BROOKHAVEN BULLETIN
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BROOKHAVEN NATIONAL LABORATORY

A Visitor's View
Rudolph Marcus, Theoretical Chemist

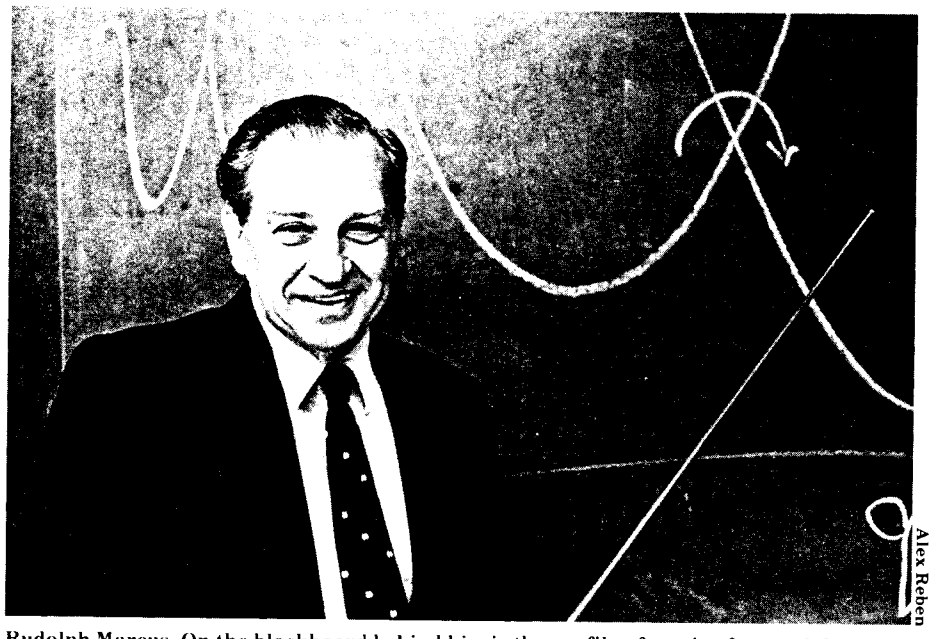
The first Haworth Distinguished Scientist in the Chemistry Department, Rudolph A. Marcus, is no stranger to BNL. "I first came to the Lab around 1958 and have thoroughly enjoyed each of my visits ever since," says Marcus, who is the Arthur Amos Noyes Professor of Chemistry at the California Institute of Technology. Marcus is best known for developing the RRKM theory, which predicts how rapidly single molecules break up after they have acquired enough energy from collisions with other molecules. As well, he is known for his work on the transfer of electrons from molecule to molecule during chemical reactions.

Marcus was born in Montreal, Canada, and received his Ph.D. from McGill University. After a postdoctoral position at the National Research Council of Canada, where he experimented with free radical reactions, Marcus did a second postdoc at the University of North Carolina with Oscar Rice, the man he considers his mentor and under whom he developed the RRKM theory.

"I was trained as an experimentalist, but I decided to do some theoretical work with Oscar Rice, a marvelous scientist and a thoughtful person," says Marcus. "After three months of discussing papers with me, he hauled out of his drawer calculations on the distribution of energy within a molecule during what is called a unimolecular reaction and thought that I should look into them. I never really used his calculations, but they were a starting point.

"The first thing I did was to read everything I could about reactions," continues Marcus, "and I noticed that in the literature there were lots of good things, but some inaccurate things too. So I pulled together bits and pieces, not intending to make a theory. After another three months, I had put together what is now called RRKM by blending the ideas from two previous theories.

"One dealt with chemical reactions in general, called transition state theory, and the other was a statistical model of molecules breaking up, called RRK theory after the people who developed it in the 20's. But they did it before quantum mechanics provided a theory of the chemical bond. I made use of later theoretical work on reactions and their statistical ideas to develop RRKM." Marcus's first papers on the theory appeared in 1951 and 1952.


Alex Reben

Rudolph Marcus. On the blackboard behind him is the profile of a pair of potential energy surfaces for an electron transfer reaction. Marcus pioneered the use of reaction coordinates as a way to visualize the course of reactions.

His next achievement came in electron transfer theory, found in papers in 1956 through 1965. "I didn't set out to develop a theory of electron transfer," explains Marcus. "I read some article in a journal in which there was a suggestion for electron transfer reactions by Willard Libby, who received the Nobel Prize for radioactive dating. Libby reported the results of a back-of-the-envelope calculation. His suggestion looked great, but not the calculation.

"I had never worked on electron transfer reactions before," adds Marcus, "but I knew enough about charges interacting with solvents to know that his calculation was wrong. I managed to find out what was wrong and derive the theory correctly. It was one of the most exciting moments in my life."

Marcus joined the faculty of the Polytechnic Institute of Brooklyn in 1951, and "about once a month for several years beginning in '58, I came out to Brookhaven's Chemistry Department, first as a consultant and later as a visiting scientist during the summer. Dick Dodson, a pioneer in isotopic exchange electron transfer, was chairman then, and the Department was an exciting place to be, and my time here played an important role in my research."

In 1964 Marcus became Professor of Physical Chemistry at the University of Illinois, and, in 1978, he assumed his present position. He is a member of the National Academy of Sciences, the American Academy of Arts and Sciences and a past member of the Chemistry Review Committee of BNL. Among the awards he has received for his research in chemical kinetics, Marcus's most recent honor was the 1984-85 Wolf Prize in Chemistry.

As the Lab's second Haworth Distinguished Scientist, Marcus has presented two lectures and will deliver two more. During his three-week stay at the Lab, he is meeting with scientific staff to discuss research of mutual interest. He will return for one to three weeks over the next two years. The Distinguished Scientist position was created to honor the late Leland J. Haworth, BNL's director from 1948 to 1961, with funding from Associated Universities, Inc.

During his first lecture on Tuesday, August 20, "Unimolecular Theory for Highly Flexible Transition States," Marcus discussed the complicated motions of molecules as they break apart into free radicals. "Instead of simply vibrating," he explains, "parts of molecules almost rotate freely as they are breaking off."

About a year ago, Marcus and a Canadian collaborator David Wardlaw were able to describe this complicated movement by dividing the motions of a decomposing molecule into two types: the many motions that don't change very much during the reaction and the few that do change enormously. "We found a way of handling the complicated motions that are changing from bending vibrational to rotational," says Marcus.

He considers this theoretical explanation of highly flexible transition states to be "a practical method of implementing RRKM theory for more complicated motions that we could only treat approximately before.

"The second lecture was a discussion of ways to overcome RRKM theory," says Marcus of his talk on "Intramolecular Dynamics of Molecules Containing a Heavy Atom." Many chemists want to "beat" RRKM theory by designing molecules in which energy can be trapped in one part long enough for that part to be broken up before the energy is redistributed throughout the molecule.

In RRKM theory, Marcus made statistical assumptions about the proba-

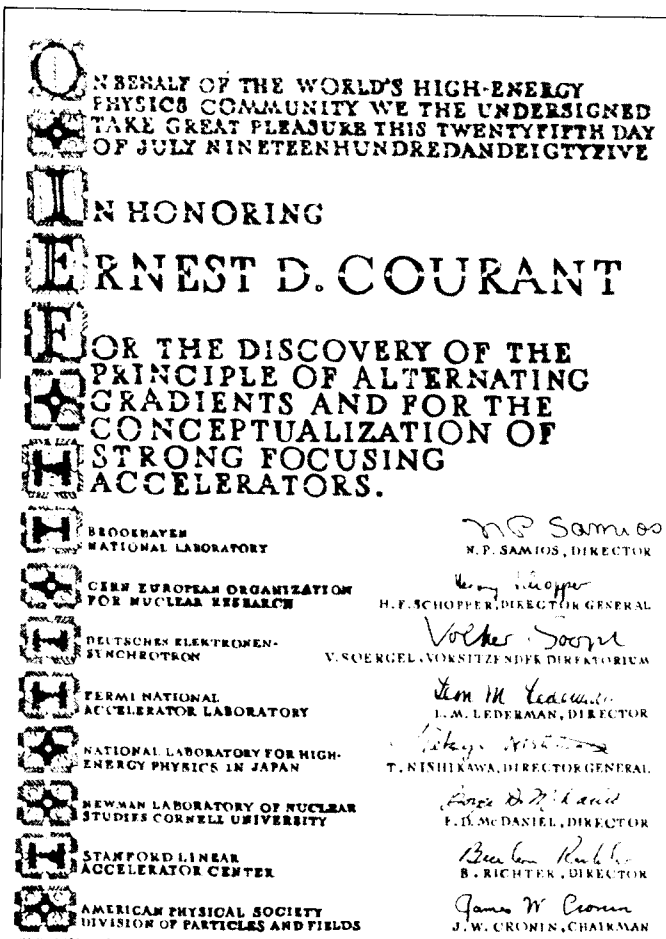
(Continued on page 2)

News Flash!

The design energy of 2.5 billion electron volts (GeV) was achieved for the first time in the x-ray ring at the National Synchrotron Light Source (NSLS) at 6 p.m. on Monday, August 19. By 3 a.m. Wednesday, August 21, the x-ray ring exceeded its design energy by operating at 2.52 GeV at a current of 110 milliamperes (mA) and a lifetime of four hours.

The achievement of design energy was made possible by modifying the x-ray dipole power supply, which runs the bending magnets in the x-ray ring. Physicist Richard Heese directed the modification effort and was assisted by Project Engineer Rolf Olsen, Senior Research Engineer John Keane and the Radio Frequency Group of the NSLS. The NSLS operators who brought the machine to 2.5 GeV are Alfonso Borrelli and Richard Murgatroyd, and those who reached 110 mA at 2.52 GeV are Iaan Fabien and George Jahnes.

"The achievement of 2.5 GeV is an important milestone for the NSLS," says Michael Knotek, NSLS Department chairman. "It means that the x-ray machine's lattice is performing at design specifications. The added features of greater than 100 mA current, four-hour lifetime and design emittance further show the outstanding job this machine team has done. This is the product of a great deal of work and dedication, and a lot of credit is owed to them."


ON BEHALF OF THE WORLD'S HIGH-ENERGY PHYSICS COMMUNITY WE THE UNDERSIGNED TAKE GREAT PLEASURE THIS TWENTYFIFTH DAY OF JULY NINETEENHUNDREDANDEIGTYFIVE

IN HONORING

ERNEST D. COURANT

FOR THE DISCOVERY OF THE PRINCIPLE OF ALTERNATING GRADIENTS AND FOR THE CONCEPTUALIZATION OF STRONG FOCUSING ACCELERATORS.

BROOKHAVEN NATIONAL LABORATORY — N.P. SAMIOS, DIRECTOR
CERN EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH — H.F. SCHOPPER, DIRECTOR GENERAL
DEUTSCHES ELEKTRONEN-SYNCHROTRON — V. SOERGEL, VORSITZENDER DIREKTORIUM
FERMI NATIONAL ACCELERATOR LABORATORY — L.M. LEDERMAN, DIRECTOR
NATIONAL LABORATORY FOR HIGH-ENERGY PHYSICS IN JAPAN — T. NISHIKAWA, DIRECTOR GENERAL
NEWMAN LABORATORY OF NUCLEAR STUDIES CORNELL UNIVERSITY — E.D. McDANIEL, DIRECTOR
STANFORD LINEAR ACCELERATOR CENTER — B. RICHTER, DIRECTOR
AMERICAN PHYSICAL SOCIETY DIVISION OF PARTICLES AND FIELDS — J.W. CRONIN, CHAIRMAN

PRESENTED AT THE U.S. SUMMER SCHOOL ON HIGH-ENERGY PARTICLE ACCELERATORS STANFORD LINEAR ACCELERATOR CENTER, PALO ALTO, CALIFORNIA JULY 15-26, 1985.

Courant Honored For Strong Focusing Principle

Late last month at the 1985 U.S. Summer School on Particle Accelerators, an afternoon was devoted to a discussion of "Strong Focusing Discovery and Impact." In the evening, at the conclusion of the History Symposium, awards were presented for outstanding accomplishments in accelerator physics.

Ernest Courant

Ernest Courant, Sr. Scientific Advisor, High Energy Facilities, was one of the five so honored. He and Stanley Livingston were cited for "the discovery of the principle of alternating gradients and for the conceptualization of strong focusing accelerators." Robert Wilson was honored for building the first strong focusing synchrotron. They each received a metal sculpture and a parchment scroll signed by the directors of all the high energy physics facilities in the Western world. Helen Edwards (Fermilab) and John Madey (Stanford) received prizes for achievement in accelerator physics and technology.

Over 300 students and lecturers attended the Summer School, this year held at the Stanford Linear Accelerator Center. As well as accelerator physics courses, there were lectures on the nuclear physics program, the light source program, the U.S. program for intense particle beams and high energy physics. In 1986, Brookhaven will once again host the summer school. It first did so in 1983.

Speaking Out

Reporter: Marsha Belford
Photographer: Peter Horton

This is the third year that a Farmer's Market has been set up for BNL employees every Wednesday in the parking lot on Brookhaven Avenue opposite the Cafeteria. From 11:30 a.m. to 1:30 p.m. from June through the end of October, local farmers sell homegrown and home made food. We asked BNL employees what and why they buy at the Farmer's Market.

Fern Coyle (Physics) - I came with my sister last week, so this is my second time shopping here. I always had some place else to be at lunch, so by the time I would think about it, lunch would be over and that was it. I came back because I like the vegetables, and I will become a regular customer.

Jerry Cadwell (DNE) - I've only been here twice. I just don't think of it, and I can't keep track of the days. If there were more choice, I would remember to come more often. Last time I was here I got some raspberries, and now I'm getting some peaches.

Frances Scesny (Personnel) - I come to the Farmer's Market every week to buy a pie because they are fresh, delicious and fattening. I usually buy whatever is in season — blueberry, apple, etc. I do think that everything here is super quality.

Howard Bell (Supply & Materiel) - I buy yellow squash, corn, potatoes and beans here because I know they are good. I have a recipe from my greatgrandmother for the yellow squash, but I can't tell you what it is because it is kept in the family. The squash is fried with onions and quite a few other ingredients, and yellow squash is the best squash to use.

Seyavash Karimian (DNE) - I always buy honey because I can't find honey this good anywhere else. At the end of the season, I buy enough to last the rest of the year. Last week, I got a full, beautiful ivy for $6 that anywhere else would be a $15 plant. You trust the products here because they have grown everything themselves. I like to support independent Long Island farmers.

Peter Cameron (Physics) - I just bought some peppers, and I will eat stuffed peppers with rice tonight. I eat vegetarian foods because they are low on the food chain, because vegetables put less pollution in my body and for other personal and philosophic reasons. I don't see any lettuce, carrots, etc. It would be good if more farmers would come to sell their produce.

Ralph Fullwood (DNE) - Shopping here is convenient — I just walk over at lunch. Today I purchased corn and peaches. We'll boil the corn for supper and probably make jelly out of the peaches. Generally, the produce is good quality, it tends to be quite fresh, and it is probably a bit better than at the supermarket.

Maria Humphrey (Medical) - I usually buy the pies, vegetables and fruit. Raspberries and peaches — they are good just by themselves or in a pie. Everyone in the Clinic likes the chocolate chip cookies — whoever goes out at lunch on Wednesdays buys some for the others.

Joyce Austen (DAS) - Usually I buy vegetables, but occasionally, like today, I buy some flowers. They are for me — I treated myself. I come here almost every week and do the majority of my vegetable shopping, as I have since the Farmer's Market has been at the Lab.

Leroy James (Physics) - This is the first time I have come over this way, and I found it very convenient to buy things that I like — lots of fruits and vegetables. They have a nice selection, and it is definitely better than the supermarket. At the Farmer's Market, you know that it just came out of the field.

Reports Available

The following reports are now available to the Laboratory staff and to affiliates of the DOE, AUI and NRC. Others may purchase the reports from the National Technical Information Service, U.S. Dept. of Commerce, 5285 Port Royal Rd., Springfield, VA 22161. Staff members should call Ext. 5068.

NUREG/CR-3444
BNL-NUREG-51699
Vol. 2
The Impact of LWR Decontaminations on Solidification, Waste Disposal and Associated Occupational Exposure. Annual Report Fiscal Year 1984. M.S. Davis, et al.

NUREG/CR-3469
BNL-NUREG-51708
Vol. 2
Occupational Dose Reduction at Nuclear Power Plants. Annotated Bibliography of Selected Readings in Radiation Protection and ALARA. J.W. Baum, C. Weilandics.

NUREG/CR-4093
BNL-NUREG-51848
Safety/Safeguards Interactions During Safety-Related Emergencies at Nuclear Power Reactor Facilities., D.A. Moul, et al.

BNL-51860
Case Study of The Brookhaven House. R.F. Jones, et al.

BNL-51863
Semiannual Report for the Period 1 Apr. 1984 - 30 Sept. 1984.
1) Superconducting Power Transmission System Development
2) Cable Insulation Development. E.B. Forsyth.

BNL-51865
Chemical/Hydrogen Energy Systems. Annual Report Jan 1, 1984 - Dec. 31, 1984. A. Mezzina, et al.

BNL-51866
An Economic Analysis of a Volume Reduction/Polyethylene Solidification System for Low-Level Radioactive Wastes. P.D. Kalb, P. Colombo.

BNL-51867
Polyethylene Solidification of Low-Level Wastes. Topical Report. P.D. Kalb, P. Colombo.

NUREG/CR-4201
BNL-NUREG-51869
Thermal Stability Testing of Low-Level Waste Forms. P.L. Piciulo, S.F. Chan.

Marcus

(Continued)

bility that energy is going to accumulate in bonds within a molecule and about the breakup of these bonds. Underlying this treatment is the assumption that energy moves freely through the molecule, that it doesn't remain in one group of bonds or another.

"But there may be situations in which the energy doesn't circulate around the molecule, so a non-statistical approach is called for," says Marcus, "And Vicente Lopez, my Spanish collaborator, and I have been making calculations on whether a heavy atom in a molecule can slow down the circulation of energy."

For his next lecture, on Tuesday, August 27, Marcus will talk about "Electron Transfer Reactions: Theory and Experiment." Says Marcus. "They are a very common type of reaction, and photosynthesis provides several examples."

In his electron transfer theory, Marcus derived expressions for how and why an electron is transferred from one molecule to another. "I found a way of calculating what the probability is of getting the necessary changes in atomic bond lengths and in the orientations of solvent molecules that would permit an electron to jump from one molecule to another."

Marcus credits Senior Chemist Norman Sutin, Chemistry, with being "the central person with whom I have interacted to experimentally verify the theoretical electron transfer expressions. Our collaboration over the years has been very stimulating and delightful."

Regarding his final lecture on Thursday, August 29, says Marcus, "I have never spoken on the 'Effect of Slow Solvent Dynamics on Electron Transfer Rates.' Hitoshi Sumi, a collaborator from Japan, and I have just submitted it for publication." The papers and the lecture deal with a newly observed phenomenon: Some chemical reactions are intrinsically rapid and now can be measured in picoseconds; therefore, it can now be seen that the slow motion of the solvent is a factor in controlling their rate. — Marsha Belford

NYC Train Trip

The Hospitality Committee is planning a group railroad trip to New York City on Wednesday, September 4. Departure will be at 7:55 a.m. from the Patchogue LIRR station. Round-trip fare for adults is $5.00; children under five years ride free.

Reserve a ticket by sending your fare through the U.S. mail to BNL, P.O. Box 322, Upton, New York 11973. Please do not send cash. Checks or money orders, payable to BNL, must be received by Thursday, August 29. Put the date of the trip, your BNL life number and your phone number on the back of your check or money order. Your tickets will be given to you at the railroad station on the day of the trip. Refunds will be made only if cancellations are received by the Monday morning preceding the trip.

In Memoriam

Dorothy Berg, Sr. Photography & Graphic Arts Specialist, died on August 19. She was 63 years old. Berg came to the Lab first in 1947 and stayed until 1962. She returned in December 1969. She is survived by her husband, Walter; a son, Glenn; and her father, Gustav Wessel, Medford. She was a resident of Blue Point.

Safety Glasses

The on-site optician, John Seffert, will be on vacation the week of August 26; normal operations will resume September 4.

Science Quiz

Going Public

1. Medical officer of the Food and Drug Administration Frances Kelsey was the recipient of the President's Award for Distinguished Civilian Service in 1962 for **a)** seeing that cigarette packages bore warnings about the dangers of smoking **b)** refusing to approve commercial distribution of thalidomide in the U.S. **c)** warning against the carcinogenic nature of certain hair dyes **d)** triggering nationwide interest in jogging by warning that Americans were overweight and prone to heart attacks.

2. The position of science advisor to the president was eliminated by President **a)** Kennedy **b)** Johnson **c)** Nixon **d)** Carter.

3. The director of the Manhattan Project, which produced the first atomic bomb, was **a)** Judge Irving Kaufman **b)** Professor Henry Smyth **c)** General Leslie Groves **d)** Harvard President James B. Conant.

4. The scientific director of the Manhattan Project was **a)** Enrico Fermi **b)** J. Robert Oppenheimer **c)** Edward Teller **d)** Stanislaw Ulam.

5. A British writer who has written books on the relationship between science and government is **a)** C.P. Snow **b)** E.B. White **c)** the Earl of Snowden **d)** Desmond Morris.

6. A government agency which makes decisions on expenditures for science bears the initials **a)** ABM **b)** IBM **c)** OMB **d)** CBS.

7. The number of physicians per 1,000 population in the U.S. today in *roughly* **a)** .05 **b)** 1.5 **c)** 5 **d)** 10.

(Answers next week.)

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BROOKHAVEN BULLETIN

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Cafeteria Menu

Week Ending August 30

Monday, August 26

Beef barley soup	(cup)	.65
	(bowl)	.85
Breaded chicken breast & 1 veg.		2.35
Braized beef liver & onions w/ 1 veg.		2.20
Hot Deli: Baked ham	(bread)	2.10
	(roll)	2.30

Tuesday, August 27

Chicken rice soup	(cup)	.65
	(bowl)	.85
Beef & broccoli stir fry & 1 veg.		2.35
Chili releno casserole & 1 veg.		2.20
Hot Deli: Grilled Reuben		2.15

Wednesday, August 28

Garden vegetable soup	(cup)	.65
	(bowl)	.85
Swiss steak & 1 veg.		2.40
Turkey chow mein on rice		2.25
Hot Deli: Italian sausage hero		2.30

Thursday, August 29

Split pea soup	(cup)	.65
	(bowl)	.85
Breaded pork chop w/cauliflower au gratin		2.30
Beef stroganoff on egg noodles		2.35
Deli Special: Cold submarine — made to order		2.75

Friday, August 30

Fish chowder	(cup)	.65
	(bowl)	.85
Baked lasagne & 1 veg. w/garlic bread		2.30
Ham & noodle au gratin & 1 veg.		2.20
Hot Deli: Breaded fish fillet	(bread)	2.10
	(roll)	2.30

BERA News

Swim Club

Toshi Sugama, DAS, placed sixth in his age category and ninth out of 75 swimmers in the 50-meter breaststroke at the Empire State Games swim meet in Buffalo on Sunday, August 11. His time was 38.02 seconds, 3.27 seconds down from the winner.

To register for the 1986 U.S. Masters Swimming season, which runs from October through September 1986, contact Marsha Belford, Ext. 3327.

Softball

League I

Games of August 6
Cool 'N Gang 20 - Scram 7
Ravens 9 - Moles 4
Phoubars 19 - Six Pax 13

Games of August 13
Blue Jays 10 - Six Pax 4
Moles 21 - Cool 'N Gang 10

League II

Games of August 7
AMD 20 - Magnuts 11
Dirty Sox 11 - Faze II 3
Medical 6 - Lights Out 5

Games of August 14
Lights Out 11 - Random Errors 10

League III

Games of August 5
Farm Team 9 - No Names 7

Games of August 12
Survivors 11 - NADS 6

League IV

Games of August 5
Septembers 17 - Who Cares 10
Mole-Esters 13 - Turkeys 5

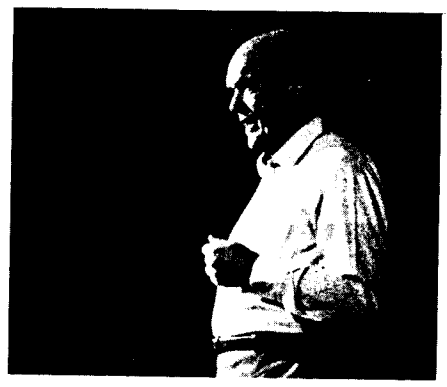
Games of August 12
Septembers 18 - Kidz-R-Us 6
Mole-Esters 27 - Farmbusters 1
Who Cares 12 - Turkeys 10

League V

Games of August 5
Foul-Ups 13 - Mudville Sluggers 11
No Feedback 23 - Simply Awesome 7

Games of August 12
No Feedback 25 - Space Kadets 9

Makeup of June 27 Game
Foul-Ups 7 - Mudville Sluggers 6



Bill Love sings comedy songs in last year's Vaudeville Show.

Music Hall Tonight

The Eighth Annual production of Vaudeville opens tonight. Skits, patter, song and dance are sure to delight and amuse the entire family. So gather up the young'uns and come down on either Friday or Saturday night at 8 p.m. to Berkner Hall. Admission is $3 for adults and $2 for senior citizens and students. Refreshments will be available and you can relax in air-conditioned comfort.

Arrivals & Departures

Arrivals

R. Morris Bullock ..... Chemistry
Joseph W. Carini ..... Plant Eng.
Ramiro R. Debbe ..... Physics
Erik D. Johnson ..... NSLS
Nancy M. Lazarz ..... NSLS
Oscar K. Mirjah ..... Plant Eng.
Edward A. Sierra ..... Reactor
Fred J. Stellabotte ..... MIS

Departures

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

Barbara H. Fleck ..... DAS
Thomas W. Mooney ..... AGS
Tracy T. North ..... Reactor
Steinar Raaen ..... Physics
Bernard D. Silverstein ..... S&EP

Come Dance With Pat

When it comes to aerobic dance, Pat Campbell has a lot to be proud of. And the BERA Aerobic Dance Club (ADC) is glad to announce that Pat Campbell will be the instructor for aerobic dance and stretch classes this fall.

Campbell has turned a hobby into a very successful avocation. She began taking aerobic dance classes about six years ago. With the dance background she has from a long association with the Long Island Dance Program, Campbell felt that more choreography might be what the classes she had attended lacked.

After she had worked up a few routines, Campbell approached the Patchogue-Medford (P-M) School District, where she was already teaching art, about starting an aerobics program.

Art's loss was aerobic's gain. Her program, initiated in 1980, was an immediate success and today involves more than 100 participants each semester. "I'm rather proud of that," says Campbell.

Obviously, this leaves no time for Campbell to teach art at P-M, but she does have time — between her job at the Long Island Library System and her evening adult education commitments — to lead classes at BNL.

For these classes, Campbell will offer the same basic formula that has proved so successful at P-M. Of her style of choreographed aerobics, Campbell says, "You can pick it up rather easily, but I think it's more fun than free-style aerobics." Though her classes are fun, Campbell gives a good workout in both aerobics and stretch, but in such a way that each participant can set her or his own pace. And they can do it with the confidence that safety is Campbell's main concern. She is also certified in CPR.

As in the past, the ADC will sponsor classes in stretch on Wednesdays and in aerobic dance on Tuesdays and Thursdays. Those signing up for aerobic dance are encouraged to take it both afternoons, or one class of aerobics and one of stretch.

Classes will run from 5:15 to 6:15 p.m., and each ten-week session (T, W or Th) will cost $30. Payment is due at registration, which will be held in the North Room of the Brookhaven Center on Wednesday, September 18, for stretch classes, and in the Recreation Hall on Thursday, September 19, for aerobic dance. A full class will follow each registration.

For more information about the fall program, call ADC President Anita Cohen, Ext. 5054; Vice President Bill Leonhardt, Ext. 2378; or Secretary-Treasurer Lisa Tranquada, Ext. 7731.

Alex Reben

Pat Campbell

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 Employment Manager, Ext. 2882.

SCIENTIFIC POSITIONS OPEN: The following staff positions are open. Candidates may apply directly to the department representative named, or through the Office of Scientific Personnel, Ext. 3338.

1) Scientist experienced in analytical or experimental spectroscopy and chromatography, to join program aimed at developing specific molecular property detectors for chromatography using the NSLS and other unique BNL facilities, and 2) Scientist experienced in high resolution gas chromatography, to further advance the BNL capability in gaseous conservative perfluorocarbon tracer (PFT) analyses. Contact: L. Newman, Head, Environmental Chemistry Division, Department of Applied Science.

LABORATORY RECRUITMENT - Opportunities for Laboratory employees only.

2308. BUDGET OFFICER - Reports to the Assistant Director for Financial Management. Will perform management assignments of a broad, general nature. Is responsible for the development of budgetary plans for internal Laboratory control, and preparation of total Laboratory budget and supporting data for annual submission to the Department of Energy and the Nuclear Regulatory Commission. Requires significant experience in the budgetary and fiscal management of a large organization, including demonstrated innovative and leadership qualities. Substantial experience in the techniques of budgeting processes, computer applications, and internal financial planning is necessary. Requires a bachelor's/master's degree in business administration or equivalent and excellent analytical and communications skills. Director's Office. Please submit resume to Robert D'Angio, Personnel Division, Building 185.

2309. ADMINISTRATIVE POSITION - Requires knowledge of the Laboratory's procurement procedures. Two to three years' related Laboratory administrative experience and familiarity with IBM-PC and/or Hewlett-Packard hardware are desirable. Requires excellent communication skills to provide effective interface with Department staff and others. Department of Applied Science.

OPEN RECRUITMENT - Opportunitites for Laboratory employees and outside applicants.

2310. EXPERIMENTAL MACHINIST (2 positions) - Requires a minimum of five years' prototype machining experience in all-around machining, proficiency in job print interpretation, layout and machine set-up. Demonstrated ability and imagination in all phases of machine work is essential. Central Shops Division.

2311. CNC/NC OPERATORS (3 positions) - Requires a minimum of three years' prototype machine experience on CNC milling equipment. Will be required to complete setups under the guidance of a group leader and input data manually on menu driven type controls. Should also have the capability to select and install tooling as required. Central Shops Division.

Autos & Auto Supplies

75 DODGE - excel. cond. in & out, $1,200 or best offer. 924-0960.

81 AMC EAGLE - p/s, p/b, a/c, 6 cyl., stereo, new clutch, 4 WD, clean in & out, runs great, $5,000 firm. Rose, 744-5069.

FAIRING - Quicksilver, full fairing, compl. with mounting hardware, new. Frank, Ext. 3120.

FORD TRACTOR 3400 - 3 cyl., diesel, 8 spd., 3-point hitch, $3,500. 363-6417 after 6 p.m.

72 FORD WINDOW VAN - V8, a/t, $400; 78 Suzuki GS1000E, 23K mi., $1,000. Ext. 4027 or 286-1121.

83 HONDA GOLDWING ASPENCADE - new in March, radar detector, many extras, $5,200. Laurence, 924-8686 or 744-5079.

76 PINTO WAGON - 70K mi., new tires, very good cond., $850. Frieder, Ext. 3723 or 3181.

78 CHRYSLER CORDOBA - a/c, am/fm, like new. 563-2847.

63 CHEVY BELAIR - 90K mi., 3 spd., 2 dr., good cond., needs work but still runs, $400. Mark, 286-4150 or John, 286-1348.

80 RENAULT LECAR - very good cond., 47K mi., $1,600. Jerry, Ext. 5506 or 732-4701.

74 AMC GREMLIN - a/t, p/s, p/b, am/fm cassette stereo, new tires, runs excel., $600, neg. Eileen or Paul, 286-2517.

73 MGB - good body, excel. eng., many new parts, $2,000. Donna, Ext. 3932 or 286-3538.

(Continued on page 4)

Autos & Auto Supplies (Cont'd)

78 FORD FIESTA - runs great, good cond., $1,200. 689-7161

TIRES - (4) radials, w/w, (2) reg., (2) snows, LR78x15, good cond., $75. Willie, Ext. 2333 or 732-3002

78 FORD GRANADA - orig. owner, 81k mi., p/s, am/fm, a/t, very good running cond., $1,100. Ext. 5165 or 475-1569.

73 PLYMOUTH SATELLITE WAGON - 318 V8, a/t, p/s, p/b, Class III hitch, needs timing chain, make offer. Bob, Ext. 4824/4561 or 744-5098.

78 HONDA MOTORCYCLE - CB550K, black, extras, mint cond., $750. Ext. 7654.

83 COLEMAN POP-UP CAMPER - Shenandoah, sleeps 7, awning, screen room, garaged, showroom cond., extras, $3,200. 878-4002.

63 CHRYSLER - hardtop, good cond., runs well, $375. H. Sauter, Ext. 3783.

77 VW RABBIT - very good cond., no rust, $1,200. Harvey, Ext. 3758 or 821-1726.

75 CHRYSLER STATION WAGON - must sell, $700. Ext. 3125 or 2442.

80 CHEVETTE - 4 spd., 77,300 mi., excel. cond., many new parts, $1,500. Ext. 4345 or 744-7642 after 6 p.m.

74 TOYOTA PICKUP - runs well, $500. 928-8623.

TIRES - (2) belted snows, F78x14, mounted on Chrysler rims, like new, $50; (1) B78x15, mounted on GM rim, $10. 698-5489.

78 OLDS 88 - a/t, a/c, p/s, p/b, new tires, batt., excel. cond., $2,800. Ext. 4169 or 981-5696.

76 MALIBU STATION WAGON - 8 seater, excel. eng., new brakes, starter, more, 130k mi., very reliable, $700. Ext. 2830 or 543-0487 eves.

72 YAMAHA - 250cc, $175. Roy, Ext. 4664 or (212)691-4396.

66 MUSTANG - convert., 6 cyl., a/t, $2,500. 589-5490.

72 VOLVO 145-S WAGON - good running cond., needs some body work, am/fm tape, $950. Ext. 2008 or 928-5875 after 6 p.m.

73 TORONADO - excel. cond., must see. Ext. 4985.

74 TOYOTA COROLLA - Deluxe, 2 dr. sedan, with '78 engine, new exhaust system. Al Campbell, Ext. 2043.

80 CITATION - 4 dr., hatchback, a/t, a/c, 6 cyl., new tires, 41k mi., excel., $2,700. Terry, 473-8426.

RIMS - Ford, (2), 15", mounted H78x15 tires, $8 ea. Mike, Ext. 2705.

83 HONDA 650 - Nighthawk, low mi., mint, must see, $2,250 neg. Bob, Ext. 3145.

73 PINTO - 4 spd., 51k mi., mech. perfect, $750 firm. Jack, 399-3899 after 5:30 p.m.

80 RENAULT LECAR - very good cond., 47k mi., $1,600. Jerry, Ext. 5506 or 732-4701.

81 SUZUKI GS650G - 4 cyl., shaft drive, triple disc, mags, 3,300 mi., saddle bags, stored 2 yrs., mint, $1,250; 81 Ford van E150, 138 WB, 6 cyl., 4 spd. o/d, fully insulated, western bullet mags with oversize radials, $4,700.

Bob, 924-5511.

71 VW BUG - golden oldie, still running, $200 firm. Ext. 3670 or 744-1760 eves.

72 PINTO WAGON - good second car, some body rust, $200. 475-3598.

74 VW BEETLE - 4 spd., good cond, orange, $850 neg. Al, Ext. 3404 or 744-9866.

73 FORD PINTO - new muffler, good batt. & tires, body & engine need some work, best offer. Ext. 3705/3537 or 862-7998.

76 PINTO WAGON - 70k mi., new tires, very good cond., $850. Ext. 3723 or 3181.

79 HONDA ACCORD LX - p/s, new p/b, a/c, am/fm stereo/cassette, excel. running cond., $3,100. 567-8618 after 6 p.m.

77 CHRYSLER CORDOBA - V8, full power, sunroof, needs tires, high mi., $1,000. 928-5065 after 6 p.m.

ENGINE CRANE - 3/4 ton cap, 4" steel wheels, extending boom, $250. 289-0413.

RIMS - (4), white spoke, 8x15, chrome nuts, hub covers, no rust, 5-hole. Bob, 467-4222.

83 MUSTANG GT - 5 liter, 5 spd., 13k mi., alarms, Alpine stereo, sunroof, louvres, new cond., $8,700. 326-2632.

81 DATSUN 200 SX - 5 spd., am/fm, 79k mi., good mech. cond., orig. owner. Cosmore, Ext. 2253.

74 PONTIAC LEMANS - 350, a/c, p/s, p/b, low mi., good cond., $900. 928-0687.

68 CHEVELLE SS - 396, 68k mi., collectible, new brakes & ignition. Henry, Ext. 4547 or 924-6688.

73 VW BEETLE - 4 spd., runs but needs work. 281-8458 eves & weekends.

80 CITATION - 4 dr., excel. cond., 6 cyl., a/t, p/s, p/b, 56k mi., $3,000 or best offer. Ext. 4425 or 751-6781.

79 FORD MUSTANG - hatchback, 4 spd., new brakes, runs well, $1,500. 744-2097 after 5:30 p.m.

78 CAMARO - V6, a/c, a/t, p/s, p/b, c/c, high mi., extras, $3,000 firm. Karen, 751-6418 leave message.

61 CJ5 JEEP - V6, rebuilt trans. and transfer case, new exhaust, top, $1,500. Bill S., Ext. 4434 or 399-6168.

72 TRAILER - sleeps 6, Tandem wheel, nice shape, $2,000; 1973 Pontiac, good transp., body good, high mi., $600. 588-1464.

TIRE - 14", with rim, good for spare. $20. Janet, Ext. 2345 or 929-8152.

73 OLDSMOBILE CUTLASS - Supreme, good trans. and 350 eng., take parts or whole. Scott Ryan, Ext. 2669 or 473-5965.

85 FORD F250 PICKUP - heavy duty, extras, mint cond., 1,500 mi. Mike, 281-0001.

70 CHEVY CHEVELLE - runs, needs new tires, could use body work, $400. Pat, 732-6266.

82 PLYMOUTH RELIANT - 4 cyl., 4 spd., white ext., red int., low mi., excel. cond., $3,895. Artie, Ext. 2674 or 325-0743 after 5 p.m.

Boats & Marine Supplies

25' CHRIS CRAFT - 10' beam, new eng., water jackets, many new extras, $7,000. 234-7225.

21' CONCORD MACH II - 1981, Designer ed., checkmate style, 200 HP Mercury, ss prop., shoreline EZ roller, mint, $8,700. Bob, 924-5511.

16' WINNER - 1971, fiberglass, 50 HP, trailer, $900. Ext. 4846 or 363-6940 after 5 p.m.

9' SAILBOAT - fiberglass, alum. mast & boom, nylon sail, seats 2-3, car topper, very good cond., $350; 16' Runabout, alum., 1978 25 HP elec. start Chrysler, new Dilly trailer, extras, $1,000. Bill S., Ext. 3848 or 281-6498.

26' CHRIS CRAFT - wood, twin screw eng., 215 HP Mercury cruiser, inboard, good cond. 878-0992.

17' GLASSMASTER - 1982, 115 Mercury, shoreline, galv. trailer, power winch, ss prop., CB radio, mint, $6,700. Ext. 3341.

22' CATALINA - 1982, sloop, 7.5 HP Honda, excel. cond., many extras. 589-5490.

16' MFG - 1972, tri-hull, full canvas, 1979 Mercury 50 HP motor with elec. start, 1983 Cox galv. trailer, extras, $2,800. 281-8458 eves & weekends.

27' O'DAY - 1977, Atomic 4, 4 sails, VHF, knotmeter, fathometer, $21,000. Bob Drew, Ext. 3575 or 689-9089.

Free

SNOW TIRE - LP800x14. 698-5489 after 6 p.m.

LAWN TRACTOR - 8 HP, you pick up. 928-8623.

Miscellaneous

STEREO - Zenith, portable, record player, works well. Walt, Ext. 7154.

STEREO - Clarion, 4 channel w/8-track, Garrard turntable, (4) speakers, make offer. Ext. 7112 or 472-1922.

POOL PUMP - elec. motor, 1/2 HP, portable stand, $35. Ext. 4240 or 286-0295.

AIR CONDITIONER - for window, $80; fan, $15. Ext. 4897 or 4940.

SIAMESE CATS - breeding pair, blue female, seal male point, both $100. Ramona, 928-3088.

BED - queen size mattress, box-spring, metal frame, excel. cond., $120; hair dryer, salon style, $20. Ext. 3370.

WORK TABLE - shop or hobby, peg board, $45; child's school desk with bench, $25; Brauns fruit-veg. juice extractor, new cond., $35. 751-0345.

OAK DESK - $200; oak table, $75; bookcases, $20 & $30; single bed, $150; B&W TV, $25; chest of drawers, $20; washing mach., $100; toaster oven, $10; lawn mower, $25. 751-6048.

COFFEE TABLE - side table, walnut glass tops, storage in both, $100. 588-7989 after 5 p.m.

UMBRELLA - 8-½ ft., 12 ribs, yellow, for round patio table, $50. Ext. 3392 or 475-8330.

COLOR TV - GE, 13", good cond., $120; Atari 2600 VCS, with 6 games, $50. Ext. 3369 days or 3177 eves & weekends.

BOX SPRINGS - fits twin beds, like new, $40 ea.; garden sprayer, used only once, $20. Ext. 3370.

PUMP - and glass lined tank, 2 yrs. old, ¾ HP, for deep well, price neg. Ext. 5139.

BELLEEK CHINA - porcelain, (3) small items, all or separate, best offer. Ext. 2816.

TYPEWRITER - elec., Brother EP44 digital, memories, 1 yr. old, $200. Ext. 4345 or 744-7642 after 6 p.m.

WOOD STOVE - Danish, $350. 928-8623.

GRAND PIANO - 6 ft., Yamaha, satin walnut. 282-5879 eves & weekends.

GE DRYER - heavy duty, large capacity, like new, $100. Bob, Ext. 3145.

WASHING MACHINE - Whirlpool, excel. cond., $195; Colonial dining room chandelier, $125; student size 120-Bass Accordion, $150. Jim, 265-8551.

WINDOW AIR CONDITIONER - $80; fan, $15. Ext. 4897 or 4940.

GIRL'S BICYCLE - 16", $5; desk, $15; wood desk, $15; (2) bean bags, $3 ea.; Scott spreader, $7; baby training chair, $5; baby bath tub, $2; (2) baby strollers, $10; floor lamp, $10. 698-5489 after 6 p.m.

DINING ROOM SET - Burlington, all oak, large table, (6) chairs, china closet, mint; sofa bed and other furniture. Ext. 2438 or 698-8958.

STORAGE BINS - industrial type, 200 bins on heavy frame, 30"x48", $75. Tony, Ext. 7772.

CAR SEATS - $8 & $15; high chair, $10; buggy, $25; vacuum cleaner, $40. Ext. 3175.

B&W TV - GE, 12", $65; Fisher skis, Marker bindings, poles, $60; Rieker boots, woman's size 8-9, $50. M. Hardy, Ext. 3389.

PERAMBULATOR - good cond., $5; strong food processor, 450 W, keeps 6 pds., flour mill, shredder. Monika, Ext. 3117.

RADIAL SAW COMBINATION - with leg set, brand new in box, 10", reasonable offer. 924-6582.

DEHUMIDIFIER - ladders; misc. furniture and small appliances. 744-9832.

TAPES - 8 track, approx. 30, make offer. Ext. 7772.

BEDROOM SET - dark pine, Colonial, full/queen headboard, dresser, mirror with shelves, chest on chest, 2 night tables, excel. cond., $800 neg. Karen, 325-1024.

MEN'S BIKES - (2), 27", 10 spd., $45 ea. Artie, Ext. 2674 or 325-0743 after 5 p.m.

DROP-IN RANGE - self-cleaning, Sears, $50; wet/dry shop vacuum, $15. Ext. 4166.

SKIS - poles & boots; pine lazy Susan; syphon; elec. drill, saw, hand drill; 78 rpm opera records; small rattan stool. Ext. 3482.

FILE DRAWERS - green metal, for 3x5 cards, 16"; for 5x8 cards, double, 16"; for standard folders, 2-drawer unit. Ext. 3731.

CHESS GAME - solid state, voice sensory with instruct. Sal, Ext. 2460 or 744-9822.

BLAZER - youth's, blue, size 20, worn twice, $15. Ext. 2543.

WATER PUMP - shallow well, $10. Mike, Ext. 2705.

BASEBALL CLEATS - new worn, size 9, $8. Ext. 2543.

CANON A-1 CAMERA - 35mm, with 1.8 50mm & 300mm zoom lens, Slik U-112 tripod, camera bag, mint, $200. Bob, 924-5511.

LIVING ROOM SET - couch, love seat, chair & ottoman, Colonial, plaid earthtones, $450. Henry, Ext. 4547 or 924-6688.

BICYCLES - (2), 1 Schwinn, $30, other for $10, both suitable for 9-13 yr. olds. Jake, Ext. 4532.

STEREO - Craig, 8-track, fm, $50. 727-0499 after 6 p.m.

CYCLONE FENCE GATE - 4'x3', good cond., $20; modern globe ceiling light with yellow cone, $10. Dan, Ext. 4677.

STEEL BED FRAME - adjustable, $7; steel card file cabinet, $3; super 8mm film editor, $8. F. Green, 281-3686.

WASHER - Whirlpool LHA 7800, excel. cond., $150. Ext. 4106 or 698-8675.

LAWNMOWER - 21", self-propelled, 4 HP, mulcher, excel., $150; 5 piece luggage set, (2) 26", (2) 24", (1) 18", excel., $150. Ext. 3392 or 475-8330.

CHAIRS - (2) matching burnt orange, w/brown flowered cushions, good cond., w/arm covers, $75. Susan, Ext. 4267.

ANTIQUE RADIO - Circa 1900, with earphones, $35; CB antenna with 25 ft. cable, etc., $10. 286-1062.

STEREO/PHONOGRAPH - very good cond., portable, for children under 12, 3 spd., $15. 751-3551.

GAS RANGE - 30", brown, $25. John, Ext. 3675 or 924-3528.

DOUBLE BED MATTRESS - and spring, good cond., $100; desk; triple dresser, teak. Ext. 4349 or 654-1326.

TICKETS - (3), City Opera, Cenerentola, Sept. 28, row A, 4th ring, $16 ea. Dave, Ext. 2694 or 941-9022.

PIANO - upright, Kincaid, with storage bench, 2 yrs. old, never used, cost $1,600 sell for $1,000. 289-0675.

TELESCOPE - 3", equatorial mount, Unitron compact, 4 Televue eye pieces, tripod, cases, etc., perfect cond., new $1,300, sell for $750. 589-3608.

BMX RACING BIKE - Patterson, Araya rims, MX 1,000 brakes, Calif. light, extras, $300. Steve, 744-8087.

GIRL'S BIKE - 20" Pink Panther, $60; Electrolux polisher, $75. Paul, Ext. 4156.

GONDOLA - decorative, w/chandelier, lighted, $5; hibachi, $5. 281-7844.

UPRIGHT FREEZER - 17 cu. ft., excel. cond., $75; Lomart pool filter, for 18 ft. pool, $35. Jim, Ext. 7772.

OMEGA B66 PRO ENLARGER - with 2-¼" and 35mm carriers and lenses, assorted 55mm screw-in filters, 67 mm polarizer. Ext. 2482.

LOVE SEAT - record cabinet; sleeper sofa; drop leaf oak secretary desk. 286-2493.

UPHOLSTERED CLUB CHAIR - gold leaf damask, beautiful material, very good cond., $50. Al, Ext. 2160 or 273-5574.

PIANO - Janssen Greed, good cond., $450. 689-7161.

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

SHOREHAM - 3 bdrm. ranch, playroom, attached util. room, patio, 1 acre, 13 yrs. old, cul-de-sac bordered by woods, taxes $1,300, SWR school district, $138,500. Ext. 7786 or 744-7796.

ROCKY POINT - 4 bdrm. comtemp. ranch, gourmet kit., central a/c, walk to private beach. Ext. 3123 or 821-1039.

RIDGE - Strathmore Ridge Townhouse, 3 bdrms., 1-½ baths, central a/c, 5 appl., private patio, $70,000. Ext. 2816.

ROCKY POINT - Tides No., 4 bdrm. Colonial, f/p in den, full basemenmt, garage, deeded private beach rights, walk to beach, $126,900. 821-9577.

For Rent

SELDEN - studio basement apt., pri. ent., eik, walk to transp. & stores, mature adult, no pets or children, $450 all. 698-8514 after 5 p.m.

MOUNT POCONO - 3 bdrms., 2 baths, f/p, whirlpool bath, min. to major attractions, $250/weekend or $450/week. Rick, Ext. 7611.

E. SETAUKET - efficiency apt., priv. ent., full bath, full kitchen, carpeted, walk to train or SUNY, $400 incl. util. Ext. 4783 or 689-3055.

SHOREHAM - studio apt., water view, use of private beach, suitable for single occup., priv. ent., avail. Sept. 1, $550 incl. all. 744-6461 eves.

NO. SHIRLEY - new 2 rm. apt., furnished, bdrm. w/skylight, kit., w/w, pri. ent., util. incl., 5 min. from Lab, 1 person only, non-smoker, no pets, security, avail. Sept. 15, $425. 281-8044.

CORAM - Strathmore East, 4 bdrm. contemp. ranch, 2 baths, fam. rm., fenced yard, gas heat, 5 appl., $800 plus util., principals only. Carl, Ext. 3791 or 928-7154.

Wanted

LOAN OF COMPUTER - pref. Apple, to help 8 yr. old boy with leukemia keep up with schoolwork. Ext. 5054.

TOYOTA RIMS - (4), 14". Al Campbell, Ext. 2043.

TRUCK RIM - 5 lug, 16"x6", Dodge, old Lab truck type; Pickup truck camper - prefer with over cab section, any cond. considered, reasonable. Bob, Ext. 3145.

HOUSE TO SIT - responsible previous homeowner, refs., any period 9/31-5/31/86. Bob, Ext. 3145.

SMALL REFRIGERATOR - for college student. John, Ext. 2269 or 281-2623.

TENNIS TICKETS - for U.S. Open, Sept. 3. Yako, Ext. 2592.

RECORDS - 45 RPM & some LPs of the 50's and 60's era. Frank, Ext. 3120.

HOUSE TO SIT - going away on vacation or business, I will stay with your house. Ext. 3671 or 736-2131 eves.

ROOM - with bath facilities, for 2-3 weeks beginning Sept. 1, for mature visiting couple. Dave, Ext. 4256.

HOUSE TO RENT - Bellport Vill. or Brookhaven Hamlet. Anne, Ext. 5055 or 286-0919.

LIONEL TRAINS - and accessories. Bruce, 924-4097.

YOGA - forming a group. Carol, Ext. 2907.

BICYCLE - for 4'-6" child, prefer boy's with 24" wheels. Ext. 3388 or 286-3903.

DRIVER - to drive my car one way to California, Aug.-Sept. Ext. 4425 or 751-6781.

BOWLERS - for men's bowling team, Tues. night, Port Jeff. Fred, Ext. 3259 or Rich, Ext. 5175.

CAR - for parts, 1968-70 Ford or Mercury. 727-0082 after 6 p.m.

Classified Ad Policy

Deadline is 4:30 p.m. Friday for publication Friday of the following week.

1. The Brookhaven Bulletin's classified section may be used only by active and retired Laboratory employees.
2. All items for sale or rent must be the advertiser's property.
3. Ads for material acquired for resale in association with a full or part-time business cannot be accepted.
4. Ads for the sale or trade of firearms will not be accepted.
5. Ads not carried because of space restrictions will be held for publication in the next issue.
6. Ads are run only once and must be resubmitted if they are to be repeated. One ad per person per week.
7. **Property for sale or rent cannot be accepted on this form. Special Real Estate Ad Forms are available at the office of the Brookhaven Bulletin, Building 134.**

☐ For Sale: Autos & Auto Supplies ☐ For Sale: Boats & Marine Supplies ☐ For Sale: Miscellaneous ☐ Car Pools ☐ Lost & Found ☐ Wanted ☐ Free ☐ _____

Please print your ad below in 15 words or less using one word per block. Include name and phone number to call.

Note: The following must be completed for your ad to appear.

NAME (Please Print) .....

Employee's Signature ..... Life No. ..... Ext. .....

Send to: Brookhaven Bulletin, Building 134 (Ext. 2345)