BROOKHAVEN BULLETIN
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BROOKHAVEN NATIONAL LABORATORY

Making Restriction Enzymes Crystal Clear

Steven White (left), Susana Martinez and Sanford Lacks, examining the diffraction pattern of a restriction enzyme crystal.

Peter Horton

"Madam, I'm Adam."

Reliable sources report that this is the phrase with which Adam introduced himself to Eve. It is also the most well-known English palindrome, which is a word or phrase that reads the same backward as forward.

You may not know it when you read it, but GATC is also a word — a genetic word — as well as a palindrome (see box). GATC is the only genetic word read by the restriction enzymes just crystallized by the Biology Department team of Sanford Lacks, Steven White and Susana Martinez.

One of those highly specific, forward-and-backward reading enzymes, a DNA methylase protein, may be the first such enzyme in the world to be crystallized.

In December 1987, Martinez produced the first high quality crystals of the restriction enzyme DpnM methylase. In June of last year, she had crystallized another restriction enzyme, *Dpn*II endonuclease.

Enzymes are proteins that act as catalysts of chemical reactions constantly taking place within all organisms. Most enzymes act on only one chemical substance. Restriction enzymes found within bacteria act on DNA to defend the bacteria against attack by viruses.

Different strains of bacteria have different restriction enzymes, but they all function similarly: Restriction enzymes "read" the viral DNA, recognize a specific genetic word and then cut the virus's DNA at that word — thus rendering the virus harmless to the bacteria.

Restriction enzymes, which were discovered less than 20 years ago, have made possible the cloning of DNA sequences and, thus, the promising field of genetic engineering. What makes this possible is the unusual ability of these enzymes to recognize specific nucleotide sequences within DNA.

Now that these restriction enzymes have been crystallized, their three-dimensional structures can be determined. Beginning this summer, White and Martinez will perform diffraction studies on their crystals at beam line X-12C of the National Synchrotron Light Source. This beam line is the protein crystallography station of the Biology Department's Center for Structural Biology, with which White is associated.

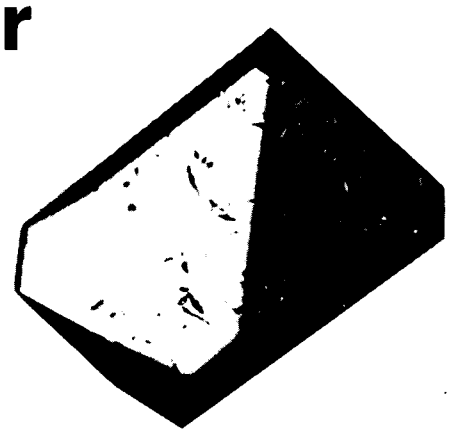
Studying restriction enzymes from *Streptococcus pneumoniae* bacteria, Lacks and company want to know how the bacteria make the enzymes and how they interact with DNA. Studying the proteins' structures will assist the Biology team in these determinations.

"Though the restriction enzymes we are working with all recognize the nucleotide sequence GATC in one of two forms in viral DNA, the amino acid sequences of the enzymes — their chemical composition — are completely different," Lacks explains.

"Since the way these enzymes recognize the GATC sequence does not depend directly upon their chemical composition," Lacks continued, "we think that it must depend upon their three-dimensional structure — the way the proteins are folded — and, so, that is what we want to know next."

Since he came to Brookhaven in 1961, Lacks has been investigating the mechanisms of genetic transformation in *S. pneumoniae*. In 1974, Lacks turned his attention specifically

(Continued on page 2)



A crystal of DpnM methylase, as seen under the light microscope, in a solution of polyethylene glycol. The crystal is bipyramidal in shape and 0.2 mm long.

The Language of the Chromosome

GATC can be considered to be a genetic word, made up of the four letters of the genetic alphabet. The letters within the alphabet are the initials of the four nucleotide bases making up the strands of DNA in the double helix: guanine (G), adenine (A), thymine (T) and cytosine (C).

Within each strand of DNA, in many permutations, these four letters are lined up next to each other to form different words, phrases and, eventually, the genetic equivalent of imperative sentences called genes, which command the characteristics of an organism.

Clusters of related genes are linked together into the equivalent of paragraphs, and these genetic paragraphs add up to make a chromosome. Each particular organism has a specific number of chromosome chapters to characterize its entirety.

Within the double helix, each genetic letter is always paired with its complement on the opposite DNA strand. Specifically, guanine is always opposite cytosine, and adenine opposite thymine.

For example, GATC is paired with CTAG on an opposite DNA strand. However, the strands are read in opposite directions, as indicated by the arrows:

→ GATC
CTAG ← Therefore, GATC is read on both strands.

Although GATC is not strictly a palindrome in English, it is one in the language of the chromosomes.

— Marsha Belford

Alfred Wolf Elected to NAS

To the long list of honors accumulated by Alfred Wolf, Chemistry Department, can now be added election to the National Academy of Sciences (NAS). Wolf is one of 61 scientists just elected to this prestigious honorary society, and one of 1,540 current members.

Wolf is best known for his pioneering work on positron emitters and positron emission tomography (PET). PET is a technique that uses radiotracers to study organs and metabolic processes in the human body. This work is an outgrowth of research with which he has been involved at BNL for over 30 years. Even while he was Chairman of the Chemistry Department from 1982-87, Wolf continued his involvement in the PET program at Brookhaven, which he now directs on a full-time basis.

In March, Wolf and his colleague Joanna Fowler shared the 1988 Gustavas John Esselen Award for Chemistry in the Public Interest, for their work with PET. Among the other honors he has received are the Hevesy Memorial Award (1986), the Javits Neuroscience Investigator Award (1986), an honorary doctorate from the University of Uppsala, Sweden (1983), the Paul Aebersold Award (1981) and the American Chemical Society Award in Nuclear Applications (1971).

'Practical' Is DOE's Goal For New Superconductors

BNL has been named one of ten Department of Energy (DOE) laboratories selected to receive funding to pursue expanded research in the development of practical high temperature superconductors, Secretary of Energy John S. Herrington announced on April 28.

In addition to BNL, the laboratories chosen to receive funding from DOE's Office of Energy Storage and Distribution are Ames, Argonne, Lawrence Livermore, Los Alamos, Oak Ridge and Sandia National Laboratories; Lawrence Berkeley and Pacific Northwest Laboratories; and the Solar Energy Research Institute.

In announcing the selections, Herrington said, "These projects are the first step toward the goal of bringing high temperature superconductivity out of the laboratory and into use in commercially available products."

Donna Fitzpatrick, Assistant Secretary of Conservation and Renewable Energy, said, "The fundamental problem addressed by the initial phase of research will be raising the current capacity of high temperature superconductors so their use in magnets, cables and other devices becomes practical."

Research is scheduled to begin with funding in 1988 and continue for several years. Only the most successful concepts will continue into prototype phases of development. BNL's initial funding for this effort is $350,000, out of the total of $2,650,000 being distributed among the ten laboratories.

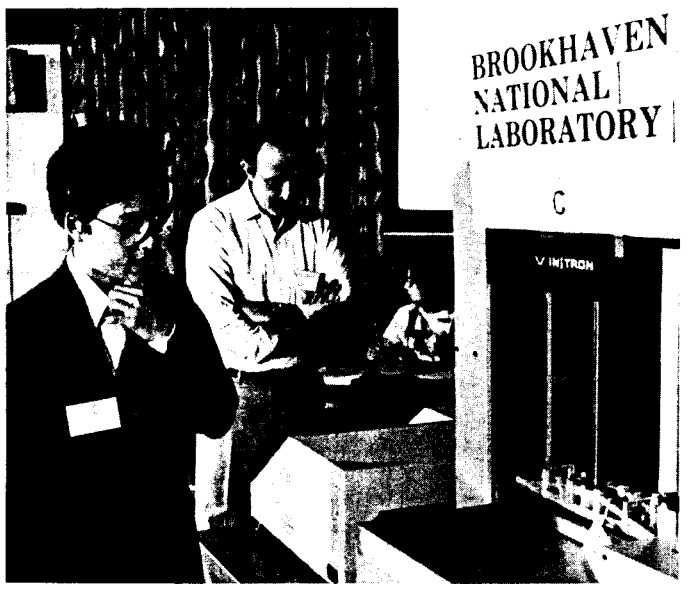
BNL will use these funds in two ways: Researchers in the Department of Applied Science will investigate several methods for fabricating practical high temperature superconducting (HTSC) conductors that can be scaled to long lengths. These conductors are intended to provide greater current-carrying capability and flexibility than existing HTSC wires. In the Accelerator Development Department, studies will also begin on the practical operational problems of applying HTSC conductors to devices such as magnets.

Victor Emery, Physics, chairs BNL's Interdisciplinary Task Force on High Temperature Superconductors. Of this new impetus for BNL's HTSC research he said, "We're very pleased to have the support for our research into applications of high temperature superconductors. There is much to be learned about the fundamental properties of these materials and it makes great sense to carry out the two kinds of research in parallel, to hasten the time when applications of the new superconductors will be available."

At the Breaking Point

3rd — Shelly Peters, Ohio, with bridge tester Donald Horne, Department of Applied Science

4th — Peter Kust, Washington



9th — Hyung Kim, New York

The pressure applied by the stress tester is mounting . . . growing . . . increasing. The balsa and glue structure creaks and creaks again. How long will *this* bridge hold?

Some of the tense moments experienced by owners of the 28 bridges being tested are captured in these photos from the 11th National Model Bridge Contest, which was organized at BNL, on Saturday, April 30, by Janet Tempel and Eloise Gmur of the Tour Program in the Public Affairs Office, with Martin Woodle of the National Synchrotron Light Source Department assisting as contest engineer.

For building the bridge that could support the greatest load per gram of its own mass, Michael Eldredge of Wheat Ridge High School, Denver, Colorado, won first prize. He was not present to witness the strength of his 31.17 gram bridge, which held 196 pounds.

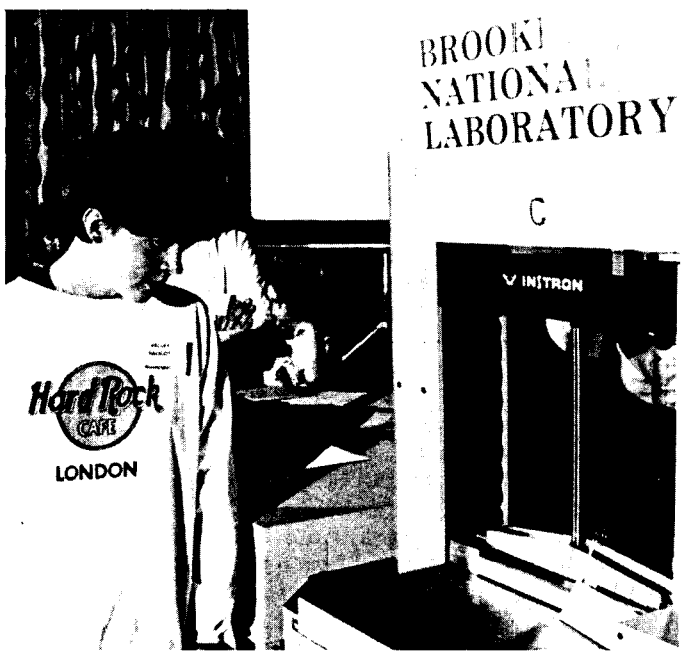
Other awards were: second — Kelley Racicot, South Whidbey High School, Langley, Washington, whose bridge weighed 40.49 grams and held 209.7 pounds; third — Shelly Peters, Garaway High School, Sugarcreek, Ohio, with a 37.03 gram bridge that held 181.9 pounds.

New York also did well, with students from Herricks, Cold Spring Harbor and East Islip High Schools gaining 5th and 9th, 7th, and 8th places respectively.

The 28 high school students who participated, each one a regional finalist, came from 14 states, and 21 of them were able to attend the event. Contestants toured the Lab and surrounding area Saturday morning, while their bridges were inspected and weighed before the contest began at 2 p.m.

At the banquet that evening, Seymour Baron, Associate Director for Applied Programs, introduced guest speaker Fred Chang, a bridge designer for Ammann and Whitney for 35 years, who gave a slide-illustrated talk about bridges.

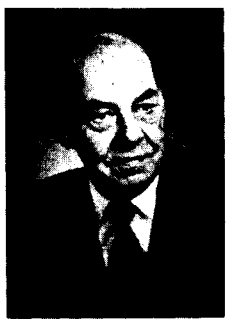
Photos by Peter Horton



2nd — Kelley Racicot, Washington

Inside Info

Tomorrow, **Donald J. Metz**, Head of the Office of Educational Programs (OEP), will receive the Robert A. Leahy Memorial Outstanding Citizenship Award from the Long Island Forum for Technology (LIFT).



The Citizenship Award is given to individuals who have made notable contributions to further math, science and technology education on Long Island. It will be presented at C.W. Post College, at the Fifth Annual Awards and Recognition Day sponsored by LIFT's Regional Industrial Technical Education Committee (RITEC).

RITEC Chairman Charles H. Herbert noted, "An active member since RITEC's inception, Don Metz has devoted his time and energy to promote technology education in the region. As a former faculty member of St. Francis College [Brooklyn], his dedication to increased excellence in performance by students and educators is well known."

In addition to receiving his bachelor's degree in chemistry from St. Francis in 1947 and serving as a faculty member until 1976, Metz received an honorary Doctor of Science from the College in 1984.

Metz earned his Ph.D. in physical chemistry from the Polytechnic Institute of Brooklyn, in 1955. In 1954, he joined the BNL staff as an Associate Chemist in the Nuclear Engineering Department. By 1972, Metz headed the Chemical Sciences Division in the Department of Applied Science. To pursue his lifelong interest in scientific education programs, Metz relinquished his scientific research in November 1985, to become head of OEP.

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Mona S. Rowe, editor of BNL's 40th anniversary book *The First Forty Years*, was recently notified that the publication has captured a fourth place Award of Achievement in the 1987 International Competition of the Society for Technical Communications (STC). The book became eligible for competition at the international level, after winning a first place award for Distinguished Technical Communication from the STC's New York Chapter.

Enzymes (cont'd)

to the two complementary restriction enzyme systems he discovered in two strains of this bacterial species. Essential contributors to this work have been his long-time colleagues Bill Greenberg and Sylvia Springhorn, as well as a number of postdoctoral research associates.

The first restriction enzyme system found by Lacks at BNL is called *Dpn*I. It cuts up viral DNA reading GATC only if the adenine (A) in that genetic word is modified by having a methyl group, an extra carbon and three hydrogens, attached to it.

As the adenine in the DNA of *S. pneumoniae* bacteria having the *Dpn*I restriction system is not methylated, the *Dpn*I restriction enzymes made by these bacteria do not cut up their own DNA.

The second restriction enzyme system in *S. pneumoniae*, called *Dpn*II, cuts viral DNA when it recognizes GATC — but only if the adenine is *not* methylated. If the adenine in the DNA of *S. pneumoniae* bacteria with the *Dpn*II restriction system were not methylated, the bacteria would cut up their own DNA.

So, to protect their own DNA, these bacteria first methylate the adenines of every GATC sequence.

"We think the reason that these strains with two complementary restriction enzyme systems evolved was to increase the survival of the species during epidemic infections by bacteria viruses," comments Lacks. "Whether or not the infecting viral DNA was methylated, at least some bacteria in a population containing both strains would survive."

In 1986, Lacks and his colleagues found the bacterial genes that make the restriction enzymes in the two systems, cloned these genes and determined the sequences of their DNA bases. They are now trying to determine how those genes are turned on and off in the regulated production of restriction enzymes.

Two genes are implicated in the production of the *Dpn*I restriction enzyme: One gene makes the endonuclease, which is an enzyme that cuts DNA after recognizing a specific sequence, in this case, GATC having methylated adenine. "We don't yet know what is the function of the second gene," admits Lacks, "but we think that it has to do with regulation of restriction enzyme expression."

The *Dpn*II restriction system has three genes: Two make methylases, enzymes to methylate the GATC sites in the bacteria cell's own DNA; and the third gene makes another endonuclease, one that recognizes unmethylated GATC and cuts it.

With regard to the *Dpn*II system, "When you introduce these genes into a bacterial cell, something must enable the bacteria to make the methylase before the endonuclease, or else the bacteria would cut up their own DNA," Lacks points out. "This is an example of the regulation of gene expression that we want to understand."

As well as crystallizing all four of the known enzymes in the *Dpn*I and II systems and determining their structures by x-ray diffraction, Lacks, White and Martinez hope to crystallize the individual enzymes together with bits of DNA containing GATC, so they can determine the structure of those complexes.

As White sums up, "We'd like to see how the bacterial enzymes interact with the DNA that they recognize, to see where the interactions are and how the chemical reactions take place." — Marsha Belford

Coming Up

James Hainfeld, a biophysicist in the Biology Department, will deliver the next Brookhaven Lecture on Wednesday, May 18, at 4:30 p.m. in Berkner Hall. He will speak about "Labeling Molecules for Biology and Medicine, Using STEM (Scanning Transmission Electron Microscope)."

10-Digit Service Chosen for Lab Phones

A permanent replacement has been selected for the FTS service formerly used when placing 10-digit phone calls from BNL. MEGACOM, a long-distance service offered by AT&T, is expected to be in operation by early June.

When the new MEGACOM service comes on line, telephone users will probably not be aware of it, as there will be no change in procedure for making long-distance calls from telephones with appropriate treatment numbers. In addition, the FTS remains available for 7-digit (on-net) access.

The replacement process began last fall, when the Lab received permission from the Department of Energy to discontinue using the 10-digit FTS service in favor of a less costly, higher quality commercial alternative. As a temporary measure, pending the outcome of a competitive procurement for a permanent carrier, the 10-digit service was switched to AT&T.

With MEGACOM on line, "It is expected that service will be as good or better than that we now have from AT&T, and far better than that of the aged FTS service it replaced. It is also expected to be considerably less expensive," said Arnold Peskin, head of the Networking, Engineering & Telecommunications Division in the Applied Mathematics Department.

Happy Birthday, Irving Berlin!

On May 11, Irving Berlin — songwriter and former Camp Upton recruit — celebrates his 100th birthday.

In 1918, as both a songwriter and a World War I soldier, Berlin wrote "Yip, Yip, Yaphank," a military musical based on his life at the camp, which predated BNL on this site. In 1982, a bronze plaque commemorating this achievement was dedicated at BNL; it decorates a large rock in front of the Brookhaven Center.

For immortalizing the Lab site and for the estimated 1,500 songs that have made the world a little better place, we thank Irving Berlin and wish him the happiest of birthdays.

Local Users Group

The next meeting of the Upton Local Users Group (LUG) will be on Wednesday, May 11, at 11 a.m. in Room B, of Berkner Hall. There will be a panel discussion on the VAX Cluster upgrade and the results of the recent survey.

Since the upgrade transcends many different levels of administration, the panel will consist of: Martin Blume, Deputy Director; James Davenport, Physics, chairman of the Computer Policy Committee; Jonathan Hanson, Chemistry, chairman of the Upgrade Task Force; and Ronald Peierls, Chairman of the Applied Mathematics Department.

All computer users are welcome to attend. For more information, call Zohreh Parsa, LUG Chairperson, Ext. 4748.

Arrivals & Departures

Arrivals

Brian E. Davis ..... Plant Eng.
Albert L. Langhorn ..... Physics
Sam Sheynin ..... Accel. Dev.
John C. Small ..... Contracts & Proc.
Richard J. Travis ..... DNE

Departures

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

Joseph M. Bennett ..... Plant Eng.
James A. Caufield ..... NSLS
Zeng-Xie Chen ..... Biology
Salvatore B. Galati ..... Fiscal
Grant A. Mayo ..... Plant Eng.
John P. Nicoletti ..... Central Shops
Joseph A. Perry Jr. ..... SMD
Frederick R. Pond ..... SMD
Robert J. Walton .... Photo. & Gr. Arts

In Memoriam

Benedicto J. Scala, a Senior Budget Specialist in the Biology Department, died suddenly on Saturday, April 30. He was 55 years old.

Scala's 22 years at BNL began on July 26, 1965, when he started as Cashier in the Fiscal Division. He became Office Services Assistant in 1971 and Accountant in 1974. In February 1976, he transferred to Biology as a Staff Assistant. He became Budget Specialist in 1982 and earned his latest title in 1985.

Scala, who lived in North Patchogue, is survived by his wife Marie and two sons, Nick and Peter.

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SEEKing Knowledge at BNL

Peter Horton

Eight students from City College of New York (CCNY) came to BNL in April to participate in the 12th SEEK mini-semester. SEEK, an acronym for Search for Education Elevation & Knowledge, is the name of a program established by CCNY to provide freshmen with an overview of engineering and technical pursuits at a major institution. Working with CCNY, BNL's Affirmative Action Office prepared a four-day agenda for the students to tour most of the Lab's facilities and attend seminars. The participants were: (front) Brian Davies-Jones, William Reid, James Harden, Arden Warner (counselor); (rear) Anita Cornado, Tamara Castillo, Brian Harris, Dolores DeJesus and Alicia Mulcare.

To Your Health

The Health Promotion Program advises that, in connection with Breast Cancer Awareness Week, May 9-13, the American Cancer Society will be offering mammograms for $40 to women over 35 who have never had a mammogram and have no symptoms of breast cancer. The fee also includes instruction in breast self examination and a physical examination by a physician.

To schedule an appointment at one of over 21 area hospitals, call 955-WELL.

Bus Trip Planned To U.S. Open

The BERA Tennis Committee is sponsoring a bus trip to the U.S. Open at Flushing Meadows on Tuesday, September 6. The 49-passenger coach will leave from BNL in the morning and make one stop at a yet-to-be determined Park-&-Ride off the LIE.

The $27 cost of the trip includes round-trip bus fare and the admission ticket for the daytime matches.

Reservations — prepaid only — may be made at the BERA Sales Office. As tickets will be purchased from the National Tennis Center in late May, the deadline for paid reservations is Monday, May 16. Sign up early; first-come, first-served.

Other news from the Tennis Committee: Tennis "Fun Day" One-Day Event, Saturday, June 18 (rain date, June 19). Watch for details.

Bowling

Pink League

Maryann Reynolds had games of 203/190 for a 555 scratch series, Donna McCambridge 190/183, Renie Rosati 180, Lynette Finlay 168.

Red/Green League

L. Jacobson rolled a 246/600 scratch series, C. Bohnenblusch 228/607 scratch, N. Parrinello 224/206/614 scratch, E. Meier 215, A. Pinelli 210, P. Pietraski 207, C. Bachsmith 206, T. Prach 204, J. Morris 201, S. Dimaiuta 201, K. Riker 200/200, H. Marshall 200.

Purple League

Carl Murray bowled a 215, Skelly Frei 208, Dick Adams 206, Ed Beadle 204, Sharon Smith 203.

White League

Jim Vogel had a 210, Vito Manzella 209, Tom Romano 208, Annette Holmquist 190, Maryann Reynolds 189, Gerry Riker 181.

Swim Lessons For Adults

Adult swim lessons will be held on eight consecutive Wednesdays from May 11 through June 29. The lessons will cost $20 and be held from 5:15 through 6:30 p.m. Registration starts immediately at the pool.

Volleyball

Playoff standings
Week of April 25

League II
Nuts & Bolts defeated Chunga's Revenge.
Set-Ups defeated Slammers.

League III
Printouts defeated Good Times.
Sourcerers defeated Airheads.
MISfits defeated Renegades.
Screwballs defeated Spikes.

Open League
Phoenix defeated Not Too Bad.
Dakota defeated Serendipity.

Golf

The second BGA golf tournament will be held on Monday, May 16, at the county golf course in West Sayville. Starting times can be obtained by contacting John Nagy, Ext. 2667. First priority will go to completed foursomes.

Greens fees are $9 for Suffolk County residents; $20, non-residents; $4 senior citizens; and free for handicapped persons. Tournament entry fees are $1 for BGA members and $2 for non-members. Pay greens fees in the Pro Shop, entry fee to the starter.

Riding carts are $18 each, pull carts are $2, deposits are $2 and $1, respectively. Tee-times are reserved for 11 a.m. through 1:30 p.m., so sign up early. Deadline for sign-up is May 11.

The results of the first tournament at the Heatherwood Golf Club were: Low Gross — John Usher, Flight A; Stan Pollack, B; Tony Baltz, C; Bill Cahill, D. Low Net — Vince Racaniello, A; Mike Losquadro, B; Norm Franklin, C; Lou Sanford, D. Long Drives — Joe DePace, Bob Mills. Closest to pin — Ted Erickson, John Usher, Mike Clancy, Vince Racaniello.

All film badges will be changed tomorrow. Please place your badge in its assigned rack space before leaving work today.

AACC Elections

The Afro-American Culture Club (AACC) will hold elections for President and Treasurer on Tuesday and Wednesday, May 17 and 18. Members may vote from 11:30 a.m. to 1:30 p.m., in the lobby of Berkner Hall. The candidates are:

President	Treasurer
George Grigg	Michelle Cummings
Leon Lawrence	Pauline Dixon
William Sells	Abass Wessen

Soccer

Pick-up games are played on Mondays after 5 p.m. and Wednesdays at noon, at the BERA field. For more information, call Enrique Abola, Ext. 4383.

Cooking Exchange

Seafood recipes will be featured at the next meeting of the International Cooking Exchange on Wednesday, May 11, from 12:30 p.m. to 2:30 p.m., in the Recreation Building in the apartment area on site.

BNL employees and their families may attend Cooking Exchange meetings. There is a fee of $2 per adult to help defray the cost of the ingredients used in demonstrating the recipes, which everyone may sample. Babysitting is provided at 50¢ per child.

Equipment Demo

A microscope show featuring Olympus products will be held on Tuesday, May 10, in Berkner Hall, from 10 a.m. to 3 p.m.

Note to Diners

The Cafeteria will be closed on Saturday, May 7. On that day, snack bar service will be available from 9 a.m. to 2 p.m. at the Brookhaven Center.

Help Wanted At Cafeteria

Marriott Corporation, which runs the Cafeteria, needs several new employees to fill utility and general positions. Marriott Corporation is an equal opportunity employer. Anyone interested may apply in person at the Cafeteria, Ext. 3541.

Cafeteria Menu

Week of May 9

Monday, May 9		
Beef barley soup	(cup)	.75
	(bowl)	.95
Fettuccine carbonara w/1 veg.		2.85
Fried clams w/1 veg.		2.95
Spinach bacon & egg salad plate (lite-weight)		2.25
Hot deli: Baked ham	(bread)	2.75
	(roll)	2.85
	(hero)	2.95
Tuesday, May 10		
Split pea soup	(cup)	.75
	(bowl)	.95
Pork chop Oriental w/1 veg.		2.95
Southern fried chicken w/1 veg.		2.85
Chef's salad plate (lite-weight)		2.25
Hot deli: Italian meatball hero		2.85
Wednesday, May 11		
Chicken noodle soup	(cup)	.75
	(bowl)	.95
Stir-fried beef Oriental over rice		2.85
Fillet of fish Parisien w/1 veg. (lite-weight)		2.95
Hot deli: Corned beef	(bread)	2.75
	(roll)	2.85
	(hero)	2.95
Thursday, May 12		
Cream of spinach soup	(cup)	.75
	(bowl)	.95
Braised fresh brisket of beef w/1 veg.		2.85
Sautéed chicken livers w/1 veg.		2.75
Baked skinless chicken w/1 veg. (lite-weight)		2.85
Hot deli: Roast turkey	(bread)	2.75
	(roll)	2.85
	(hero)	2.95
Friday, May 13		
Fish chowder	(cup)	.75
	(bowl)	.95
Veal parmigiana w/1 veg.		2.85
Mexican macaroni w/1 veg.		2.75
Baked fresh fish w/lemon & 1 veg. (lite-weight)		2.95
Hot deli: Fried fish on a bun		2.85

Classified Advertisements

Motor Vehicles & Supplies

80 YAMAHA 850 MOTORCYCLE - full fairing, trunk, 6k mi., excel. cond. $975. 878-0175.

CAR BATTERY - 1 mo. old, top mounted terminals, 600 cranking amps, 6½"x8"x12", $30. Lou, Ext. 5454.

81 CHEVY MONTE CARLO - a/c, am/fm stereo, 82k mi., very clean, dependable, $1,850 neg. Saeed, Ext. 4339 or 2862, Rm. 8.

88 CHEVY PICKUP - 4x4/2500, Silverado, western plow, running boards, loaded, must sell, $18,500. 734-7325.

75 CHEVY IMPALA STATION WAGON - 9 passenger, tires, good cond., $650. 473-6432.

80 AMC SPIRIT - ps/pb, a/c, am/fm, new brakes, good cond., $800. Ext. 2884 or 744-1786 after 6 p.m.

84 LE SHARA WINNEBAGO MOTOR HOME - 19', fully equipped, sleeps 4. 475-0509.

76 VOLVO - 4 dr., sedan, mech. sound, asking $1,200. Ext. 7126 or 924-0138 after 5 p.m.

HIGH PERFORMANCE PARTS - for Ford, small block motors. Wayne, Ext. 3499.

80 TOYOTA CELICA GT - 5 speed, moonroof, cassette, low entropy, good cond., runs fine, $1,700. Bill, Ext. 2378 or 758-3284.

82 CHEVY BLAZER SILVERADO - 4x4, 54k mi., a/c, stereo/cass./equalizer, a/t, p/w, excel. cond., $8,500. Jeannie, 737-4270.

84 FORD MUSTANG - console, am/fm/tape, p/s, p/l, a/c, sunroof, alum. wheels, s/t, 2.3 lt., excel. cond., $4,999. Ext. 4846 or 363-6940.

75 SUZUKI 250 GL - very good cond., $275; 2 extra wheels, $40. Ext. 7699 or 821-1435.

79 TOYOTA CELICA SUPRA - blown engine, good body, $500. 474-3837.

73 SAAB 99 - runs, rear end damage, $200 or best offer. Ext. 7708 or 744-0903.

81 PLYMOUTH RELIANT - new tires, $1,200. Ext. 4100 or 929-8876 after 6 p.m.

84 RENAULT ENCORE - hatchback, 54k mi., 4 dr., s/t, excel. cond., $2,700; 74 Volvo, good running cond., $700. Torsten, Ext. 3817 or 878-1210.

87 CARGO VAN E150 - 15k mi., 6 yr. warranty, 6 cyl. Dave, Ext. 2076.

SUZUKI LT-80 ATV - 4 wheel, elec. start, auto clutch, brand-new, won in raffle, retail $1,300, asking $850. Dick, Ext. 3273.

MOTORCYCLE/SCOOTER HELMET - red, w/visor, $25. Jim, Ext. 3372 or 821-0250.

73 HOLIDAY VACATIONER - 26', clean skylight & cedar in bdrm., asking $4,500. 289-4732 after 6 p.m.

73 MERCURY COMET - 6 cyl., 59k mi., good for parts. 759-0800 days or 928-0242 wknds.

77 CHEVY CAMARO - blue, a/t, p/s, a/c, am/fm cass., new trans., rebuilt 350 eng., 56k mi., many new parts, asking $2,000. Ext. 5141.

ATV - H.D. pipe frame & running gear, very good shape, needs engine, incl. tow bar, asking $200 neg. 929-4522.

62 CHEVROLET STEP VAN - alum., 6 cyl., a/t, short wheel base, $650. 744-4386.

83 BUICK REGAL - a/c, p/s, am/fm, beige landau top, excel. cond., $5,800 neg. Ext. 2964.

72 CADILLAC - good running cond., clean in & out, best offer. John, Ext. 4988.

85 PLYMOUTH TURISMO - hatchback, 2 dr., custom interior, a/c, stereo, mint cond., $3,500. Patricia, 751-7233.

74 CHEVY MALIBU 350 - V8, new battery, ball joint, looks great, running cond., best offer. Ext. 4254.

TRAILER/CAR CARRIER - homemade, as is, $200 or best offer. Pete, 399-2813 after 5:15 p.m.

76 CHEVROLET - 109k mi., 4 drs., 8 cyl., am/fm, a/c, excel. cond., $1,200. Chris, Ext. 3191 or Peter, 3734.

74 CHEVETTE - a/t, new tires, am/fm cass., excel. cond., $2,900. 878-0874 eves.

81 DATSUN B-210 - 4 cyl., 5 speed, am/fm cass., new tires, exhaust, paint, very clean, $1,600. 737-3327.

79 FORD PINTO WAGON - 4 speed, am/fm, 94k mi., reliable, good cond., $625 neg. Graham, Ext. 4253 or 331-4171.

82 VOVLO DL - 4 dr., 69k mi., a/t, a/c, beige, am/fm cass., new exhaust, brakes, Pirelli tires, mint in & out, $6,300. Ext. 2830 or 543-0487 eves.

74 PLYMOUTH DUSTER - no rust, new radial tires, slant 6 engine makes noise, $250. Ext. 4240 or 286-0295.

81 LINCOLN MARK VI SIGNATURE SERIES - black/gray, 2 dr., loaded, all opts., moonroof & CB radio, $6,950. Fred, Ext. 3259 or 473-8622.

79 CAPRICE - a/t, a/c, am/fm cass., body good, 79k mi., may need valve job, asking $625. Ext. 4118 or 928-5714.

80 MONZA - 4 cyl, 4 speed, looks good, needs some work, $950. Ext. 2175.

80 CADILLAC COUPE DEVILLE - red w/white top, cruise, tape, tilt, excel. cond., $4,200. Ext. 7732.

79 MUSTANG - 8 cyl., p/s, p/b, a/c, am/fm cass., good cond., asking $2,000. Ext. 2175 or 399-0224.

77 TOYOTA CELICA - 87k mi., good tires, good mech., needs radiator, $900. Rick, Ext. 3932 or 472-9789.

74 CAMARO - rebuilt engine & trans., many extras, good cond., $850. Ext. 4629.

79 FAIRMONT SW - 4 cyl., 4 speed, runs OK, body damaged, handy size, good utility car, $300. Tom, Ext. 7196 or 286-2505.

81 FORD GRANADA - 2 dr., a/c, cruise, p/l, low mi., very clean, $1,600. 878-4285.

TIRES - truck, Siberling, power lugs, 11-15, $10. 474-3837.

76 FIREBIRD - good cond., $1,000. Robin, 475-5591 after 6:30 p.m.

81 MERCURY LYNX - high mi., good body, needs some mech. work, best offer; 79 Chevette, needs some work, best offer. Jack, Ext. 2907 or 928-3545.

72 YAMAHA 650 - road ready, many extras, good cond., $250. Kevin, 281-8031.

69 PONTIAC LEMANS - 2 door, 350 V8, a/t, reliable. Jim, 744-3792.

87 PORSCHE 944 - like new, must be seen, $22,900. 475-4596.

SLIDE-ON CAMPER - 11', self-contained, gas/elec., oven, shower, refrig., king-size bed, $2,200. Ext. 4142 or 345-3915.

Boats & Marine Supplies

20' HURLEY SAILBOAT - sleeps 4, 9.9 Evinrude cradle/cover/mooring complete, mint cond., $10,000. Hubert Frank, Ext. 3499 or 271-1773 eves.

23' CHRISCRAFT LANCER - glass hull, V8 inboard, many extras, $2,495. 878-0175.

15' RUNABOUT - fiberglass, new seats, 50 h.p. Evinrude, trailer, skis, $1,100. 821-1042.

16' GLASSTRON BOWRIDER - 70 h.p. Johnson, E.Z. loader trailer, all accessories, excel. cond., Ext. 5319 or 325-1756.

20' IMPERIAL - 1984, cuddy, 140 h.p., I/O, excel. cond., low hours, full canvas, extras, $8,500. Dennis, 736-5736 after 5 p.m.

23' CHRISCRAFT LANCER - 1974, tunnel drive, 350 cid, full canvas, many extras, $5,500 neg. Ray, 654-0810.

SAILFISH - red/white, good cond., $250. 821-0250.

14' HOBIE - w/turbo jib, trailer, extras, $1,300. P. Hichborn, 929-4133.

22' SEAFARER SAILBOAT - 1974, 3 sails, Volvo outboard, full keel, neg. from $4,000. Fred, Ext. 4407 or 4435 or 499-1214.

Miscellaneous

THREE-SECTION SCREEN - amber plastic bottle glass pattern, oak frame, 78" x 77", $20. Ext. 2981 or 744-1440.

EARLY AMERICAN HUTCH - dark pine, 66" wide, excel. cond., $400. 472-2581.

OSCILLOSCOPE - Hitachi V-222, 20 MHz, 6" screen, 2 channel, new, never used, $600. Ext. 2528.

PREGO BABY CARRIAGE - excel. cond., $20. Walter, Ext. 2050.

CENTURY BABY STROLLER - hardly used, $20. Debbie, 751-0538, mornings.

BRIDESMAID'S GOWN - periwinkle blue, satin, size 9, used once, $50 entire ensemble, other avail. Ext. 7108.

SHOWER ENCLOSURE - 36 x 36 Fiat w/stone base & glass door, new, $200. Tony, Ext. 2462.

BACKPACK - boy's, great for new Boy Scout, like new, $10. Al, Ext. 5033.

DBX - for greater stereo sound, new box, never used, $50. Ext. 2528.

FOOD PREP. CENTER - used once, $75; Mr. Coffee, Jr., new, $10; Toshiba digital coffee machine, mills & grinds, new, $75; Blender, $10. Ext. 2434.

POOL - 21' round, 4' deep "to remove" with quarter deck, 2-yr. filter and acces. incl., chem., $300. 281-7993.

SCREENS & STORM WINDOWS - wood, 9 each, good cond., $35. Cliff, Ext. 3794.

POOL SUPPLIES - diving board, etc.; range hood, 36", white, $25; Hoover shampoo polisher, $50. Ext. 4727.

GERRY BABY SAFETY GATE - $8; Houdini portable playpen, $20; youth school desk w/bench, all wood, $15; typewriter table, $40. 751-0345.

WATER BED - like new. 732-0494.

RADIO-PHONOGRAPH - 1930-40's, Zenith, $50; stereo-radio am/fm w/turntable, wood cabinet, $25; freezer, sm. upright, $30. 585-4038.

VARI PET KENNEL - used once, 37" long, 27" wide, airline approved, $80. 474-3837.

KITCHEN CABINETS - all wood, w/magnetic closures, in exec. cond. Ext. 7115 or 744-5801.

PEKINGESE PUPS - AKC male & female, shots, health guaranteed, 654-1731 or 289-7153.

SPEAKERS - Magneplaner, MG-11c, 18-mo.-old, in original carton, $600. Ext, 2955.

COUCH, LOVESEAT, CHAIR - Colonial, maple wood, frame w/separate cushions, $125. John Ext. 5152 or 281-2471.

GIRL'S BICYCLE - 3-speed, Ross, excel. cond., best offer; woman's bicycle, 10-speed, French, like new, best offer. Ext. 4449 or 751-8403 after 6 p.m.

20" TOSHIBA TV - Magnavox HQ VCR, remotes, cable-ready, stereo, 9 months old. 345-3006.

GOLD RING - woman's, oval, black onyx w/dia., size 7, high setting, like new, $125. 289-3808.

WURLITZER THEATER ORGAN - 3-tier, Orbit III w/synthesizer and cass. recorder, $475. Mike, Ext. 4728 or 475-3896.

HUFFY LAWN TRACTOR - H1054, 8 h.p. pull start Briggs & Stratton, 26" cut, tuned up, $250. Ext. 3428 or 427-6738 eves.

ARM CHAIRS - stackable, beige fabric, back and seat, chrome legs, unused, 4 @ $30/ea. 727-6481 after 6 p.m.

DELUXE PORTABLE B&W TV - 5" screen, new, still in box, $45. 878-2239.

DELUXE COAL STOVE - ½ ton of hard coal, $200 for all; Sears upright freezer, $150; ½ h.p. deep well jet pump (2"), $50. 924-6751 eves.

AQUARIUS COMPUTER - w/16k mem., data rec., printer, more; Polaroid Auto 250 w/case, flash, cable release, make offer. Ernie, 588-4987.

CALORIC GAS DOUBLE OVEN - good cond., almond color, best offer. 399-3390.

KENMORE WASHER - heavy duty plus, adjustable water level, very good cond., $195. Ext. 2710 or 331-7350.

BOY'S 20" BMX BIKE - Peugeot, good cond., $55; Atari-1200 w/cart., $40. Walter, Ext. 3499 or 757-6392.

LOTUS SYMPHONY - 2.0/IBM, $295. Casper, Ext. 3469.

CHILD'S FIRST BED - Danish built, 2 draws under, best offer. 473-6904 after 6 p.m.

G.E. UPRIGHT FREEZER - $50; G.E. washer/dryer, best offer; pool, 18' dia., 4' deep, 1 h.p. filter, all accessories, $800. Bob Wayte, 286-0795.

HOTPOINT REFRIGERATOR/FREEZER - frost free, 18 cu. ft., good cond., you cart, $125. Joe, Ext. 2975.

MOVING OVERSEAS - maple dinner table, $95; TV, $95, woman's desk, $85; Perego stroller, $100; portable stereo, $50; more. Ext. 3817 or 878-1210.

MOVING SALE - entire contents of house must go. 821-0840 eves.

AZALEAS - field grown, 2½-3', $5 ea.; shrubs, $5-7 ea.; assorted annuals, $10/flat; geraniums, 4½" pots, $2 ea. Ken, 744-0722.

PC JR. - cartridge Basic, factory sealed, $45; technical manual for jr., $35. Bernie, Ext. 4842.

DINING ROOM SET - black laquer, never used, must sell, $700. 475-4596.

MAPLE SYRUP - from my family's farm in VT, grades A, B, C. Peter, Ext. 7687.

NINTENDO GAME - "Gotcha", purchased 4/14/88, paid $42, asking $32. Ext. 7795 or 589-8331.

LAWN BOY MOWER - 21" cut, new bag, runs excel., asking $125; lawn mowers, 21" cut, rear bag, Briggs eng., $65. Dan, Ext. 4987 or 698-7322.

Yard Sales

YARD SALE - first in 38 yrs., moving, something for everyone, 5/13 & 5/14, 10-5 p.m., 106 Bayport Ave., Bayport.

ESTATE SALE - May 14, 15, 9-2, bdrm., living room, dining furniture, 301 Emerson St., Port Jefferson. 473-0963.

Free

KITTENS - orange & black tigers and brown & white calico, available immediately, come see. Paul, Ext. 2447.

KITTENS - two gray, one calico, available in two weeks, four weeks old. Ext. 4194 or 286-7984.

Car Pools

WANTED - 5th member for established Bellport car pool. Liz, Ext. 2346 or Ed, 286-7539 after 6.

W. ISLIP-BAYSHORE - looking to join car pool, 8:30-5:00. Mike, Ext. 2705.

Real Estate

Real Estate advertised for sale or rent is available without regard for the race, color, creed, sex or national origin of the applicant.

For Sale

PORT JEFFERSON - Harbor Hills, 3 bdrm. Colonial, l/r w/fp, d/r, eik, 2½ baths, near beach & country club, fenced yard/patio, $210,000. 473-5668.

PORT JEFFERSON - Harbor Hills, 3 bdrm. ranch, 3 baths, wooded golf course setting, balcony, deck, patio, 2-car garage, 3-zone gas heat, $259,900. Ext. 3791 or 928-7154 eves.

PORT JEFFERSON - Harbor Hills, 4 bdrm. split ranch, d/r, eik, family room w/fp, brick patio, winter waterview, 24'x44' bsmt., exel. cond., $199,000. Ext. 4483 or 473-3689.

HILTON HEAD, SC - 3 bdrm. condo, sleeps 8, 2 baths, washer/dryer, wet bar, 6 tennis courts, 3 pools, whirlpool, golf, ocean view, asking $89,000 or will rent. 929-8912.

SETAUKET - north of 24A, 6 rm. cape, 2 baths, 2-car garage, wooded area, 3-Village schools, asking $190,000. 751-1401.

STONY BROOK - mint 4 bdrm. Colonial, 2½ baths, eik, d/r, l/r, 2-car garage, new siding, Andersen windows, ½ acre, 3-Village school district, asking, $225,000. 689-8605 eves. & wknds.

CENTER MORICHES - 3 bdrm. ranch, 1½ baths, garage, storage shed, ⅓ acre on cul-de-sac, excel. location. 878-0175.

N. PORT RICHEY, FL. - 5 bdrm. 5 baths, (1 w/jacuzzi), l/r, d/r, custom kit. w/all appl., fam. rm., f/p, w/w, 3 a/c, 2-car gar., patio, pool, 1¼ acres, $195,000. 813-862-6262 or 698-0576.

CENTEREACH - 1 acre, 3 bdrm. ranch, 1½ bath, finished bsmt., IGP 18x36, 2-car garage & shop, f/p, $175,000, neg. Ext. 4843, 585-7342 after 3 p.m.

STONY BROOK — 8 room ranch, 4 bdrm., 2 bath, w/cac, w/w, Pella room, European gourmet kit., $219,990. 751-7023, eves.

HOLLYWOOD, FL. - 3 bdrm., screened porch, appliances, shed, fenced, taxes $327, many extras, $67,000. 289-3586.

HOLBROOK, Timberidge custom-built, ranch, 3 bdrm, 2 bath, 2 car gar., den w/bk. f/p, ctry kit., d/r, l/r, brick-faced, new carpet, landscaped, mint, Sachem school, $172,000. Ext. 2679 or 472-6922.

PALM COAST, FL. - ¼ acre lot, 80'x125', 5 mi. to ocean, 24 mi. north of Daytona Beach, water drainage & sewage util., $3,995 & take over loan, $141/mo. over 7½ yrs. Thomas Nolan, Ext. 5265.

WADING RIVER - 3 bdrm. ranch, l/r w/ f/p, d/r, eik, 2 baths, 2-car oversized garage, 10'x24' deck with screen room, 1 acre, SWR schools, low taxes, $192,000. 929-3251 after 6 p.m.

ROCKLEDGE, FL. - block & stucco, 2 bdrm., 2 bath, fam. rm., 11x25 porch, carpet, shades, some drapes, extras, good loc., $64,500. 305-631-2840.

EASTPORT - 2 bdrm., l/r, kit., bath, full bsmt., 100x120 property, good loc., close to school & shopping, beautifully landscaped, $115,000, firm. Ext. 2232 or 325-0835.

LAKE GROVE - Hi-Ranch, 3 bdrm., poss. mother/daughter, custom built, brand-new, must see, $179,000. 732-7695.

For Rent

MORICHES - waterfront room in shared house, avail. June 1, $330/mo. + util. 874-3729 eves.

CALVERTON — 2 bdrm. condo, 1½ baths, f/p, patio, central a/c, 5 appliances, 2-story, l/r, dining area, no pets. 878-0874 eves.

LAKE PLACID - modern 2 bdrm. A-frame, loft, sleeps 8, full furn., near swimming, boating, golf, tennis, hiking, more. 757-1775 after 3 p.m.

HILTON HEAD, SC - 2 bdrm. condo, sleeps 6, beach, pool, golf, tennis, May-Sept $420/wk. 585-9149.

SHOREHAM - large 1 bdrm. apt., full kit., bath, l/r, storage area, separate entrance, $550 includes everything. 744-8659.

BROOKHAVEN HAMLET - share spacious house, 4 bdrm., 2 bath, w/2 other professionals, ¾ acre, wooded, $350 incl. all. Sydney Stafford, 286-4028.

SHIRLEY - new 1 bdrm. apt., ww, new appliances, mature working woman, non-smoker preferred, $575/incl. all. 281-1840 after 4 p.m.

SHIRLEY - new 1 bdrm. apt., l/r, eik, full bath, w/w, priv. ent., working person or couple, $575/mo. includes util. 281-1840 eves.

LONDONDERRY, VT - Chalet, 4 bdrm., 2½ bath, stone f/p, sauna, on pond w/beach, swimming, boating, hiking, tennis, nearby music theatre, antiques, more, $500 week. 757-5599.

STONY BROOK - one bdrm., upstairs apt., private entrance, excel. area. Ext. 4120 or 588-8492.

Wanted

BOBCAT/CEMENT MIXER/WET SAW - to buy or rent. Tony, 698-9274.

SUMMER HOUSING - for visiting couple furnished, 1-2 months, starting July or August. Tang, Ext. 3869 or 5186.

DROP-LEAF TABLE - closed about 30x45, fully opened about 45x90, needs to sit 8 or 10. 727-3608 after 5.

HOUSE TO SIT - May or June. Ext. 4144.

BASEBALL CARDS - any cond., young boy wants to start collection. 924-4070.

APT IN PT. JEFF/MT. SINAI AREA - ground floor accessible, garage. Janet, Ext. 2345 or 929-3910.

STUDIO APT. - close to Lab., reas. price, lease (option), for 1 female, clean, quiet, non-smoker. Kate, Ext. 2647 or 345-5294.

HOUSE OR APT. - 3 or 4 bdrm., 1½ baths, l/r, d/r, kit., wash/dry, family neighborhood, June. 914-245-0907.

HOUSE TO RENT - 1 yr., 3 bdrm., for family, starting July. Juan, Ext. 3523 or 472-4970.

RIDING LAWN MOWERS - old, will pay cash if complete. Dan, Ext. 4987 or 698-7322.

HOUSEMATE - non-smoker, share 3 bdrm. hi-ranch, Wading River, avail. Sept/Oct, $500, approx. Sam, Ext. 4023, 5211 or 929-3721.

Services

Services are listed as a courtesy to BNL employees. They are neither screened nor recommended by the **Bulletin**.

CONSTRUCTION — home improvements, decks, extension, garages, bsmts. Kevin, 874-2386.

STALLS FOR RENT - TLC, daily turnout, full board, miles of trails, Manorville area, private, 281-2105.

LAWN CARE - maintenance and cleanups, Shoreham area. Randall, 821-1042.

ROTOTILLING - Troybilt, lawns and gardens, custom work. Bob, 732-9517.

MARINE MECHANIC - I/B, I/O only, Merc., OMC, Volvo, Crusade, Flag, gas, diesel, Beep 506. 928-1445, eves.

BRICKWORK - patios, walks, swimming pools, Belgian block, landscape ties, retaining walls, 20 yrs. exp., Lab discount. Tony, 698-9274.

CHILD CARE - I will watch your child in my Holbrook home. Reasonable rates, 981-9037.

COMMODORE COMPUTER REPAIR - C64, 64C, 1541DD, fast, reas., free estimates. Henry, Ext. 5110 or 399-3087.

FREE LIFE INSURANCE QUOTES - by certified planner. Bob, 584-7350.

LAWN MOWERS REPAIRED - all types. Dan. Ext. 4987 or 698-7322.

RESPONSIBLE COUPLE - will housesit your home this summer. Exper. yard/housekeepers. Marianne (718) 728-6873 after 8 p.m.

CARPENTER - all types home improvements, reasonable. Helen 399-0969.

CHILD CARE - full time in my home, reas. rates, seven minutes from Lab. Dawn, 395-5158.

LAND CLEARING - using excel. rake on JD 450 track loader; $60/hr. w/operator. Tom, Ext. 4084 or 878-1060.

ISLAND TENT RENTALS - let us cover your next party, tents, canopies, tables and chairs. 689-6666.

TREE STUMP GRINDING - Bob, Ext. 4434 or 727-2346.

HOUSE CLEANING - Cindy, 395-4984.

HOME IMPROVEMENTS - kitchen, bath, siding, decks, roofing, windows. 475-6797.

CARS - cleaned, washed, waxed, interior shampooed, cleaning service, tailored to your needs. 929-4910 after 5 p.m.

PARTY TENTS FOR RENT - we set up & take down. Fred Kuehl, Ext. 7947, 792 beep or 588-2268.

ENGLISH TUTOR - flexible hours. Cathy, 924-2205.

CATERING - for all occasions, any party, reas. prices. 821-3762.

PAINTING - weekends, prof. results, reas. prices. Pete, 475-8406, Mon.-Fri. after 6 p.m.

LIMOUSINE SERVICE - for airport, weddings, and proms. P.J.L. Limousine Service, 286-2517.

ROTOTILLING - small gardens. 924-8143.

FIRESIDE CHIMNEY SWEEPS - fireplaces, wood, coal & oil flues, stainless steel caps, relining, glass doors. Mike 821-9690.

CAR WINDOWS TINTED - prof. results, reas. prices. 281-7432.

DRIVEWAYS REPAIRED - from patches to top seal coat. 924-9427 after 7 p.m.

BABYSITTER — reliable, avail. in May for p/t day or eve. child care in Stony Brook or Setauket area. 751- 8381.

BABYSITTER - experienced, Bellport area, July to Aug., references avail. Ext. 2346 or 286-8563 eves.

KENTO POOLS - openings, vacuumings, all repairs, weekly service, discount rates to BNL employees. 758-7853.

MOTHER'S DAY FLOWER ARRANGEMENTS - in mug, $15; communion bouquets, other specials also, delivery avail. 821-1560.

CUSTOM GOLF CLUBS - fitted to you, as low as $150/set. 924-2384.

Ads left out of this issue due to lack of space need not be re-submitted to appear in the next issue.