BROOKHAVEN BULLETIN
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BROOKHAVEN NATIONAL LABORATORY

To Fight Lyme Disease, BNL-Developed Protein Is Long on Potential, Short on Form

Much has been learned about Lyme disease since it was first described in 1977: Lyme is caused by a spirochete called *Borrelia burgdorferi*; it is transmitted to humans by the bite of *Ixodes dammini*, commonly known as the deer tick; it can cause symptoms ranging from a bull's-eye type rash to severe arthritis; and it is usually treatable with antibiotics.

It is also known that the incidence of Lyme disease is on the rise. Preliminary figures from the Centers for Disease Control show that 8,535 cases were reported nationwide in 1989, up almost 50 percent from 1988. Of those cases, 3,224 were reported in New York State and 925 in Suffolk County.

Despite all that is known, a person who has been bitten by a deer tick cannot be conclusively tested for Lyme disease for two to three weeks. And there is still no way to prevent an infected tick from transmitting Lyme disease to a human in the first place.

The key to changing this situation could lie in work done in BNL's Biology Department by John Dunn and Barbara Lade, in collaboration with Alan Barbour of the University of Texas Health Science Center.

They have used recombinant DNA techniques to produce large amounts of a protein of the Lyme spirochete — a protein that may prove useful in testing for the disease and as a possible immunogen to protect against Lyme disease. As described in an article accepted for publication in the journal *Protein Expression and Purification*, the team engineered the gene for one of the spirochete's outer surface proteins, OspA.

John Dunn's pencil points to two deer ticks: one adult (left) and one immature. —Photos on this page by Roger Stoutenburgh

Stimulating Immune Response

OspA and its companion outer surface protein, OspB, are antigens. This means they are capable of stimulating an immune response in the body — the production of antibodies to help destroy the invading spirochete. In humans, antibodies to OspA and OspB generally do not show up in the blood for several months.

"Mice, on the other hand," explained Dunn, "recognize these proteins right away as foreign and make good antibodies. That may be why mice do not get Lyme. However, if a mouse's immune system has been compromised, it will get sick. But if it's treated with antibodies to OspA, it doesn't get sick. So it has been theorized that, if there were a vaccine to hasten the process of raising antibodies to OspA in people, they would not get sick."

Therefore, the BNL team looked more closely at the OspA protein as a key to understanding the human immune response to the disease.

The collaborators' first step was to clone the whole OspA gene using the BNL-developed, T7-based expression system. A group at Yale University has also cloned the whole protein.

The BNL/Texas team, however, recognized that it would be difficult to work with the whole gene because they found that cloned versions of the full-length OspA were not produced, or expressed, well in an *E. coli* host, and the protein product remained associated with the insoluble *E. coli* cell membrane.

So the researchers looked for a better way to work with OspA.

Zip-Code Free Proteins

"We recognized that it probably had a 'zip code' sequence that tells the protein where to go in the cell," said Dunn, "and we guessed that this zip code was the first 17 residues on the protein chain." So the researchers cloned new OspA genes in coding proteins that were zip code-free.

"Our guess was right." Dunn said, "Unlike the full-length clones of OspA, these truncated versions expressed at very high levels and were highly soluble in *E. coli*, which made purification straightforward. In addition, the truncated protein is

(continued on page 2)

BNL Lecture: Functional Imaging — What to Expect of SPECT

At one time, the only way to determine what was going on inside the brain was by surgical intervention.

Over the last few decades, however, a number of technologies have been developed that are noninvasive and allow researchers and physicians to look inside the brain without surgery.

One of these is SPECT, or Single Photon Emission Computed Tomography — a technology that can provide functional images of almost any part of the body, with the promise of doing so at a much lower cost than perhaps any of the other procedures now available.

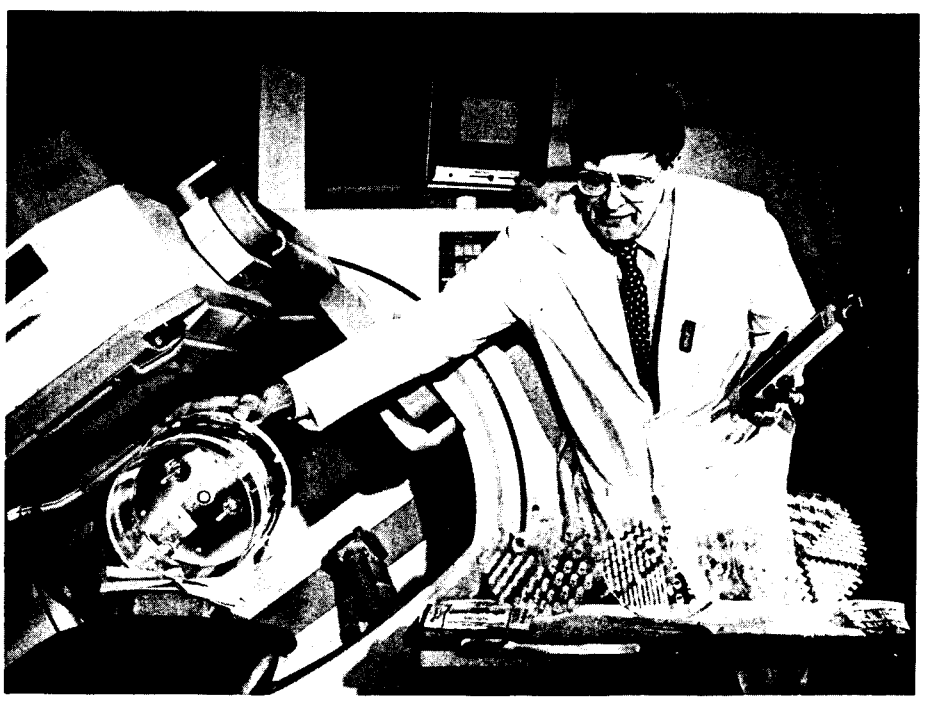
SPECT research is now being done in BNL's Medical Department, in the Nuclear Medicine Research Group headed by Senior Scientist David Weber. He will talk about "Functional Imaging of the Brain, Heart, Lungs and Skeleton — What to Expect of SPECT," when he delivers the 267th Brookhaven Lecture, on Wednesday, February 20, at 4 p.m., in Berkner Hall. Weber will be introduced by his research collaborator Hal Atkins, a professor of radiology at the State University of New York (SUNY) at Stony Brook and head of nuclear medicine at University Hospital.

SPECT studies begin with the injection of a small amount of a radiopharmaceutical. This substance goes to the target area and acts as a tracer, emitting photons that are absorbed by a sophisticated detector rotating around the subject. Images of the distribution of radioactivity in an organ are collected at regular angular intervals.

These images are processed by a computer to produce pictures from which the three-dimensional distribution of the administered radiopharmaceutical can be evaluated. The distribution of the radiopharmaceutical indicates how the organ is functioning.

Weber will begin his lecture with an overview of nuclear medicine and a comparison of SPECT with other imaging technologies, such as computerized axial tomography (CAT), magnetic resonance imaging (MRI)

(continued on page 2)



David Weber positions the SPECT detector around a medical "phantom" that he is about to image.

Last Chance To Enter R&D 100

If you think that your technological achievement could be a winner in the prestigious R&D 100 competition, don't miss your chance. The deadline for completed entries is Friday, February 22, so get an application now from Dorry Tooker, Office of Technology Transfer, Bldg. 902C, Ext. 2078.

Sponsored by *Research and Development Magazine*, this contest recognizes the top 100 technological achievements that were completed and delivered during 1990, or became available for contract or licensing last year. These technological products are broadly defined to include any product, material, process, software, program, or system of scientific or technical origin or use.

BNL to Sponsor Women in Science Career Day; Volunteers Needed

Students from high schools all over Long Island are being invited to the Women in Science Career Day that BNL will host on site on Saturday, April 20. The full range of disciplines at Brookhaven will be represented, and, since the date coincides with Earth Day, there will be some emphasis on careers related to the environment.

While the event is being officially sponsored by the Laboratory, it is being organized by Brookhaven Women in Science (BWIS), under the leadership of Victoria McLane, Department of Nuclear Energy. She is calling upon the experience that BWIS has gained in running three highly successful career days over the last ten years. Other cooperating BNL groups include the Office of Educational Programs, Office of Equal Opportunity, Office of Scientific Personnel and Women's Program Coordinator Virginia Brown.

Explaining the need for targeting a program at careers in science and engineering for women, Brown said, "It is widely held that role models for young women can be of real assistance in encouraging them to enter research fields where women are traditionally underrepresented both in college majors and in the work force."

To provide these role models, an important aspect of the Career Day will be interaction with BNL women scientists and engineers, in the form of discussions and demonstrations. Also featured will be a keynote speaker, career information for the students and a computer exhibit.

At the Career Day, volunteers will be needed to talk with the students, as well as to help with registration and other activities. Though the event will be held on a Saturday, supervisors and managers are encouraged to release volunteers from work for the necessary preparation time.

To volunteer to help out with the Career Day, call Vicki McLane, Ext. 5205.

Lyme Disease (cont'd)

still recognized by antibodies in Lyme patient serum.

"Ultimately, our work with OspA could aid in the development of highly sensitive, species-specific seriological tests for diagnosis of Lyme disease," continued Dunn. "Also, the fact that we have been able to produce large amounts of a highly purified and soluble form of OspA raises the possibility that this recombinant protein may be useful as an immunogen in a vaccine."

In Other Collaborations . . .

With this in mind, Dunn has already sent the protein to other laboratories, including the Centers for Disease Control, Ft. Collins, Colorado. There, in collaboration with Barbara Johnson, the BNL researchers are testing the vaccine concept by injecting OspA into hamsters, which can get symptoms of Lyme disease, and then challenging them with spirochetes.

"Presumably," Dunn said, "the procedures used in this work could be applied to express other *Borrelia* proteins." For example, another such protein is found in the spirochete *B. hermsii*, which causes relapsing fever. Dunn's Texas collaborators are now applying their work to this related tick-borne disease that is prominent in North Africa and in the Middle East.

In another collaboration, Dunn and three researchers at the State University of New York at Stony Brook — Sara Buchstein, Ben Luft and Don Oliver — are characterizing a large set of DNA clones from *B. burgdorferi*, many of which code for previously unidentified surface proteins. This is an ongoing project to identify the genes that have a good possibility of being on the surface of *Borrelia* cells.

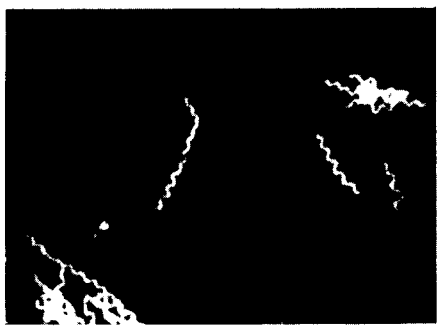
A Variety of Technologies

Funded by the U.S. Department of Energy, Dunn's work with OspA was also possible, he said, because of the state-of-the-art equipment available at BNL and the advanced technologies developed here. "We can synthesize four DNA molecules simultaneously," he explained, "and use them to design genes or put 'handles' around them so we can move them, then clone them."

These methods have provided, for the first time, a purified *B. burgdorferi* protein in quantities sufficient for structural studies.

As Dunn explained, "We're now attempting to crystallize OspA so we can study it with x-ray crystallographic analysis at our structural biology station at the National Synchrotron Light Source (NSLS). We've already used circular dichroism spectroscopy at the NSLS to obtain information concerning OspA's secondary structure.

"So, in addition to what we are learning about OspA and Lyme disease," Dunn continued, "our work with this protein points out the variety of technologies BNL has to offer to researchers in this field."



The Lyme disease spirochete *Borrelia burgdorferi*.

Now, Dunn plans to apply these technologies to an even more ambitious project — sequencing the Lyme spirochete's entire DNA molecule — as part of BNL's genome project.

From 40,000 to 4,000,000,000

At a minimum, about 600,000 bits, or base pairs, of DNA are needed to make a life form — an organism that can live and survive on its own. *Borrelia burgdorferi*, it turns out, is "pretty close to minimum, two minimums at most," said Dunn. "It has a single large chromosome of one million bits with some satellite DNA molecules of under 50,000 bits. We want to use this organism as our benchmark, to show that we can handle large sequences — such as the human genome. We see this as a springboard for our participation in the national Human Genome Project."

Next to the human genome, which has some four billion bits, the Lyme DNA is minute. Still, Dunn expects that sequencing it will take about two years. But he doesn't expect much difficulty. "About ten years ago, [Biology Department Chairman] Bill Studier and I sequenced the virus T7, which has 40,000 base pairs. Going from 40,000 to one million should not be all that much of a jump, given the technology that we have available now."

— Anita Cohen

Special Military Leave Extended

Recently, President George Bush announced that the period of service for military reservists called to active duty would be lengthened to one year. As a result, the Trustees of Associated Universities, Inc. (AUI), have approved a further revision of BNL policy concerning military leave. The special military leave will be extended to one year.

Shortly after the beginning of the Persian Gulf crisis, the U.S. government began calling up reservists for an initial period of three months. In response, the Lab's previous policy of terminating reservists called to active duty was modified in September, to provide employees a special military leave of three months, with the possibility of a three-month extension, and to continue medical coverage, including dental, if applicable, for family members during the period of absence.

"The purpose of the change," said Personnel Manager Robert D'Angio, "was to relieve employees of concerns about medical expenses for their dependents and about employment when they return from military service. Now that the period of active duty has changed, it only seemed right to extend the leave policy."

In addition to the special military leave extension, the AUI Trustees also voted to provide medical insurance coverage to dependents for the entire period of leave. The other aspects of military duty policy announced in the Brookhaven Bulletin on September 21, 1990, remain unchanged.

In a September 19, 1990, memo to all employees regarding military leave, BNL Director Nicholas Samios requested that all Lab employees who are reservists identify themselves by completing a form attached to the memo. To date, the Personnel Division has been notified of approximately 40 BNLers who are in the military reserve. Of those, three have been called to active duty.

Any reservists who have not yet completed the form should contact Virginia Brown, Ext. 2874, Bldg. 185. Any employees notified by their branches of service that call-up is imminent are requested to speak to their supervisors, who should contact Personnel to process the necessary papers. Anyone with questions regarding BNL policy on military leave should call Virginia Brown.

BNL Lecture (cont'd)

and positron emission tomography (PET).

He will explain that the dose received from nuclear medicine procedures like SPECT and PET is very low — on the order of a half of a chest x-ray or less. He will also explain how recent changes in computer technology have made SPECT a practical technology with which to study and monitor function and metabolism in the human body.

Weber and his group are investigating methods of improving the quality of information found in SPECT images. This involves Monte Carlo simulation studies and experimental measurements of radionuclides used in SPECT. The group was the first to characterize the energy and spatial properties of Compton-scattered photons in bone, muscle and lung that are detected in SPECT images. Weber will discuss the importance of these results.

Weber will also describe current preclinical and clinical investigations in which the group is using SPECT to see the effects of crack on the brain, heart and lungs, and for the study of new radiopharmaceuticals.

After earning his B.S. in physics at St. Lawrence University in 1960, David Weber spent a year as a graduate teaching assistant at the University of Buffalo, then a fellow in biophysics at Roswell Park Memorial Institute, Buffalo.

From 1961-68, Weber worked in the Biophysics Division of the Sloan-Kettering Research Institute in New York City. In addition, from 1967-68, he served as both laboratory chief of the Radioactive Isotopes Section and the assistant attending physicist in the Division of Medical Physics of the Memorial Hospital for Cancer and Allied Disease.

In 1968, Weber joined the University of Rochester where he was an Atomic Energy Commission graduate laboratory fellow, receiving his Ph.D. in radiation biology and biophysics, in 1971. He remained at Rochester, first as assistant professor, then associate professor, until 1987. During this time, he was also acting chief of the University's Division of Nuclear Medicine, 1974-75; a Fogarty Senior International Fellow at Lund University Hospital in Sweden, 1978-79; and on the clinical faculty of the Department of Clinical Sciences, Rochester Institute of Technology, 1976-86.

Weber came to BNL in 1987 to direct Medical's Nuclear Medicine Research Group. Since 1988, he has also been a professor of radiology in the School of Medicine, SUNY at Stony Brook.

Named a fellow of the American College of Nuclear Physicians in 1986, Weber is also a member of the American Association of Physicists in Medicine, the Health Physics Society, Sigma Xi and the Society of Nuclear Medicine, for which he has been chairing the Medical Internal Radiation Dose (MIRD) Committee since 1988.

After the lecture, those attending are invited to join the speaker for discussion and hors d'oeuvres. To join the lecturer for dinner at a restaurant off site, call Marija Ivanovic, Ext. 5367.

Pick a Student

Applications for two summer programs run by the Office of Educational Programs (OEP) will be available for review from February 19 through March 8, from 9 a.m. to 4:30 p.m., in the Solarium, Bldg. 490, Medical Department. Use the Clinical Research Center entrance and follow the signs.

The two programs are:

- **Summer Students** — The 39 year-old, traditional summer program in which junior and senior-level undergraduates receive ten-week summer research appointments, June 10 to August 16. OEP pays the individual stipends of $200 per week and round-trip transportation. The sponsoring department pays for the student's housing at $75 per week.
- **Summer Interns** — This is similar to the Summer Student program except that appointments are offered to students who have participated in prior High School Honors Programs conducted by the U.S. Department of Energy (DOE) at several DOE Labs. Generally, these students are finishing their freshman year of college, but a few may be recent high school graudates. OEP pays all costs associated with these students — stipend, travel and housing.

For more information, call OEP, Ext. 4503.

In Memoriam

BNL's oldest retiree, Allie Kaplan, died at the age of 98 on Tuesday, February 12, following a short bout with cancer. He was buried Wednesday in New Montefiore Cemetary in Farmingdale.

Prior to being hospitalized for his illness three weeks ago, Kaplan had been living independently at his home in Quogue.

Born in Brooklyn on November 14, 1892, and raised in East Quogue, Kaplan first came to the Lab site during World War I, when he was inducted into the U.S. Army and spent two weeks at what was then Camp Upton.

As a civilian Army employee during World War II, Kaplan returned to Camp Upton, where he performed grounds maintenance. Because Kaplan spoke enough Yiddish to make himself understood to German prisoners of war at Camp Upton, he supervised those working as grounds crew.

When Camp Upton became BNL, Kaplan was hired as a laborer on March 24, 1947, and issued life number 351. In addition to grounds maintenance, he worked as a rigger, "moving out the Army and bringing in the Laboratory," as he told the Bulletin in a 1987 interview. Kaplan also served as a BNL firefighter from November 1947 to October 1951.

From the end of October 1951, until his retirement on December 31, 1957, Kaplan took care of high-pressure boilers as a stationary engineer in the heating division of the then Architectural Plant & Plant Maintenance Department. Following his BNL retirement, he took a job as the caretaker of a beachfront estate in Quogue, which he gave up only two summers ago.

Kaplan is survived by two sons, David Kaplan of Melbourne, FL; and Eugene Kaplan of East Moriches, who works in BNL's Alternating Gradient Synchrotron Department; four grandsons and eight great-grandchildren.

Note to Employees:

Attendance at lectures, meetings and other special progams held during normal working hours is subject to supervisory concurrence.

Equipment Demo

Leybold Inc. will present a tabletop display and product seminar on Friday, February 22, from 10 a.m. to 2 p.m., in Berkner Hall.

Products on display and operating will include the TMP340M magnetic-bearing turbo pump, cryopumps, rotary vane pumps, QX2000 RGA, IM520 extractor gauge, UL-100 leak detector and a turbo pump system.

The product seminar schedule is:

10:00-11:30	coffee & danish
11:30-12:00	turbo pump presentation
1:00-1:30	cryopump applications

Vacuum technology handbooks will be given away.

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Info & Sign-Up For BNL's Child Development Center

The contractors selected to operate BNL's Child Development Center (CDC), which is to open this September, will present their child-care philosophy and program at an informational meeting on Tuesday, February 26, from noon to 1 p.m. in Berkner Hall.

At that time, registration information will be available to all interested parents who are employees of BNL, AUI or DOE, as well as employees of on-site services or others with a continuing association with the Lab.

Then, Wednesday through Friday, February 27, 28 and March 1, parents may register their infants through five-year-olds for the CDC on a first-come, first-served basis. Registration will take place from 11:30 a.m. to 1:30 p.m. in the lobby of Berkner Hall.

After those dates, registration forms will be available from Susan Foster in the Personnel Division, Bldg. 185, Ext. 2888, and completed forms may be mailed to the CDC operators.

CDC operation and registration will be discussed more fully in the next issue of the Bulletin.

Support Group For Women

The Women's Support Group meets on the third Tuesday of every month, from 10 a.m. to noon, at the Recreation Building in the apartment area on site. The next meeting will be on February 19.

The group discusses any problems or concerns facing women. If you have been at the Laboratory awhile, you may have a lot to offer those who are just arriving. Please join the group to share your experiences. Wives of Lab employees and guests are welcome.

Microcomputer Club

Veena J. Naidu, a certified public accountant, will talk about "Highlights of Tax Law Changes for 1990," at the next meeting of the Microcomputer Club, at noon, on Thursday, February 21, in the conference room of Bldg. 475. All are welcome to attend.

In connection with this talk, the club has acquired a shareware tax program called AMTAX90. The disk will be distributed free to all 1991 paid members.

For more information, contact Irving Montanez, Ext. 2540.

Catch a glimpse of
GLANCE
playing in Berkner Hall
weekdays, 11:30 a.m. to 1:30 p.m.
Show changes every Tuesday.

Volleyball

Standings as of February 8

Open League		League I	
Phoenix	36-12	Cannonballs	31-8
GTEAM	33-15	Upfagrabs	30-9
Me & the Boys	32-16	Dinkers	21-18
Magnum	31-17	Rude Dogs	20-19
Dig-It	23-25	Network News	13-26
Penetrating Vollies	11-37	Upsetters	2-37
Jet Setters	3-45		

League II		League III	
Fossils	34-5	High Volley'em	24-12
Net Wits	32-7	Nutcrackers	20-16
Nuts & Bolts	29-10	NoKaOe	19-17
Pteropods	20-19	Renegades	18-18
Slammers	13-26	Good Timers	17-19
Upton Ups	12-27	Undertakers	15-21
Chunga's Revenge	12-27	Sourcerers	13-23
Aces	4-35		

Cross-Country Snowmen

If a winter storm should ever hit the Lab this year, some BNLers will lunch huddled over radiators, but others, like cross-country ski fans Rolf Beuttenmuller (left) and Richie Machnowski, both from Instrumentation, will glide through the snow outside. "You don't have to be an expert to have a great time," says Machnowski, who started skiing only two years ago.

This photo, taken by the Power Transmission Project last March, should encourage enthusiasts to check their gear to be ready for a snowfall — perhaps this year! And though indoor heat-seekers may hope the snow will be light and short-lived, intrepid skiers will be delighted if it is at least six inches deep and lasts into spring!

photo by Roger Stoutenburgh

Tonight!
Fox Family Bluegrass
Berkner Hall, 8 p.m.
Tickets $6 each

- Buy tickets tonight at the door or today at the BERA Sales Office in Berkner Hall, from 9 a.m. to 2 p.m.; at the Recreation Office in Personnel, Bldg. 185, after 2 p.m.; or from the following people: Rick Backofen, Bldg. 197B, Ext. 2973; Michelle Cummings, Bldg. 459, Ext. 2077; Kay Dellimore, Bldg. 185, Ext. 2873; Elizabeth Pergan, Bldg. 179A, Ext. 2937; Jean Ramirez, Bldg. 197C, Ext. 2119; Maryann Reynolds, Bldg. 703, Ext. 5241; and Sharon Smith, Bldg. 510A, Ext. 3995.

Scotch Doubles

The Scotch Doubles Tournament will be held on Sunday, February 24, at 1:30 p.m., at the Port Jeff Bowl. The cost is $20 per couple. The tournament is open to BNL employees and immediate family members.

Applications are available at the BERA Sales Office. Deadline for applications is Friday, February 15. If you need a partner or have any questions, contact Maryann Reynolds, Ext. 5241, or Ed Sperry IV, Ext. 2697.

Basketball

Week of January 31

Trail Blazers 53		Runaways 46	
T. Mayo	19	L. Walcott	14
D. Evans	15	J. Desmond	13
R. Domenech	11	J. Belz	8
C. Edwards	4	B. Wells	6
R. Garapolo	2	J. Garrison	2
S. Springston	2	G. Smith	2
		G. Shepherd	1

Three-point shots: R. Domenech, J. Desmond, T. Mayo (2), L. Walcott (2)

Bulls 56		Scram 45	
P. Johnson	17	S. Nappi	11
W. Cummings	11	T. Powers	9
B. O'Brien	9	J. Duggan	7
S. Gilbert	9	E. Gregory	7
M. Williams	5	P. Bergh	5
F. Ligon	4	V. Cassella	4
L. Furenlid	1	M. Davis	2

Three-point shots: P. Johnson, S. Nappi (2), T. Powers (3), M. Williams

Celtics 63		Deep Six 42	
B. Turner	17	R. Hart	12
A. Jones	11	B. Brown	11
G. Mack	11	D. Eleazer	8
J. Wells	7	J. Willi	6
A. Schwabb	6	R. McMillan	5
P. Browne	4		
R. Schullman	4		
N. Schaknowski	2		
L. Mauro	1		

Three-point shots: D. Eleazer, J. Wells

HMO Reps on Site

Representatives of the five Health Maintenance Organizations (HMO) the services of which are being offered to active BNL employees as additional health-care options will be at Berkner Hall on two Wednesdays, February 20 and 27, between 11 a.m. and 1:30 p.m., to answer employees' questions about their plans.

Employees are reminded that the deadline for HMO enrollment is February 28, with coverage effective March 1. Those wishing to enroll in one of the optional HMO plans must contact Personnel Services, Bldg. 185, Ext. 2877, for the necessary forms.

Arrivals & Departures

Arrivals

Kenneth Krasner.....S&EP
Linda J. Murphy.....App. Science
Douglas E. Paquette.....S&EP
Christoph H. Witzig.....Physics
Genshen Zhao.....Accel. Dev.

Departures

None

Note to Diners

The Center Club will be closed Sunday, February 17, the day preceding Presidents' Day. However, it will be open on Monday evening, February 18, at 5 p.m.

The Cafeteria will be open from 9 a.m. to 2 p.m. on Saturday, Sunday and Monday, February 16, 17 and 18.

The vended food service in Bldg. 912 will be in operation continuously.

Cafeteria Menu

Monday, February 18
Snack bar service - 9 a.m. to 2 p.m.

Tuesday, February 19	
Soup: Maryland crab	.75/.95
Entree: Braised beef steak & onions	3.10
Entree: Chef's choice	3.10
Fitness: Baked fish	3.10
Carvery: Hot roast beef sandwich	2.85
Grill: Grilled Monte Cristo	2.85
Wednesday, February 20	
Soup: Hearty navy bean	.75/.95
Entree: Golden fried fish	3.10
Entree: Baked eggplant Parmesan	3.10
Fitness: Spicy sausage jambalaya	3.10
Carvery: Hot Black Forest ham sandwich	2.85
Grill: Double cheeseburger	2.35
Thursday, February 21	
Soup: Minestrone	.75/.95
Entree: Chile con carne	3.10
Entree: Cheese manicotti	3.10
Fitness: Szechuan chicken	3.10
Carvery: Hot corned beef sandwich	2.85
Grill: Super chili burger	2.00
Friday, February 22	
Soup: Home-style vegetable	.75/.95
Entree: Baked macaroni & cheese	3.10
Entree: Chef's choice	3.10
Fitness: Baked fish	3.10
Carvery: Hot turkey sandwich	2.85
Grill: Tuna melt	2.35
Breakfast w/coffee, 7:30 - 10:30 a.m.	2.65

Mon.: 2 eggs, bacon & pancakes
Tue.: Western omelet, French fries, toast
Wed.: Spanish omelet, home fries, toast
Thu.: 2 eggs, bacon, cheese on croissant, fries
Fri.: French toast, 2 eggs, bacon, home fries

BNL will be closed on Monday, February 18, for Presidents' Day.

Bowling

Week of February 4

Red/Green League

R. Eggert had a 242/237/661 scratch series, N. Combatti 230, E. Meier 221, T. Prach 221, J. Muller 209, C. Scarlett 209, F. Hohmann 207, R. Jones 204, R. Larsen 202/202, H. Marshall 200, N. Scala 200.

White League

Larry Musso had a 247, Ken Riker 213, Andy Warkentien 211/207/610 scratch, John Addessi 205, Jim Goode 201, Caryl MacDougall 190, Ellie Adams converted the 6/7/10.

Purple League

Mark Guadagna had a 228, John McCarthy 216, Pat Manzella 212/193, Joe Ferrante 210, Ed Sperry IV 205, Rich Scheidet 204.

Week of January 28

Red/Green League

K. Asselta had a 247/200, E. Carter 240, R. Mulderig 227/210/618 scratch series, R. Jones 224/202, R. Larsen 217, E. Sperry IV 213, L. Jacobson 208, N. Parrinello 204, H. Dawson 201.

White League

Ed Beadle had a 204/200, Dick Adams 200, Pat Oster 193, Mary Addessi 187.

Purple League

Pat Manzella had a 192, Nancy Erickson 186.

Classified Advertisements

Placement Notices

The Laboratory's placement policy is to select the best-qualified candidate for an available position. Consideration is given to candidates in the following order: (1) present employees within the department/division and/or appropriate bargaining unit, with preference for those within the immediate work group; (2) present employees within the Laboratory; and (3) outside applicants. In keeping with the Affirmative Action plan, selections are made without regard to age, race, color, religion, national origin, sex, handicap or veteran status.

Each week, the Personnel Division lists new placement notices. The purpose of these listings is, first, to give employees an opportunity to request consideration for themselves through Personnel, and, second, for general recruiting under open recruitment. Because of the priority policy stated above, each listing does not necessarily represent an opportunity for all people.

Except when operational needs require otherwise, positions will be open for one week after publication.

For more information, contact the Employment Manager, Ext. 2882, or call the JOBLINE, Ext. 7744 (282-7744), for a complete listing of all openings.

The vacancies listed below have been exempted by the Director's Office from the current freeze on open requisitions.

LABORATORY RECRUITMENT - Opportunities for Laboratory employees only.

RD 0668. MANAGER, MANAGEMENT INFORMATION SYSTEMS DIVISION - Requires a bachelor's degree, significant experience in a supervisory capacity in a business data-processing environment, and demonstrated ability to manage a staff of professionals. Additional requirements include a high level of motivation and initiative, superior analytical and communication skills, as well as extensive experience in working with the user community. A thorough knowledge of Laboratory administrative systems and interfaces, and a strong knowledge of COBOL, 4GL's, CASE tools and the Hewlett Packard environment are highly desirable. Responsibilities include the development, installation, maintenance and management of large-scale business information systems. Additional areas of responsibility include hardware/software selection, training, programming, computer security and operation. Position reports to the Associate Director for Administration. Please submit resume to Robert D'Angio, Personnel Division, Bldg. 185. Director's Office.

DD 8670. SECRETARIAL POSITION - Requires AAS in secretarial science or equivalent and a thorough knowledge of Laboratory policies and procedures. Excellent communication skills and IBM PC experience also required; WordPerfect experience highly desirable. Will provide varied secretarial support to Section Head and Hazardous Waste Management Group. Safety and Environmental Protection Division.

OPEN RECRUITMENT - Opportunities for Laboratory employees and outside applicants.

NS 8667. TRAINING POSITION -Requires BS in chemical or nuclear engineering or equivalent and a minimum of five years' experience. Must have demonstrated experience in planning and conducting instructional programs in hazardous-waste management or related technical areas. Knowledge of environmental regulations is highly desirable. Safety and Environmental Protection Division.

NS 8666. QUALITY ASSURANCE POSITION - Requires BS in chemical or nuclear engineering, or equivalent, and a minimum of 2-3 years' experience in QA procedures as applied to hazardous-waste management or related areas. Excellent communication skills and experience conducting audits and writing procedures is necessary. Safety and Environmental Protection Division.

LL 3322. MICROBIOLOGY ASSOCIATE POSITION - Requires an MS degree in microbiology with 2-5 years' experience in modern techniques of microbial growth and culturing. Responsibilities will include the maintenance of organisms, such as acidophilic, thermophilic, psychophilic and halophilic. Will actively participate in the biogeochemical effort at the Laboratory in the areas of microbial-enhanced oil recovery and geothermal energy. Occasional travel may be necessary. Department of Applied Science.

LL 5059. ENGINEERING POSITION - Requires a BS degree in mechanical engineering and a minimum of five years of pertinent experience. Will work in the mechanical engineering group of the NSLS on problems related to electron storage rings, beam lines and associated insertion devices. Responsible for operation, maintenance and upgrade of electron storage ring utility systems, including new projects as well as current operating machines. National Synchrotron Light Source Department.

DD 3135. ENGINEERING POSITION - Requires MS or Ph.D. in chemical or mechanical engineering. Experience in combustion equipment technology, stack sampling methodologies or condensation heat transfer desirable. Responsibilities will include planning and implementing projects on the use of condensing economizers for emission control in coal-fired boilers. Department of Applied Science.

Motor Vehicles & Supplies

89 DODGE PICKUP - 4wd, ¾-ton, 8' bed, ac, a/t, p/s, p/b, $11,000. Joelle, 286-3847, leave message.

88 CHRYSLER LEBARON - turbo, convertible, 55k mi., white/tan leather, all options, ext. warr. Martha, 924-7593 eves.

87 IROC Z28 - T-top, every option, 46k mi., $8,500. Victor, Ext. 5318.

87 BRONCO II XLT - 5-spd., ac, cruise, p/w, 30k mi., ext. warr., visor, running boards, alarm, more, excel. cond., more, $9,000. Susan, Ext. 5149.

87 DODGE D150 4x4 PICKUP - snowplow, a/t, rims, $7,500 neg.; 87 Ford F250 4x4 pickup, a/t, 54k mi., V-8, $8,500 neg. Harry, 395-4039.

86 HONDA ACCORD - a/t, ac, silver, 45k mi., mint cond., $6,995. JoAnn, Ext. 4120 or 689-7963.

86 CHRYSLER NEW YORKER - turbo, white/vin., leather int., 4-dr., full spare, cruise, more, excel. cond., all options., $6,300. Jim, Ext. 4040.

85½ FORD ESCORT - 5-spd., 76k mi., am/fm, new brakes & tires, tilt steering wheel, runs well, $2,200. Huang, Ext. 5364 after 6 p.m.

85 CHEVY S-10 PICKUP - 5-spd., 6-cyl., 108k mi., good body, needs engine work, asking $1,350. 698-8514.

85 SUBARU XT - fwd, 5-spd., ac, sunroof, am/fm radio, light blue, good cond., $3,995. 757-1973.

84 GMC VAN - p/s, p/b, a/t, 6-cyl., 41k mi., custom windows, more, $3,500. Rich, Ext. 2043.

84 OLDSMOBILE FIERENZA - 2-dr. h/b, a/t, p/s, am/fm, 2-tone white/beige, 100k mi., runs well, $600. Phil, 286-1348.

83 280 Z - T-top, turbo, good cond. 744-3203.

83 DODGE CHALLENGER - p/s, p/b, a/t, ac, am/fm, used daily, needs carburetor, $250. Paul, 361-6835.

83 FORD ESCORT - a/t, 84k mi., ac, sunroof, v.g. cond., $950. Huang, Ext. 5364, leave message after 6 p.m.

81 F-100 PICKUP - 6' bed, body rot, needs work, p/s, p/b, toolbox, rubber bed liner. Scott, Ext. 5319 or 929-4563.

80 CHEVY MALIBU WAGON - well maintained, perfect second car, $800. 924-4206, 9 a.m. to 9 p.m.

80 CHEVY VAN - 6-cyl., $325. Charlie, Ext. 3082.

80 FORD VAN E-250 - p/s, p/b, a/t, heavy-duty suspension, new brakes & tires, good work van, windows, $1,000. Jim C., Ext. 4150.

79 CHEVY PICKUP - ½-ton, 6-cyl., p/s, p/b, a/t, full-size bed, w/cap, reliable, $1,750. 286-8582.

79 JEEP WAGONEER - p/s, p/b, 4wd, a/t, runs OK, $300. Pete, Ext. 4414.

79 DATSUN 210 - new front tires & rear shocks, good battery, $150 or reasonable offer. James Gibbs, Ext. 5318 or 399-4912.

78 MERCURY ZEPHYR - 84k mi., good tires, good cond., would make nice local car, asking $600. Keith, Ext. 5295.

76 FORD GRANADA - 6-cyl., 2-dr., green, good running cond., $550. Tim, 281-3622.

72 NOVA - V-8, 94k mi., orig. owner, new master cylinder, brakes, tires, & muffler system. 698-0654, after 5 p.m. Mon.-Fri., Sat. & Sun. anytime.

71 DATSUN - s/w, a/t, ac, new brakes, exhaust, battery, tinted glass, no rust or dents, $675. Kevin, Ext. 4843 or 281-8031.

70 JEEP CJ5 - 4wd, with or without snowplow. Frank, Ext. 3120.

CAR-TOP CARRIER - Sears, plastic, like new, large capacity, lockable, beige color, $50. John, Ext. 2294.

TIRE - Firestone Steeltex radial, ASR LT 215/85R16 M/S, great cond., $15. John, Ext. 4414.

Boats & Marine Supplies

16' MFG - 1962, fiberglass hull, 75-h.p. Johnson, Gator tilt trailer, motor runs, needs some work. Paul, Ext. 7697 or 689-2829.

13' BOMBARD - inflatable, 1987, 30-h.p. Mariner, trailer, all access., excel. cond., great scuba diving, must sell, moving, asking $3,500. 474-5715.

BOAT - 1987, Celebrity, 200-h.p. Merc., w/trailer, low hrs., excel. cond., $9,995. Bob, 689-7963.

MOORINGS - two, 75 pounds. 689-9234.

Furnishings & Appliances

COUCH - good cond., $25; Magic Chef microwave, large, good cond., $75. JoAnn, Ext. 4120 or 689-7963.

CREDENZA - antique, 1910, beveled mirror, pedestal shelf, swiveled ball handles, $1,200 or best offer. 698-0654 after 5 p.m.

CABINET - gun cabinet, glass doors w/lock, 2 doors on bottom, good cond., $100. Lillian, Ext. 2772.

DINING ROOM - maple oval table w/3 leaves, 2 armchairs, 4 side chairs, $500; china closet, $375, or $800/both. Arleen, Ext. 4519 or 924-6051.

LIVING ROOM SET - couch, loveseat, coffee table, lamp table, traditional, like new, $400. Chuck, Ext. 4095.

HIGH CHAIR - baby's, good cond., $30. Ext. 2582.

HUMIDIFIER - Sears, 13 gallons per day, excel. cond., $30. Joe, Ext. 2975.

HUTCH - Colonial, 72" table w/2 leaves, 4 captain's chairs, asking $500. 929-4962.

WASHER & DRYER - Frigidaire, 1½ yr. old, apartment size, still under warranty, $500 neg. Lillian, Ext. 2772.

CHAIR - old, 7" high back, leather seat, $125; brass coat hanger, 100 yr. old, $75; bird's eye Queen Anne table, $50. 698-0654 after 5 p.m.

OTTOMAN - Castro, 33", good cond., $100. 281-8538.

REFRIGERATOR - freezer, Frigidaire, 14 cu. ft., white, good cond., $75. Joe, Ext. 2975.

REFRIGERATOR - Kenmore, 22 cu. ft., side-by-side, coffee color, still under warranty, you pick up, $300. 472-0029.

RUG - Oriental design, beige, wool, 9'x12', good cond., $95 neg. 736-6993.

RUGS - Oriental design, 8'x11', $375; 20' runner, $100; 8'x11', pastel, $450; all 1½ yr. old. Donna, Ext. 2716.

SOFA - navy blue w/small pattern, excel. cond., $175. 689-7326.

TABLE - round, glass, w/4 swivel chairs, asking $45. 474-3799.

UPRIGHT CABINET - stereo, 8-track, record player, $30; 2 hexagon end tables, $25; 5 windows, $25/all; juice extractor, very old, $50. 878-6637.

WATER BED - king, motionless, excel. cond., $100. Bobbi, Ext. 2456 or 654-1993 after 5 p.m.

Tools, House & Garden

CARPENTER'S PLANES - Stanley & other makes, modern & antique, other tools. Jack, Ext. 4947.

FIREWOOD - seasoned, hardwood, cut, split, delivered, $125/full cord. Dave, 331-4629 leave message.

HEATER - portable, electric, thermostat controlled, 600-1,500 watts, like new, orig. $40, sell for $25. 924-3236.

KEROSENE HEATERS - Coleman, w/6" exhaust, 7, baseboard electric heaters; Sears air conditioner, 17,000 Btu. Frank, Ext. 3120.

LAWN MOWER - electric, good cond., asking $40. 474-3799 afternoons.

PLOW - Meyers, 7'6", w/pump & piston, $300 neg.: enclosed trailer, 4'x6', w/ramp & toolbox, $200 neg. Fred, 878-4254 eves.

FIREWOOD - ½ cord, $65; coffee pot, stainless steel, $10; wicker chair, $100; small desk, $20; antique saw, $45; Kathy, 744-2203.

Sports, Hobbies & Pets

BIKE - Vista, girl's, 24", single-speed, blue, $25. Joe, pager 0925 or 728-1859 eves.

DRYSUIT - Poseidon, man's, large, like new, must sell, orig. $1,500, asking $500. 474-5715.

ELECTRONIC ORGAN - Kawai, 4 yr. old, hardly used, $2,000 neg. 281-7510 eves.

SCANNER - programmable, Realistic model 2005, 400 channels, multi-mode, 25 to 1200 MHz, 12 Vdc & 110 Vac, $225. J.G. Skora, Ext. 4379.

SKIS - Head Radial, 170cm, Marker M36 bindings, poles, $95. 473-2473.

SKI LIFT PASSES - 2, all day at Stratton; 1, all day at River Maine, Sunday. ext. 4727.

TYPEWRITER - Smith Corona, portable, manual, $10. Ellie, Ext. 3395.

Audio, Video & Computer

AMPLIFIER - Heathkit, 100W, AA15 Heathkit AJ tuner, dual 1218 charger w/cartridge, mint cond.; Uniden cordless telephone, $20. 929-4326.

COMPUTER - Commodore 64 keyboard, 1541 disc drive, 1902A monitor, $400 or reasonable offer. Ext. 5318.

COMPUTER DESK - w/hutch, oak color, detached printer stand, $100 or best offer. 924-2298.

RADIO - 1920, RCA Victor model 16K, standard police, aircraft, short-wave, 23"x11"x37", $75; corner cabinet/TV cart, maple, $50. 289-8212.

VCR & CAMERA - RCA CK031 color video camera, w/RCA VGP170 VHS cassette recorder, carrying case, manuals, etc., $600. Ed, Ext. 4645.

Miscellaneous

LEATHER JACKET - white, short, size 7/8, $30; red down ski jacket, small, $15. Ext. 2733 or 878-8491.

Free

CONVERTIBLE SOFA - full size, you pick up. Walt, Ext. 2246.

ASSORTED TOYS - & stuffed animals, prefer charitable organization. Ext. 2172 or 744-4386.

Yard & Garage Sales

YAPHANK - Sat. & Sun., 2/16-2/17, 10-4 p.m., Gerard Rd. Yaphank, off Yaphank Ave., across from police headquarters.

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 Rent

BLUE POINT - 2-bdrm. house, 1½ baths, l/r, d/r, study, large yard, walk to beach, shopping, etc., $900/mo. + util. Austin, Ext. 5329.

HOLTSVILLE - new, large studio, kitchen, bathroom, cable, priv. ent., no pets, driveway parking, $600/mo. all. 472-3254.

LAKE PANAMOKA - 2-bdrm. ranch, deck, eik, d/r, l/r w/fp, full bsmt., w-d, priv. beach, 5 min. to Lab., avail. Mar. 3, $725/mo. + util. 929-3407.

MASTIC - 2-3 bdrm. apt., full bath, l/r, priv. ent., yard, $700/mo. all. Jim, 281-2849.

MIDDLE ISLAND - 2-bdrm. condo, 1½ baths, partially furn., all appl., 5 min. to Lab, $850/mo. + util. 751-8351.

PATCHOGUE - 14 mi. from Lab., 2-bdrm. apt., full bath, eik, w/w, $675/mo. 758-9835.

PORT JEFFERSON STATION - 1-bdrm. apt., l/r, eik, bath, quiet area, priv. ent., single preferred, $500/mo. all. 757-1973.

RIDGE - 3-bdrm. ranch, eik, l/r w/fp, 2½ acres, quiet area, full bsmt., min. from Lab.. Jim, Ext. 4606 or 654-5049.

SELDEN - 1-bdrm. apt., 1st fl., l/r, eik, priv. ent., avail. immed., 15 min. to Lab., no pets, $650/mo. incl. util. 698-0576 or 698-8360.

SHIRLEY - 3-bdrm. house, 1 bath, quiet area, near Smith Point Bridge, fenced yard, $825/mo. + util. 757-1973.

SOUND BEACH - 1-bdrm. apt., full bath, kitchen-l/r combo, cable, priv. ent., $650/mo. incl. all; also, 2-bdrm. apt., bath, l/r, eik, near all, $675/mo. + elec. Ext. 2671 or 744-3284 after 4 p.m.

CLAREMONT, NH - 2-bdrm. condo, 40 mi. to Killington, Okemo, Magic Mt., Mt. Sunappe, $300/wk., $225/wknd. Frank, Ext. 7749 or 758-7913.

HILTON HEAD, SC - 2-bdrm. condo, sleeps 6, 2 baths, beach, pool, tennis, golf, Feb. $250/wk; Mar., $300/wk. 689-5378.

NORTH MYRTLE BEACH, SC - 1-bdrm. condo, sleeps 4, tennis, fitness, in/outdoor pool, golf course, beach rights, $250/wk. Joann, 472-6742.

For Sale

BAYSIDE - 1-bdrm. co-op, breakfast nook, kitchen, bath, tennis, pool, first-class shops, rent/lease/option to buy, Julia, 718-468-8097.

BROOKHAVEN TOWN - 10 acres, industrial, on LIE, terms, tax abatement for 10 yrs. 928-1020.

CALVERTON - 2-story, 2-bdrm. townhouse, 2 decks, new appl., Andersen windows, fenced, 1½ baths, assumable mortg., $77,000. Steve, 369-9884.

CENTEREACH - 4-bdrm. hi-ranch, l/r, d/r, eik, 2 full baths, large fam. rm. w/fp, deck, fenced yard, $133,000. 698-8514.

CORAM - Strathmore East, 4-bdrm. ranch, 2 baths, cath. l/r, 2-car gar., gas heat, fenced corner lot, $120,000. Ext. 3791 or 928-7154 after 7 p.m.

HOLBROOK - Birchwood split-level, 3 bdrm., 1½ baths, deck, bsmt., sprinklers, oak floors, $148,000. Norman, 472-3985.

MIDDLE ISLAND - 3-bdrm. ranch, eik, den w/fp, d/r, l/r, 1½ baths, screened porch, patio, full bsmt., wooded ½ acre, $149,500. 924-6051.

MIDDLE ISLAND - Lake Pointe, 2 bdrm., l/r-d/r area, cac, gas heat, wood deck off master bdrm., w-d, all appl., bsmt., pool, tennis, will pay half closing cost, ask. $69,000. Bob, 924-7316.

RIDGE - 2-bdrm. house in adult community Leisure Knoll, ac, newly carpeted & decorated, walking distance to rec. hall, pool, tennis, lots of extras, 5 mi. to Lab, $135,000. 744-3366.

RIDGE - Leisure Knoll, 1-bdrm. duplex, all appl., walk to clubhouse, tennis courts, etc., low taxes, immed. occupancy, over 55 only, $89,000. Ted, Ext. 4589 or 475-8581 eves.

SELDEN - 3-bdrm. L-shaped ranch, l/r, d/r, eik, den, gar., new heating system, ac, w/w, custom fence, agp, shed, walk to schools, $119,000. Ben, Ext. 7732.

SHOREHAM - 3-bdrm. Colonial, N. of 25A, SWR schools, 1½ baths, eik, d/r, den, l/r w/fp, fin. bsmt. w/sep. work rm., deck, gar., 3-zone heat, 7 mi. from Lab, $165,000. 821-9513.

SHOREHAM - 3-4 bdrm. ranch, ½ acre, eik, 1¾ baths, l/r, d/r, laundry rm., workshop/storage rm., fp, ig sprinklers, 5 app., 5 min. to Lab, $149,500. Ext. 2833 or 744-7172.

CLEARWATER, FL - 2-bdrm. condo, 1½ baths, d/r, l/r, kitchen, gar., furn., $48,000. Charlie, Ext. 3082

COLLINGTON HARBOR, NC - deep-water canal, bulk-headed property, 50'x150', 24-hr. security, pool, tennis. Ext. 4446 or 744-4625 after 6 p.m.

Wanted

LAVA LIGHT - any color, Lincoln Logs, any cond., table tennis, 5'x9'. 289-8212.

BABY-SITTER - experienced, 2-4 hrs./wk., afternoon, Pt. Jeff. area, 2 children, ages 3 and 1. Bente, 474-5939.

CELLO - ¾ size, reasonable. Lee, Ext. 4242.

ELECTRONIC PIANO - Yamaha Clavinova or Roland. 689-7326.

GAY WOMEN & MEN - Feeling isolated? Join us at our next on-site meeting, 2/22. 758-0930 after 5:30.

HIGH CHAIR - folding type, reasonable. Bob, Ext. 7238.

HOUSEMATE - to share 2-bdrm. condo in M.I., 5 min. to Lab, $450/mo. + util. 751-8351.

JUNK 1980-81 TOYOTA TERCEL HATCHBACK - for parts, will pay finder's fee. Bill, Ext. 4312 or 281-6498.

OUTBOARD MOTOR - Johnson/Evinrude, 9.9-15 hp, good cond. only, short shaft. Paul, Ext. 7697.

PEOPLE TO JOIN - non-denominational Christian fellowship group, every Thurs. at Snyder Conf. Rm., Bldg. 911A at noon. Pete, Ext. 3297.

SKIERS - for bus trip, Windham, Wed. Feb. 27, $41 incl. bus and lift, last trip of season. Nick, Ext. 3884.

TRAINS - Lionel & American Flyer, priv. collection, pays top $. Carole, Ext. 7100.

In Appreciation

I would like to thank all my friends at BNL for the wonderful retirement party. Also, for all the friends I have made while working at BNL, which by the way, was one of the happiest times of my life.

— Frank R. Winter

Classified Ad deadline is 4:30 p.m. Friday for publication Friday of the next week.