen Thomas; 2nd, Kathleen Holden; 3rd, Kina Thomas.

Ping-Pong/Spoon Race

Ages 10 and over — 1st, Megan Holden; 2nd, Alyse Holden; 3rd, Keith Holden.

Coming Events:

Today — Balloon Races

August 20 — Annual Water Carnival (lots of races and prizes for all!).

**Art Show
This Week**

An exhibition of artwork centered on the theme of "Containers" will be on display in Room B, Berkner Hall through Friday, August 20. The show, which comes from the Elaine Benson Gallery in Bridgehampton, may be seen weekdays from 11:30 a.m. to 1:30 p.m.



Doug Humphrey

Twenty-two students from local high schools are participating in Brookhaven's Youth on Campus program, now in its eighteenth year. The program provides summer employment opportunities for young people who are interested in pursuing a vocation. Said Program Coordinator Nancy Sobrito, "This program gives them a preview of what working life is all about." In addition to the summer support they are giving to departments throughout the Lab, the students may take courses in typing and office practice. Here, some of the youths take a break during a recent lesson taught by Fran Ligon (standing, right) of the Affirmative Action Office. Typing classes were also led by Wendy Westfall, NSLS.

Mountain Club

The Mountain and Canoe Club will have a meeting at 7:30 p.m. on Tuesday, August 17, in the television room of the Brookhaven Center. Plans for Labor Day and early fall will be discussed.

Golf

The next BGA tournament will be held on Monday, August 23 at the Timber Point Suffolk County Golf Course. Tee times may be obtained by contacting Ron Webster (Ext. 2845) Bldg. 526. There is a \$1 entry fee for league members and a \$2 entry fee for non-league members which must be paid by Friday, August 20. All BGA tournaments are open to Lab employees, spouses, and retired employees.

A total of 47 golfers played in the rain-delayed tournament held at the Swan Lake Golf Course. John Usher won low gross with a 78 and Dan Mulaly won net with a 63. Other winners were: Bill Laws and Mike Zguris Jr., low gross front 9 (39); John Dioguardo and George Korhut, low gross back 9 (40); George Speidell and Lou Repeta, low net front 9 (32); and Artie Dick, low net back 9 (31). Longest drive was won by Mike Zguris Jr., and Jim Morris won closest to the pin.

Picnic Tomorrow

The "Foods Of All Nations" picnic will get under way at 10 a.m. tomorrow at softball fields 1 and 2. The picnic, sponsored by the BNL Afro-American Culture Club, will last until approximately 6 p.m. Food tables will be set up at the pavilion near the softball fields. Those who would like to play softball, should bring gloves; bats and balls will be provided. Good weather is expected, but in case of rain, everything will be moved to the Recreation Building, 317. For further information, contact Mary Durham, Ext. 7982.

Cafeteria Menu
Week Ending Aug. 20, 1982

Monday, August 16	
Spinach egg drop soup	(cup) .60 (bowl) .70
Home-style meatloaf w/mushroom gravy & 1 veg.	
	1.85
Turkey à la king on rice	1.80
Hot Deli: Pastrami	(bread) 1.85 (roll) 1.95
Tuesday, August 17	
Chicken & rice soup	(cup) .60 (bowl) .70
Pork & cabbage crisp on toasted Chinese noodles	
	1.90
Swedish meatballs on egg noodles	1.85
Hot Deli: Roasted top round of beef	(bread) 1.95 (roll) 2.05
Wednesday, August 18	
Corn chowder	(cup) .65 (bowl) .75
Chinese pepper steak on fluffy white rice	
	1.95
Stuffed bell peppers & 1 veg. or w/spaghetti	1.85 2.05
Hot Deli: Knockwurst & kraut on rye	1.85
Thursday, August 19	
Minestrone soup	(cup) .60 (bowl) .70
Country-fried steak w/mushroom gravy & 1 veg.	
	1.95
Yankee pot roast & 1 veg.	1.95
Hot Deli: Monte Cristo	1.90
Friday, August 20	
Manhattan clam chowder	(cup) .65 (bowl) .75
Shelly's homestyle chili on fluffy white rice	
	1.85
Tuna noodle casserole	1.80
Hot Deli: Veal pattie & pepper hero	1.90

Softball

Scores for week of August 2:

Leagues I and II

Blue Jays 10 - Six Pax 6
Phoubars 14 - Ravens 2

Peter Messineo was 4 for 4 and scored 4 runs. Richie Parsons was 4 for 4 and scored 4 runs.

Big Sticks 20 - Roga 15

The Big Sticks win was aided by 2 back-to-back home runs by Steve Bennett and Charlie Bloxom. Harry Ackerman and Ray Rathamel were 4 for 5.

Ice Pops 16 - Moles 3

Tony Mendez had 3 home runs; Tirre Farmer had 1 home run. Bob Danowski pitched 6 scoreless innings.

Leagues III and IV

Titans 12 - Magnuts 2
Medical 10 - Electric Co. 8

Spectacular hitting and fielding by Pete Bonti and Claire Shellabarger led Medical to short circuit the Electric Co.

Lights Out 22 - Random Errors 5

The Lights Out got turned on in the 6th inning with 10 runs to break open the game.

Double-header:

AMD 21 - Dirty Sox 7
AMD 8 - Dirty Sox 2

League V

Survivors 11 - Nads 0
No Names 13 - Turkeys 3
E-Z Riders 7 - TNT 5

League VI

Mudville Sluggers 12 - Random Sample 4
Who Cares 20 - Who's On First 6
Mole-Esters 19 - The Source 9
No Feedback 14 - Underalls 11

Great playing by all. Jody had a triple and even the guys played well.

Makeup game:

Who Cares 12 - No Feedback 11

Corrections to last week's scores:

League I- Ravens 18 - Ice Pops 10
League VI- Who's On First (win) - Underalls (forfeit)

