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BROOKHAVEN NATIONAL LABORATORY

The Role of DNA Repair in Cancer

Looking into the cells of the body is like opening up a set of Chinese boxes. Within every body cell is a nucleus. Within every nucleus are chromosomes. And within every chromosome is DNA.

DNA stands for deoxyribonucleic acid, the chromosomal substance that carries genetic information. It occurs in a constant amount in all body cells of a particular species and is also found in mitochondria, chloroplasts, micro-organisms (such as bacteria) and many viruses.

In most instances when DNA is damaged, excision repair enzymes cut out the defective part and put in a new one. Called "cut and patch," this process works well because DNA is a double-stranded molecule. Its duplicate information provides a template with which to do repair work.

On occasion, however, the enzymes fail to repair the DNA and damage is perpetuated through replication — when the DNA duplicates itself during cell division. In some instances, this repetitive cellular damage results in cancer. Studies of DNA repair by Richard Setlow, Chairman of the Biology Department, and his collaborators are adding to current knowledge about the mechanisms by which cancer evolves.

"Although DNA damage seems to be the starting point," Setlow said, "cancer is more complicated than that. It is difficult to cause cancer in normal people without repetitive stimuli. It could take ten years of constant exposure before cancer develops."

Setlow speculated about this long gap. "It seems to me, that in normal people most damage to DNA is repaired," he said. "But keep it up long enough and one of these days, it may not be. Even with long exposure, some people develop cancer and some don't. You always need two things: exposure and susceptibility. It may be that there's a reasonable variation among the general population in the ability to repair DNA. And small changes in this ability among individuals could have tremendous effects on susceptibility to cancer development. Every technique we've used to examine mammalian lymphocytes [white blood cells] has shown that, in the normal population, there's a five-fold variation in ability to repair damage."

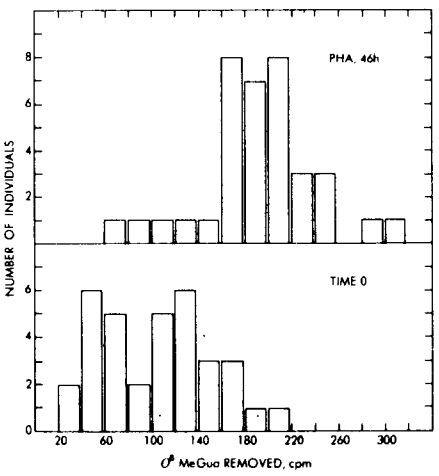
"This whole line of research started with bacteria," Setlow said. "Originally it had nothing to do with cancer. It was an effort to see how bacteria responded to radiation — why are some strains resistant and some not?" The link to DNA was discovered in 1963. Five years later came the tie-in with xeroderma pigmentosum (XP).

Mort Rosen

Gathered in the Biology laboratory where they collaborate on studies of the ability of human cells to repair DNA damage are (from left) En-Hua Cao, Neva Delihas, Eleanor Grist, Richard Setlow and Evelyn Waldstein.

XP, a very rare condition that tends to run in families, is the first human disease described in which cells were found to be deficient in DNA repair. In this disorder, the sufferer's skin is extremely sensitive to sunlight and small exposures can result in premature degenerative changes — anything from large, freckle-like pigment spots to cancerous lesions. Said Setlow, "XP's existence is direct evidence that damage to DNA can be carcinogenic." In the case of XP, the carcinogen is ultraviolet light. "An important thing about it is that this one of the few instances of cancer for which the causative agent is known," Setlow said. "It's also one of the best lines of evidence that people who can't repair DNA are at high risk of getting cancer."

About 50% of Caucasians with XP get skin cancer before the age of 20. The incidence of skin cancer in the normal white population is about 10,000 times smaller than that. (When people of other races have this condition, their increased pigmentation offers increased protection against developing, at an early age, skin cancer from sunlight.) "Since most people who go in the sun do not get skin cancer, we have to ask 'Why not?'," Setlow said. "It is reasonable to suppose that small differences in DNA repair ability may have a several-fold effect on an individual's susceptiblity to skin cancer, as well as to other types of internal cancer."



O^6-methylguanine is a suspected mutagenic and carcinogenic product contributing to breakdown of DNA repair. These charts show the amount of O^6-methylguanine removed by a 100 microgram extract of lymphocytes from apparently normal, individual Laboratory employees. Each point on the left side of the chart represents a different person. The upper panel represents lymphocytes stimulated to divide; the lower panel represents unstimulated lymphocytes. In all cases, there was a surprising variation in the subjects' ability to remove O^6-methylguanine.

Testing this supposition is the aim of the collaboration which includes Setlow; Michael Bender of the Medical Department; En-Hua Cao, a visiting researcher from the People's Republic of China; Evelyn Waldstein, an Israeli scientist; Neva Delihas and Eleanor Grist of the Biology Department.

Using a simple high pressure liquid chromatographic technique developed in the Biology Department, the researchers have measured lymphocytes from apparently normal individual Laboratory employees for their ability to remove 0^6-methylguanine, which seems to be responsible for some mutagenic and carcinogenic activities in DNA. "We were surprised to find a big variation in this capacity among our initial subjects," said Setlow (see figure), "and it raises several important questions: How is repair distributed among apparently normal individuals? How much of that is genetic and physiological, and how much can be attributed to life-style? Do differences in repair abilities reflect any enhanced susceptibility to disease? Is someone who is fairly repair proficient this year going to be the same way next year?" To answer such questions, the collaborators will be involved in two studies.

In one approach, sponsored by the National Cancer Institute (NCI), they will study samples from a cell bank run by the NCI to analyze the DNA repair capabilities of members of cancer-prone families.

In the second project, supported by the Department of Energy, they will continue working with Lab employees. Epidemiologist Robin Leonard of Medical will be establishing guidelines for choosing, from the Lab population, an appropriate random sample of apparently normal individuals to get a good cross-section of subjects. Starting with detailed histories, the researchers will follow the subjects until their deaths. Along the way, samples of their cells will be treated with carcinogenic agents, as the collaborators

(Continued on page 3)

More DNA Studies

For the past year, visiting scientist Wu-Nan Wen has been working in Richard Setlow's biology lab. Wen is an associate professor at the National Taiwan University, teaching cell biology.

Here at Brookhaven, he has traded his lectures and exams for hours of microscope work, studying the millions of cells he grows. Wen is conducting two studies: one, to get a better understanding of sister chromatid exchange, and two, to see if a cell's ability to repair damage to its DNA is affected by age.

Chromosomes carry DNA, which contains a cell's genetic information. Seen through a microscope, a chromosome can resemble the letter "X." Two arms of an "X" make up a chromatid, and there are two chromatids, called sister chromatids, in one chromosome. When a cell is exposed to a mutagen or carcinogen, exchanges between any part of the arms become more frequent.

"Biologists have known that exchange occurs. I'm studying why it happens, what specific damage to DNA results in sister chromatid exchange," says Wen.

For this study, he uses human cancer cells, which can be cultured easily. He treats the cells with methylnitrosoguanidine, an alkylating agent which can damage DNA. Then he counts the number of exchanges that occur and measures the cell's ability to repair one of the damages to DNA, O^6-methylguanine, caused by the alkylating agent. He has found that the higher the dose, the greater the frequency of exchanges.

Wen's second study focuses on DNA repair and aging. "Because old people are at higher risk of getting cancer, I thought it would be interesting to know whether aged cells are as capable as young cells to repair O^6-methylguanine, the damage which has been proven repeatedly to have a correlation with cancer formation," says Wen. For this study, Wen has been using normal human fibroblast cells.

He notes that normal human fibroblast cells grow differently from cancer cells. When the normal cells have multiplied until they fill up the area of the dishes in which they are grown, they stop growing. Cancer cells, on the other hand, would start to stack up on each other.

Mort Rosen

Wu-Nan Wen

But even if the normal human fibroblast cells were not restricted by their container, they would eventually stop multiplying. Like people, normal cells have a certain life span, and as they age, they slow down, dividing less frequently.

Wen grows the fibroblast cells to different ages and then measures the repair activity. While his studies are not extensive enough to be conclusive, they indicate that aged cells have a higher ability than young cells to repair the damage of O^6-methylguanine. Wen says that when cells get old, a lot of them become polyploid, which means that they have a greater amount of DNA. Being polyploid seems to increase their ability to repair. "If aged cells had instead a lower repair ability, this could be cited as a beautiful explanation of why old people tend to get cancers more frequently. But my research seems to indicate that the issue is not that simple."

Wen will be going home this summer, in time to prepare for the fall semester at his university. "I will continue my research there, but at a much slower pace without the good facilities here at Brookhaven," he says.

Sunspots And Starspots

Sallie L. Baliunas, Research Physicist at the Harvard-Smithsonian Center for Astrophysics, will speak on "Sunspots, Starspots and Sunspot and Starspot Cycles" at 10:30 a.m., on Monday, April 11, in the Hamilton Seminar Room of the Chemistry Building. The lecture, sponsored by BNL Women in Science, is open to the entire Laboratory community.

New advances in technology have revolutionized the investigations of solar and stellar activity, for example, starspots and sunspots. Dr. Baliunas will discuss the use of the International Ultraviolet Explorer and Einstein satellite observatories to study the physical condition of the plasma above the starspots.

Dr. Baliunas received her Ph.D. in

Sallie L. Baliunas

astrophysics from Harvard University in 1980. She was the recipient in 1979 of the Donald E. Billings Award, an international prize for outstanding research in solar physics. In 1980 she was awarded a Langley-Abbot Fellowship from the Smithsonian Institution to conduct research in solar and stellar physics.

The lecture will be followed by a luncheon at noon in Room A of Berkner Hall. The cost of the luncheon, which is open to all, is $7.50, and reservations should be made by calling extension 3541.

Steam Plant Retrofit Complete

The noise, the heat and the grease are all still there, but BNL's Central Steam Plant can certainly be called a clean operation, now that a number of improvements have been completed.

It started back in October 1981, when work began to bring the plant up to peak efficiency. Retrofit money came from DOE's Office of Construction and Facilities Management.

The first project was to install a flue gas economizer on boiler No. 5. Out of the four oil-fired boilers at the plant, No. 5 is the workhorse which keeps most of the Lab warm through the winter months. The economizer was installed just before winter set in, and an estimated $175,000 was saved that winter by recovering waste heat that is normally exhausted from the boiler.

Next, work began on putting in a new boiler control/burner management system. The heart of the new system is a mini computer, which keeps track of how the boilers and burners are operating and displays the data on two video screens. The computer also does most of the logging functions, eliminating a lot of paper work for the plant operators.

Last summer, the operators went through training sessions to get accustomed to the computerized system. Says Walter Bay, group leader for the operators, "Like anything new, the system takes getting used to, but we realize that the computer has more capabilities than the old system, which was all pneumatically controlled. There were some bugs at first, but it's all working out for the better now."

Another change has been the addition of a light feed stock fuel train, which allows the plant to burn more ALF. ALF, an acronym for alternate liquid fuels, is made up of recycled or surplus combustible liquids such as alcohols, mineral spirits, fuel oils and solvents. It's generally half the cost of No. 6 oil, the heavy, viscous oil which conventional steam plants use.

For many years, the BNL plant has been using a 50-50 blend of ALF and No. 6 oil. Now, with the installation of more light feed stock storage tanks, pumps, strainers, pipes and assorted safety equipment, up to 100% ALF can be burned. All four boilers have also been modified so that they can burn both weights of fuels at the same time.

The final improvement to the plant was the installation of more steam meters. According to Bill Chaloupka, assistant to the general supervisors for mechanical operations and maintenance, about 10% of the steam produced by the plant is used internally for running steam auxiliaries like fans and pumps, heating feedwater, or for heating No. 6 oil tanks in the dead of winter so the tar-like oil will flow. "With the new meters, we measure how much steam the plant produces, how much steam is used internally, and how much is sent out to the Lab site. By comparing those numbers, we can monitor the plant's efficiency."

Fourteen operators work around the clock, every day of the year, keeping the Lab supplied with steam. For them, the past year has been like living in a house that's being re-modeled. "Everyone has been really gung ho about the project, though, and because of that, we have stayed close to schedule," says steam plant supervisor Tom Fitzgerald.

All in all, the improvements to the steam plant have made it safer to operate and more efficient at doing its job. Project engineer Ed Murphy, in the energy management group of Plant Engineering, coordinated the past year's effort. He says the $2.3 million spent on retrofitting the steam plant will be recovered in less than four years through fuel savings.

Peter Horton

Robert Brockman, project engineer, DOE's in-house energy management group, was at Brookhaven this week to oversee a boiler efficiency course being sponsored by DOE. The course was attended by BNL's steam plant operators, heating engineers who service independent boilers around the site, design and construction engineers, and the Lab's general supervisors for mechanical operations and maintenance. Given by the Boiler Efficiency Institute from Auburn, Alabama, the course will be taught at other DOE installations around the country. During the four-day course on how to improve the efficiency of the steam plant, classroom instruction was combined with hands-on training at the plant.

Science: an orderly arrangement of what, at the moment, seems to be the facts.

Life insurance: a contract that keeps you poor all your life so you can die rich.

You Have A Right To Know!

For some months the Laboratory Employee Suggestion System has been in business and suggestions have been flowing in — and, apparently, flowing out just as fast. We managed to retrieve some ideas dealing with BNL's physical plant before the Suggestion Committee consigned them to oblivion. In the interest of employee enlightenment, we hereby bring them to your attention:

- Put the swimming pool and gym on wheels, so they could have the mobility of the lunch truck. This would give everyone a crack at a swim or handball, and be good for employee morale.
- Move the tennis courts next to the steam plant, paint the surface black, run water pipes back and forth on the surface, and connect the system to the plant. Free solar heat!
- Move the cafeteria next to the Physics Department so physicists can get a quick bite to eat and not be gone too long from their calculations.
- Take all the buildings on site and move them into a formation that spells "BNL." This would make a great aerial photo for postcards, and the Lab would make it into the Guiness Book of Records.
- Put the clinic next to the Brookhaven Center so that hangovers could be more easily treated.
- Move the steam plant into the middle of the site, so it radiates warmth. Same principle as a wood burning or coal burning stove in your living room.
- Raise the water tower another 50 feet so the toilets will flush more quickly and cut down on loitering in restrooms.
- Line up all the stacks — HFBR, Medical, Brookhaven Center, etc. —so they present a prettier picture to passers-by on the Long Island Expressway. Good political move.
- Move the AGS into the CBA ring, so the protons don't have as far to travel. The National Synchrotron Light Source should be moved there too so all the unwanted synchrotron radiation from the other two accelerators could be utilized. With all the extra space available, more softball fields could be built.

So employees out there, keep those ideas coming into the Laboratory Employee Suggestion System, where you can earn more with LESS.

April Fool!

Art Rosen

Outside the Central Steam Plant are (from the bottom) operators Pete Murphy, Ronald Wagner, Abraham Sampson, Marty Kissen, Ken Davis, Richard Lopez, Robert Foley, group leader Walter Bay, and Tom O'Rourke. Standing on the platform are (from left) operators Robert Browngardt and John Kuzow, and steam plant supervisor Tom Fitzgerald. Operators missing from the picture are: Bob Brady, Bill Farrell and Tom Snowden.

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BERNICE PETERSEN, Editor
MONA S. ROWE, Assistant Editor
ANITA COHEN, Reporter

35 BROOKHAVEN AVE., UPTON, N.Y. 11973
Telephone (516)282-2345

Inside Info

Each year, the Concrete Industry Board (CIB) recognizes structures that best utilize concrete in their construction. In 1982, BNL received an Award of Merit from the CIB for the Colliding Beam Accelerator project. The architect/engineer on the project is Ammann & Whitney Inc./Safeguard Construction Corporation.

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Marvin Shear, who heads the Quality Assurance Section at the CBA Project, served as moderator for the lead-off session of the 21st Annual Quality Conference sponsored by the Long Island Section of the American Society for Quality Control. William Harrison, an engineer with the Power Transmission Project, was a speaker in an afternoon session of the conference, held earlier this month at Adelphi University in Garden City. This organization has a membership of over 800 persons.

DNA Repair (Cont'd)

look for signs of unrepaired damage to DNA. "Ultimately, we should be able to identify those who are at risk," said Setlow.

The study will be a long one. "The only end point is death," said Setlow, "because cancer is generally a disease of the aged. We suspect it usually takes a lifetime of exposure to carcinogens in one's lifestyle or environment before DNA repair breaks down in humans. Human cells are really very proficient at repairing DNA. And this hasn't changed; if you put it on an age-adjusted scale, there hasn't really been an increase in the amount of cancers in humans. It's just a risk we've assumed because we're living longer."

—Anita Cohen

Arrivals & Departures

Arrivals

Sadayuki Ban ..... Biology
Henry F. Peters ..... Reactor

Departures

None

Gym/Pool Schedules

Admission Fees:

Season (four-month fees not prorated)	
Individual Membership	$23.00
Family Membership (must be members of employee's household)	33.00
Daily Admission	
Employee/Family Member	1.25
Guest	1.75

Schedule:

Monday through Friday
(Employees Only)
11:00 a.m. to 1:30 p.m.
(Employees/Families/Guests)
5:00 p.m. to 9:30 p.m.
Saturday and Sunday
(Employees/Families/Guests)
1:00 p.m. to 6:00 p.m.

Notice

The swimming pool will be closed this Sunday, April 3.

The Ridge String Quartet, April 14

Concert Week

Music lovers can look forward to a week of two fine concerts this month. On Tuesday, April 12, pianist Minoru Nojima will present the final concert of the BERA Concert Series. On Thursday, April 14, the Ridge String Quartet will present a special concert at Brookhaven prior to their New York debut. Both concerts will begin at 8:30 p.m. in Berkner Hall.

Mr. Nojima was born in Japan and began lessons at the age of three. He continued his studies at the famed Toho Music School in Japan, with Lev Oborin in Moscow, and with Constance Keene and Abraham Chasins in New York. Since his prize-winning performance at the 1969 Van Cliburn Competition, he has performed throughout the United States, the Far East and Europe. Nojima has been acclaimed by the critics as one of the most remarkable pianists of his generation. For his concert at BNL, he will perform Robert Schumann's Phantasie in C, Opus 17, and Claude Debussy's Preludes, Book I. Tickets will be sold at the door. General admission is $7; students and senior citizens, $4; and those under 18, $3.

The Ridge String Quartet catapulted to national attention last year by winning first prize at both the Fischoff National Chamber Music Competition in Indiana and the Coleman Chamber Music Competition in California. All alumni of the Curtis Institute, members of the quartet are violinists Krista Bennion and Robert Rinehart, violist Matthias Buchholz, and cellist Ramon

Pianist Minoru Nojima, April 12

Bolipata. The weekend following their performance at Brookhaven, the Ridge Quartet will make its New York debut in the distinguished New School Concerts series, which in the past has presented the Guarneri, Cleveland and Vermeer Quartets and TASHI in their New York debuts. On the program at BNL will be Joseph Haydn's Ultimo Quartetto, Opus 50, No. 5 in F Major; Bela Bartok's Quartet No. 2, Opus 17; and Anton Dvorak's Quartet No. 10 in E Flat, Opus 51. Tickets will be sold the night of the performance. General admission is $6; students and senior citizens, $3; and those under 18, $2.

Quilting Club

The Quilting Club will meet on Friday, April 8 from 9:30 - 11:30 a.m. in the lounge of the Recreation Building. Please bring your completed "schoolhouse" blocks or finish them at the meeting. For more information, call Bernie Benz, 928-1068.

Theater Group

The Theater Group will meet at 8 p.m. on Friday, April 8, in the Physics Department lounge (area near the auditorium), to discuss plans for future activities. Anyone interested in helping with BNL theater productions is welcome to attend.

Billiard Table Sale

A secondhand Fischer billiard table with assorted equipment will be sold by BERA to the highest bidder. The table is housed at present in the Recreation Building and may be inspected at that location by anyone interested, on Tuesday and Wednesday, April 6 and 7, between 5 and 9 p.m.

All written bids (minimum $200) must be delivered to the Recreation Office in Personnel no later than Monday, April 11.

Dismounting and transporting the table will be the responsibility of the buyer.

Service Awards

The following employees received 35-year BNL service awards in March.

Richard T. Adams ... Reactor Div.
Paul Colsmann .. Reactor Division
Lloyd O. Davis ..... Accel. Dept.

Volleyball

Standings as of 3/28/83

Mixed League

A Division

Dinkers	12-0
EPO's	8-4
Mixed Ups	6-6
Teddybares	5-7
Nuts and Bolts	4-8
Nuclear Wastrels	1-11

B Division

The B Division games are now over except for a few makeup games and current accurate standings are not known at this time.

Open League

Phoenix	12-0
Brewmasters	5-7
Raiders	4-4
Random Errors	4-4
Half Lifes	4-8
FRE8D	3-9

Bowling

White League

B. Belligan rolled a 240, K. Asselta 217, G. Hassell 212, R. Scheidet 211, J. Griffin 207/213, D. Adams 206, T. Erickson 206, P. Manzella 193, K. Vogel 191, M. Scheidet 183, S. Long 181, S. Smith 173/173/173.

Red/Green League

High games were bowled by J. Medaris 229/606 scratch series, C. Bohnenblusch 223/205/602 scratch, N. Combatti 210/204, J. Morris 205/200, W. Kristiansen 221, R. Larsen 221, E. Sperry IV 215, L. Jacobson 215, K. Asselta 202.

Purple League

Jim Morris had games of 220/203 for a 610 scratch series, E. Sperry IV 209.

Pink League

High games were bowled by S. Long 182, D. Johnson 173/169/177, E. Kristiansen Moore 165.

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L.I. Industrial Tournament

The team representing BNL finished 8th out of 16 teams.

Cafeteria Menu

Week Ending April 8,1983

Monday, April 4		
Spinach egg drop soup	(cup)	.65
	(bowl)	.75
Broiled chicken livers & 1 veg.		1.75
Beef stroganoff on egg noodles		1.95
Hot Deli — Roast turkey breast	(bread)	1.85
	(roll)	1.95
Tuesday, April 5		
Lentil soup	(cup)	.65
	(bowl)	.75
Veal scallopini & 1 veg.		1.90
Swedish meatballs on egg noodles		1.85
Hot Deli — Sandwich steak w/peppers & onions	(bread)	1.95
	(roll)	2.05
Wednesday, April 6		
French onion soup w/croutons	(cup)	.65
	(bowl)	.75
Salisbury steak & 1 veg.		1.85
Southern fried chicken w/1 veg. & cranberry sauce		1.90
Hot Deli — Sausage & pepper hero		1.95
Thursday, April 7		
Turkey noodle soup	(cup)	.65
	(bowl)	.75
Sweet 'n sour pork on white rice		1.95
Yankee pot roast of beef & 1 veg.		2.00
Hot Deli — Monte Carlo		1.90
Friday, April 8		
Manhattan clam chowder	(cup)	.65
	(bowl)	.75
Breaded shrimp fries & cole slaw		2.10
Beef hash & 1 veg.		1.85
Hot Deli — Clam boat		1.95

Hospitality News

The Hospitality Committee's next morning get-together will be held Tuesday, April 5, from 9:30 a.m. to 11:30 a.m. in the Brookhaven Center. Elizabeth Lapham, a noted historian, will be the guest speaker. The topic of her presentation will be "The Early History of Long Island."

All wives of Laboratory employees and their guests are welcome. Coffee, tea and danish will be served.

Please come and bring the children. Babysitting will be provided free of charge.

Classified Advertisements

Placement Notices

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

Each week, the Personnel Office lists new personnel placement requisitions. The purpose of these listings is, first, to provide open placement information on all non-scientific staff positions; second, to give employees an opportunity to request consideration for themselves through Personnel; and, finally, for general recruiting purposes. Because of the priority preference policy stated above, each listing does not necessarily represent an opportunity for all candidates. As a guide to readers, the listings are grouped according to the anticipated area of recruitment.

Except when operational needs require otherwise, positions will remain open for one week following publication date.

For further information regarding a placement listing, contact the Personnel Placement Supervisor, Ext. 2882.

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

OPEN RECRUITMENT: Opportunities for present Laboratory employees and outside applicants.

1842. HEAVY EQUIPMENT MECHANIC OPERATOR - Requires demonstrated ability to maintain, repair and operate all material handling, earthmoving, road and ground maintenance and related equipment. Plant Engineering Division.

1843. CLERICAL POSITION - Requires excellent typing and record keeping skills in support of the Technical Services Section of the Research Library. Familiarity with standard library procedures and practices and previous experience in OCLC database searching extremely desirable. Technical Information Division.

1844. TECHNICAL POSITION - Requires an AAS degree in electronics technology or equivalent and significant prior experience, including equipment development, familiarity with integrated circuits and modern semiconductors. Will assist in the construction/debugging of primarily digital electronics, although some analog and linear work will be required. Capabilities in mechanical and P.C. layout and interpretation of schematics are required as well as standard benchwork techniques. Electronics drafting capability desirable. Physics Department.

Autos & Auto Supplies

VW PARTS - muffler assemblies, $28; bumpers, $27; repair manuals, $16; 009 distributor, $36, full line of parts, all brand new. Augie, Ext. 2419 or 289-4211 eves.

79 HONDA MOTORCYCLE - CM400T, 2,000 mi., garaged, must sell, $1,000. Ext. 7125.

MGB - or GT front & rear ends, 1970-1974, complete with shocks, other misc. parts, $80 all. Dan, Ext. 7518 or 929-3195.

72 HONDA - CL-100, on/off road, good cond., $150. Dan, Ext. 7518 or 929-3195.

VW ENGINES - (2) 1500cc, new hds., jugs/pistons, good lower half, $50 for both. Dan, Ext. 7518 or 929-3195.

64 JEEP PICK-UP - 4x4, 360 V8, am/fm cassette radio, many extras, asking $1,500. Linc, 286-9385.

68 BUICK SKYLARK - V8, 120K, hitch, repainted 12/79, dependable, $250. Jay, Ext. 4994 or 751-0538.

CAP - for 8 ft. bed, $175. Rosemary Taylor, Ext. 2546.

80 HONDA HAWK - CB400T, excel. cond., low mi., extras, $995. 286-8814 after 5:30 p.m.

73 DODGE MAXIVAN - 1 ton, high mi., good cond., $1,050. Ext. 3336.

76 HONDA MOTORCYCLE - CB500T, red, crash bars, sissy bar, looks & runs well, new battery, $900. Ext. 2957 or 331-2270.

80 KAWASAKI - 650, LTD, red, crash bars, helmet, excel., $1,850. Bob Johnson, Ext. 3354.

70 OPEL GT - 1900, new interior, paint, brakes. 929-4287 after 7:30 p.m.

81 PONTIAC T-1000 - white w/blue pinstripe, a/c, 4 spd., w/w rad., 15,000 mi., still under warranty, tinted windows, asking $4,500 neg. Ext. 2964.

79 MAZDA - 626, 2 dr. sedan, excel. cond., 5 spd., met. blue, rust-proof, 30-35 mpg, $4,500. Larry, Ext. 4107 or 472-0721.

72 VW BUG - 110,000 mi., new valves, good body & engine, new front brakes, asking $1,500. Harriet, Ext. 4853 or 473-4948.

72 FORD - LTD, 4 dr., reg. gas, low mi., runs and looks like new, $800. 744-2805.

PICK-UP CAMPER - 11-1/2 ft., heater, refrig., hot water, shower, sleeps 4-6. Ext. 3278 or 281-6365 after 6 p.m.

78 FORD FIESTA - 55,000 mi., excel. cond. & mileage, 4 spd., complete records & shop manuals. Mark, Ext. 4315.

66 SEARS MOTORCYCLE - 250cc, $175; VW repair manuals, $7 ea.; padded motorcycle sissy bar, $15. Frank, 399-4480.

77 BMW - 530i, 55,000 mi., air, sunroof, stereo, bronze w/tan leather, 6 cyl. OHC, excel. cond., $6,250. Peter, Ext. 3867.

75 PONTIAC LEMANS - a/c, 70,000 mi., 4 new tires & brakes, clean in & out, brown w/brown vinyl roof, am/fm cassette, $1,600. Ext. 4089 or 698-5679.

79 SUBARU - station wagon, 5 dr., 4 wd, roof rack, stereo cassette, a/c, 60,000, excel. main., $4,000. 281-7844.

74 BLAZER - 36" tires, new 350 engine, 4 spd., $2,500; Blazer top, white, 74-75, w/o windows, new $1,400, now $750. 744-3968 anytime, leave message.

80 MAZDA RX7 - charcoal grey, 5 spd., tape deck, excel. cond., well maintained. Ken, Ext. 2008 or 928-5875 eves.

77 CHEVY NOVA - 2 dr., 305 ci, dk. blue, no rust, 65K mi., must see, $2,365. Ext. 5507.

82 MAZDA SPORT PICKUP - a/c, cap, radials, am/fm, 5 spd., 29 mpg, $7,695. Janet, 929-4439.

MGB PARTS - call for needs. Bob, Ext. 4976.

69 MGC - 6 cyl., 4 spd., overdrive, conv., chrome wire wheels, many extras, rare, $2,500. Bob, Ext. 4976.

74 AUDI FOX - auto., 4 dr., 68,000 mi., runs well, body has rust, asking $550. 751-8240 eves.

75 HONDA MOTORCYCLE - model 750, 13,000 mi., good cond., $950. 286-9315.

75 BLAZER - 350-4bbl, auto., Cheyene pkg., electro touch plow, mags, new radials, $3,500. Bob, Ext. 4976.

79 CHEVETTE - 4 dr., 4 spd., economical, good body/interior, 55,000 mi., $2,400. 473-2473.

MOPED - Kreidler (West Germany), like new, many extras, 26 mph, no insurance required, $300. Walter, Ext. 2050.

TRAILER HITCH - for Olds Starfire. 732-6647.

75 TOYOTA COROLLA - new paint & radials, rebuilt engine, am/fm, auto., asking $1,900. 878-2233 after 6 p.m.

81 CITATION - 4 dr., 4 cyl., auto., a/c, p/s, p/b, low miles, $4,750. 567-9025 eves.

79 DATSUN - 310-GX, 5 spd., front wheel drive, 30+ mpg, 2 dr., hatchback, a/c, am/fm stereo, excel. cond., $3,900. Suzie, Ext. 7677 or 585-7572.

72 DODGE POLARA - excel. mech., body & interior, well maintained, $700. 924-3281.

JEEP RAG TOP - fits '55-'75 CJ5, black; white & alum. rims, l200xl5, Flot-Tracs; snow plow. 281-7230.

75 DATSUN - B-210, white, 49,000 mi., excel. mech. cond., needs some body work. Ray, Ext. 2432 or 924-0361.

73 CHEVY VEGA - 75,000 mi., good engine & drivetrain, 4 spd., custom features, $750. Ext. 3596 or 821-1039.

76 FORD LTD - 4 dr., excel. cond., inspected Feb. 15, good, safe transportation, $1,800. Ext. 2761 or 3110.

72 PINTO - auto, a/c, 6,000 mi. on tires, good running, body N.G. $125. Ext. 3365.

80 KAWASAKI LTD - black, 4 cyl., highway bar, 8,000 mi., mint, garaged, $2,000. Ricky, 588-6879 after 7 p.m.

79 DODGE COLT - new tires & brakes, 30, runs beautifully, well maintained, $1,000. Corliss, Ext. 4438 or 472-1585.

72 PONTIAC VENTURA - mechanics special, $300. Ext. 2529.

78 CHEVY MONZA - V6, 4 spd., hatchback, am radio. 289-2899 after 6 p.m.

PIONEER STEREO - under dash, fm cassette 761 or 3110.

76 FIAT - 131S, 5 spd., 2 dr., a/c, am/fm, asking $1,300. Ext. 2521 or 928-8374.

TRAILER - 1 ton, 6'x7'x2' bed, $550 or best offer. Bob, Ext. 2957 or 878-4556.

80 KAWASAKI LTD - black, 4 cyl., highway bar, 8,000 mi., mint, garaged, $2,000. Ricky, 588-6879 after 7 p.m.

79 DODGE COLT - new tires & brakes, 30stereo, slide bracket included, KP-500 w/Supertuner, excel. cond., asking $85. Chip, Ext. 2256.

77 BERMUDA MOPED - no insurance required, excel. cond., $200. Terry, Ext. 3725 or 325-1080 after 5 p.m.

68 BUICK SPECIAL WAGON - 350, V8, auto., it runs, $250. Lloyd, Ext. 3381.

72 HONDA MOTORCYCLE - 750cc, custom rigid frame w/fender & seats, many other parts. 654-2076 eves.

Boats & Marine Supplies

20' GARVEY - glass over wood, and trailer, asking $200. Dan, Ext. 7518 or 929-3195.

20' BAYLINER - 1976 Liberty, 130 Volvo I/O, cabin, trailer, extras. John, 541-4792.

21' LUHRS - 1965, wooden inboard, 6 cyl., fresh water-cooled, CB, depth finder, $2,300, neg. 567-2717 after 5 p.m.

17' THUNDERBIRD - cathedral hull, 90 hp Mercury, Trailex aluminum trailer, asking $2,000. Borg, Ext. 3568 or 286-0428.

18' HERESHOFF CAT BOAT - 1973, fully equipped, 1976 outboard, excel. cond. 286-1024.

23' CRUISING SLOOP - sleeps 4, head & galley, 6 hp outboard, Deep Keel, $9,000. Walter, Ext. 2050.

25' ERICSON C/B SLOOP - 1975, 99 Johnson, VHF, RDF, DF, autohelm, 150% Genoa, excel. $17,500. 878-8774.

JOHNSON - 115 hp, with controls, good cond., $650. 286-1618 after 6 p.m.

17' COBIA - fiberglass, 85 hp Johnson, w/trailer, life jackets, gas tanks, excel. cond., $3,000. Jim, Ext. 7772.

16' FIBERGLASS BOAT - for fishing or clamming, 40 hp motor, trailer, $900 or best offer. Ext. 4505 or 928-2803.

16' SKIMMER CENTER CONSOLE - 1975, w/1970 Johnson motor & trailer, 33 hp, $1,500. 878-8769 eves.

18' SPEEDBOAT - 1969, Chris Craft, mahogany, 283 ci, collector's item, mint cond., $4,000. Mike, 289-0602 eves.

19' GALAXY BOWRIDER - V-bottom, full canvas, gauges, 120 hp I/O, less than 20 hrs., (I/Z load trailer gal.), extras, all like new, $5,950. Lou, 286-1420 or 589-4262.

Moving Sale

MOVING SALE - (4) tires, A78-13; car radio, speakers, bookcase, swivel rocker chair, night table, electric mower, electric heaters, much more. Carol or Seth, 928-3650.

Miscellaneous

DENIM JACKET - w/picture of Jim Morrison painted on back. Rose, 744-5069.

IRONING BOARD - Mary Proctor, sturdy steel, adjustable vented top, non mar feet, $10; Swing-A-Way ice chopper, course and fine, $9. 289-6490.

MET TICKETS - (2), April 15, Il Trovatore, evening, orchestra, $32.50 ea. Ext. 7126 or 924-0438 after 6 p.m.

BAR-B-QUE GAS GRILL - Crestline, tank, lava stones, ready to use. 821-0865.

MINI BIKE - rear sprocket wheel. Mario, Ext. 7148 or 363-2522.

CLOTHES DRYER - gas, pilotless ignition, good cond., $75. Ext. 3877 or 698-6120.

SWING ALBUMS - (3) records, w/picture texts, Time-Life series, $6 ea.; (3) winter coats, size 10-14, very reasonable, blue/beige/gold. 281-2002.

CANOPY FRAME - white, good cond., $50. Ext. 2964.

WOMENS SHOES - 9 West, 8-1/2 B, tan, Suzanne style, new $40, asking $15; "Old Brook" stoneware, eggshell w/brown ring, new, 3-pc. service for 6, $15. Cheryll, Ext. 4207.

MULTIVOX MX2000 SYNTHESIZER - excel. cond., $400. 363-2614 after 6 p.m.

POOL - 24', with accessories, 1 yr. old; kerosene heater with 50 gal. drum. 744-3315 after 6 p.m.

MENS SHOES - Florsheim, 11-1/2 D, brown leather slip-on style, practically new, $25. Ext. 5154.

ORGAN - Thomas, 2 keybord, Californian Model #263, rhythm section, excel. cond., $1,500. 472-1394 after 6 p.m.

FIREWOOD - 3 spruces, approx. 30', easy access, you chop, you take, I watch. 878-0717.

GUITAR - folk type, 6 string, steel, w/case, $105. Nick, Ext. 4701.

PSE HUNTING BOW - 45-60 lbs., 4 wheeler, w/case, sights quiver, stabilizer, 2 doz. Graflex arrows, $175. 281-2731.

ALUMINUM GUTTERS - & leaders, over 200 ft., $50 takes all. 751-6418.

SNOWMOBILE SUIT - men's, $45. Frank, Ext. 2022 or 399-4480.

LAWN MOWER - Jacobsen, 21" self-propelled w/bag & extra blade, electric start option, rebuilt engine, $85. 281-8274.

ASPARAGUS ROOT - freshly dug, local, excel.; child seat for bicycle, new, padded steel construction, $12. Tom, Ext. 4084 or 878-1060.

TABLE SAW - Sears, 10", 1-1/2 hp, 4' table, good cond., $250. 878-8769 eves.

MET. OPERA TICKETS - 83-84, Balcony, Boheme, M. Lescaut, Carlo, $20 ea. Dave Christman, Ext. 2694.

SINGER SEWING MACHINE - industrial; formica top desk; 19" b/w TV. 281-6099.

BLANK CASSETTE TAPES - Basf C-90, CrO_2, $2.75 ea. Ext. 2521.

ACOUSTIC GUITAR - Martin, left hand, D28 hardshell, excel. cond., $550. 363-7595 eves.

SINGER SEWING MACHINE - $75; step stool, $20; bookcase headboard, $25; quartz heater, $30; new toaster oven, $45; 2 table lamps, $25 ea.; electric knife, $20. 744-6874.

UPRIGHT FREEZER - Sears, 16.8 cu. ft., excel. cond., $250. 878-2421.

DOG FENCE - 4xl50 ft., plus metal poles, 1 yr. old, $75; b/w TV, $15. Ursula, Ext. 4389 or 331-4596.

BASEBOARD HEATER - electric, portable, llOV, 1320 watts; Edison fan, forced, cost $50, never used, $25; 25" color TV, Curtis Mathes console, complete service within last 18 mos., picture tube now blown, $25. Ext. 4456 or 281-0360.

DRUM SET - Majestic Deluxe, Zildjian cymbals, $450. Dan, 862-8022 days or 475-1870 eves.

DINETTE - Douglas, w/4 chairs; 6' decorator wall units; queen sz. sleeper sofa; Bassett square sofa table; large desk. Ext. 3565 or 929-6964.

FURNITURE - solid pine colonial, 5 pc. living rm., compl. dining room set, like new. 286-9315.

ROLL-TOP DESK - solid oak, new, excel., $500. 981-9584 eves.

WALL OVEN - w/infra-red broiler, Caloric Ultramatic, propane, stainless steel finish, very good cond., $75 or best offer. Ext. 2492.

LIQUIDATION - of TV business, tubes, tools and many parts, see & make offer. 732-6647.

IRONING BOARD - Proctor Silex w/cover, like new, $12. 751-1884.

WOMEN'S BICYCLE - 5 spd., Mossberg, $40; Strolee child car set, $25; both in good cond. Ray, Ext. 4479.

COMPUTER - TI/4A, color, with RF modulator, cassette interface cable, learning cartridges, and manual, like new, $170. 924-5513 after 6 p.m.

CHILD'S SKI JACKET - good cond., size 10, navy w/hood, $8. Susan, Ext. 4267.

BLENDER - Vita-Mix, collision impact, like new, $75. Bob W., Ext. 7197 or 821-0705.

BOWLING BALL - men's, 15-16 lbs., hardly used, $20; new bowling bag, $5; men's bowling shoes, sz. 8-1/2, $5; upright freezer, 10 cu. ft., excel. cond., $140. Linda, Ext. 2733.

Real Estate

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

For Sale

RIDGE - (3) one acre building plots, each over 100 x 400, fully wooded in quiet established area, $13,900 ea., terms. 924-3236.

BLUE POINT - older house in quiet neighborhood, 3 bedrooms, dining room, 1 car garage, basement & attic, $56,000. 363-2049 after 6 p.m.

E. PATCHOGUE - Cape Cod on 1/3 acre, 3 bdrms., full basement, garage, walk to bay and marina. 289-7858 after 6 p.m.

SHIRLEY - mother/daughter house, upstairs - 6 rms. & lrg. bathroom, fireplace, downstairs - 3-1/2 rooms including full kitchen, garage, 50'x207', fenced all around, income potential, $50,000. 281-2257 anytime.

ROCKY POINT - 3 bdrm. ranch, living rm., dining rm., eik, full basement, 1 car garage, assumable 6% mortgage, $59,900. 744-9760.

For Rent

SHOREHAM - 1 bdrm. apt., available April 1st, newly renovated, brand new kitchen and private entrance. 744-3315 after 6 p.m.

STONY BROOK - 2-3 bdrms., l/r, d/r, eik, full basement, f/p, walk to Stony Brook, asking $700. 751-2835 after 6 p.m.

YAPHANK - large 2 rm. apt., full bath, newly renovated. Rose, 473-5869 or 473-3633 after 6 p.m.

WESTHAMPTON BEACH AREA - summer house, pool, Har-Tru court, dock, interesting, bright, friendly, professional group with diversified talents & careers, $750 half share, $950 private room. 653-5372.

EAST MORICHES - share 3 bdrm. house, use of washer/dryer, female only, no children, no pets, all utilities included except telephone, rent until house is sold, $85 per week. Linda, Ext. 2733.

PATCHOGUE - 4-1/2 rm., 1 bdrm. apt., includes heat, hot water, laundry, garbage pickup, cable TV, dock space avail., lst floor, full end apt., $460/mo., avail. immediately. 286-8368.

Lost & Found

LOST - 1 gold earring. Vera, Ext. 4444.

Free

HOT WATER HEATER - 30 gal., LP gas, you pick up. 473-767.

Car Pools

BABYLON/WEST ISLIP - one or two drivers needed for 4-person car pool. Ext. 2500.

PORT JEFFERSON - student looking for an emergency ride from Lab to Port Jeff., willing to pay. Wayne, Ext. 3582.

STONY BROOK/STRATHMORE - established carpool looking for 4th rider/driver. Morris, Ext. 4192.

Wanted

SAILBOAT - 22-26 ft. fiberglass, K/CB or shallow keel for cruising. Ken, Ext. 7959 or 581-1169 eves.

CAMPBELLS SOUP LABELS - send to F. Chandler, Bldg. T-89, for St. Mary School, E. Islip.

TORO POWER HANDLE - and accessories. Ron, 732-6712.

RUGS - donated for religious group. Claire Hull, 281-2002.

HOME - for adorable kittens, black & white, will have long hair, now 1 week old, will be ready in 5 weeks. Ext. 7009.

RIDES - to New York City, will pay expenses. Ext. 3941.

TRAINS - Lionel, American Flyer, accessories, any condition brings good price. Carole, Ext. 3362 or 924-4097 eves.

WOOD EXTENSION LADDER - 24 ft., good cond. Dan, Ext. 7518 or 929-3195.

HOUSE TO RENT - Bellport Village or Brookhaven Hamlet. Ext. 5055 or 286-0919.

MOTORCYCLES - bent or broken, any age or condition. Kevin, 281-8031.

ANY UNION MEMBERS - (2230), interested in playing softball. Pete Eterno, Ext. 4167 between 12-12:30, Bldg. 452.

TEDDY BEAR HAMSTER - male, to mate with my female, must be apricot color & 1-2 yrs. old. Donna, 744-8063 days.

BENTWOOD ROCKER - wicker rocker or wicker chair, must be in good cond., reasonably priced. Donna, 744-8063 days.

INFANTS SWING - outdoor, pressure gates; covered sandbox; mini chaise lounge; toddler pool w/slide. Ken, Ext. 4421 or 744-0722.

FLOOR WAXER MACHINE - scrubber with 2 sets of brushes, reasonable cost.

HOUSE TO RENT - Bayport/Blue Point area only, 2 to 3 bdrms. Carol, Ext. 3341 or 567-6433 after 6 p.m.

WORKING FEMALE - to share house in south Bayport, single, $275/mo. pays all. 289-7228 after 5 p.m.

GOLF CLUBS - left handed, 1 & 3 woods and putter, modest price. Ext. 3428.

DRUM SET - good cond., used. Bob, 732-9517.

BABYSITTER - full time, in my home, 5 min. from Lab. 744-5285.

CAMPING EQUIPMENT - tent, lantern, etc. 924-3281.

DIVING EQUIPMENT - scuba tank, regulator, B.C. suit, weight belt, spear gun. Don, 286-0151.

SAILBOAT - 14'-18', wood or glass, trailer, outboard. 924-3281.

CELLO - 3/4 sz., for 10 yr. old. Pat, Ext. 2531 or 727-0547 after 6:30 p.m.

HOUSE - 2 bdrm., living rm., eik, bath, small lot OK, to $32,000, leads please! Sanchez, Ext. 3848, 698-8649.

MAGAZINES - second hand, cleaning up for spring? I'll pick up your magazines for chips. Joe, Ext. 2897 or 281-7683 after 5:30 p.m.

HOUSEMATE - to share large house in Coram, 4 bdrm., 3 bath, $165/mo. plus 1/3 util. Ext. 2521 or 928-8379 eves.

HOME - for 1 yr. old, golden Lab, good with children, house broken. Vinny, Ext. 2350 or 2353.

Services

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

CUSTOM BUILT FURNITURE - upholstering, picture framing. Bill, 928-5875 eves.

AUTOMATIC TRANSMISSIONS - complete service guaranteed, coast to coast, free est., discount w/BNL ID. 289-4200.

STEVE'S CAR WAXING - any size car, $24.95. Ext. 4297 or 929-6877 after 5:30 p.m.

Ads left out of this issue due to lack of space need not be re-submitted to appear in next week's issue. Please note that ads may not be more than 15 words long and must be received in the Bulletin office by 4:30 p.m. Friday, for inclusion in the following week's Bulletin.

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