BROOKHAVEN BULLETIN
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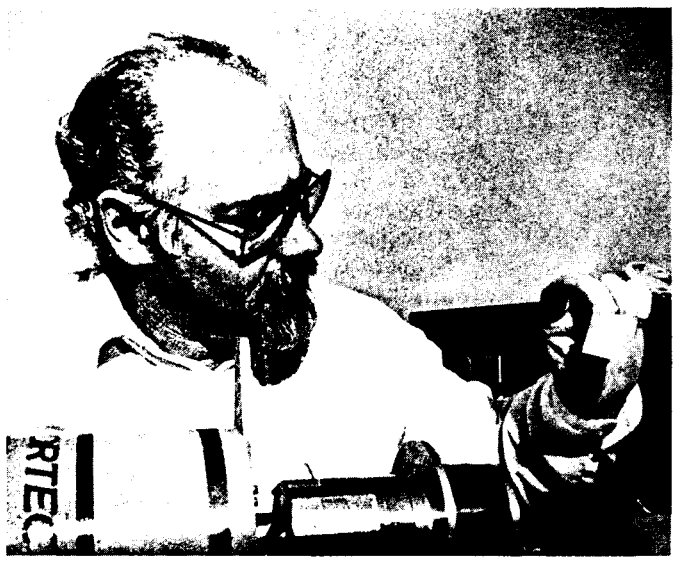
BROOKHAVEN NATIONAL LABORATORY

Phantoms of Medicine



Lucian Wielopolski holds one cube of the jello-like muscle phantom. At the lower right sits the biscuit-like bone phantom, with is used with the silicon-lithium x-ray detector in the foreground.

—photos by Horton

Gerald Bennett adjusts the dynamic cardiac phantom, which is placed under a scintillation camera.

Unlike the Phantom of the Opera, a phantom of BNL is not some discontent employee ghosting around the site looking for revenge for failed experiments. Three medical phantoms recently developed at BNL, in fact, don't look like what you'd expect a ghost to look like.

For years, the Medical Department has used a plastic apparition for whole body counting calibration, which was designed by the Air Force over 25 years ago to resemble a standard American male. However, because of the complexity and diversity of human beings, no single phantom is suitable for every purpose.

Hence, Physicists Lucian Wielopolski and Gerald Bennett, Medical, independently developed new phantoms for different purposes. While the new BNL phantoms simulate certain human tissues and functions, they don't even look human. One looks like jello, another like a dog biscuit, and a third looks like a record player.

Lucian Wielopolski, together with Research Collaborator Marek Maryanski, developed two phantoms, one simulating muscle and another bone tissue, to calibrate systems used for analysis of elements in the human body, such as lead in bone, lithium in the brain and cadmium in the kidney. These phantoms are also suited for use in nuclear medicine and radiation oncology. Instead of using cadavers in the calibration of his system, Wielopolski uses the polyacrylamide phantoms as tissue substitutes.

These phantoms are mixed up when needed according to two different recipes, in which the main ingredient is acrylamide. To simulate the abnormal accumulation of metals in bone and muscle tissues, other ingredients can be added. The bone phantom mixture and the muscle phantom solution are poured into molds to make slabs, cylinders or anthropomorphic shapes if required. After about two hours, polymerization is complete. The phantoms last a couple of months and cost $2.50 per kilogram of muscle tissue and $12.50 per kilogram of bone tissue.

The polyacrylamide phantoms were designed to replicate the effects within and around bone and muscle tissue irradiated with low energy x-rays of between 10-20 KeV energy. "There are many phantoms described in the literature, but none for such low energies," explains Wielopolski. "At these energies, the elemental composition of the phantom is very important because the transport of low energy x-rays is strongly dependent on elemental composition, density and morphology. Since those parameters in the polyacrylamide phantoms are similar to those found in human muscle and bone, the radiation transport should be similar to that of real tissue for different types of radiation, such as gamma or neutrons, over a wide energy range."

Wielopolski found this to be true for x-rays between 20 KeV and 15 MeV using, respectively, radioisotopes and the therapeutic electron linear accelerator in the Radiation Oncology Department at the State University of New York at Stony Brook.

The bone phantom is being used in a study of lead accumulation in the tibia of workers in Cleveland, and Wielopolski, in collaboration with Professor of Pediatrics John Rosen of Albert Einstein College of Medicine-Montefiore Medical Center, is planning to use it in a study of inner-city children of New York.

The standard man phantom, filled with radioisotopes, sits within the whole-body counter in the Medical Department. Measurements of radioactivity levels in the phantom provide data for calibrating the counter and for comparison of data obtained from research patients who have been administered radioisotopes for the diagnosis and treatment of diseases.

While Wielopolski's static bone and muscle phantoms at least resemble the respective tissues when looked at under an electron microscope, Gerald Bennett's dynamic cardiac phantom in no way looks like a human heart. "It looks like a phonograph record on a turntable," says Bennett. "But when a scintillation camera looks at it, it sees activity which varies in time much like the left ventricular in a human heart."

The dynamic cardiac phantom was developed by Bennett to simulate how the left ventricle, one of the four heart chambers, fills with blood during the relaxation phase of the heart called diastole and forces blood out of the heart during systole, the contraction phase. Bennett worked in collaboration with Mark DeSantis, chief nuclear medicine technologist in nuclear cardiology at Long Island Jewish Medical Center.

The cardiac phantom is composed of a rotating disk, like a phonograph record, which sits over a radioactive source contained in a plastic box. The inner and outer bands of the disk are covered with lead. The two bands are notched, so therefore the clear middle band is irregularly shaped. As the middle band rotates over the radioactive source, it reveals a varying amount of radioactivity to a camera positioned above it. The amount of radioactivity revealed to the camera increases and decreases in the same way as the radioactivity in the chambers of a beating human heart infused with a radioisotope changes.

How well the left ventricle functions after a heart attack can be determined by injecting a radioisotope into the blood and measuring the different amount of radioactivity

(Continued on page 2)

Chanana To Head Medical

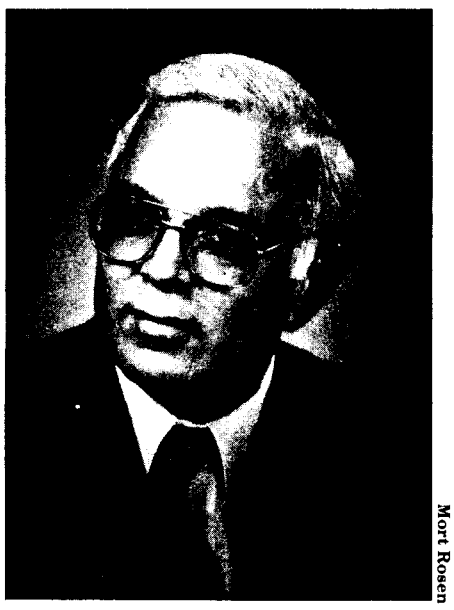
Senior Scientist Arjun Chanana will head the Medical Department, effective April 1. Announcement of his appointment as Chairman was made by Laboratory Director Nicholas Samios in a memo to all employees last week.

A surgeon, Chanana came to Brookhaven from England in 1963 with the intention of returning, after one year, to England and to surgery. He did neither. Initially, the extracorporeal irradiation machines that were only available at Brookhaven, and, later, other research projects, caught and held his attention. As he says, "I got hooked on research."

Educated in India, Chanana received his M.D. from the S.M.S. Medical College at Jaipur and further degrees from the Royal College of Surgeons at Edinburgh and at London. His residencies in surgery were spent at various hospitals in England.

Working with extracorporeal irradiation machines, Chanana's early research was in organ transplantation and leukemia and, he says, "those were exciting days." Then, the Lab's 44-bed hospital was full of patients in acute stages of various diseases who had been referred to Brookhaven for possible help. He reminisces: "Every day brought new problems, new ideas, new issues. Everybody was working together. No one ever complained about long hours." Chanana has been Chief of Staff of the hospital since 1974.

In the late 1970's, funding for this research and for maintenance of the hospital began to dry up and Chanana turned to studies of immunology. He later added a new program to the Department's roster, namely, pulmonary pathophysiology and immunology.



Mort Rosen

Arjun Chanana

Currently, Chanana holds appointments as Research Professor of Pathology and of Surgery at the State University of New York at Stony Brook. He is also a research consultant at the Nassau County Medical Center.

After he assumes his new administrative duties, Chanana plans to continue with research. As for the Medical Department's program, he referred to the statement in Samios' memo that it was the administration's intent to open up new areas of fundamental research in this department. Chanana adds that the research focus will be on medical applications of nuclear technology, and cellular and molecular pathophysiology.

Claire Shellabarger, who has been holding the fort as acting chairman of the Department for the last year and a half, will now return to his research in carcinogenesis.

Coming Up

Hywel White, senior physicist, will talk about "Neutrinos, Electrons and the Tie That Binds" in the next Brookhaven Lecture. The lecture will be given at 4:30 p.m. on Wednesday, April 9, in Berkner Hall.

Phantoms (Cont'd)

within the chamber during the two phases using a scintillation camera. The dynamic cardiac phantom can imitate healthy and unhealthy hearts. The geometry of the disk determines the phantom's ejection fraction, a ratio which is small if the heart is weak.

Bennett's phantom is less complicated, safer and more accurate than two other cardiac phantoms in use at present. One, called the Vanderbilt phantom, uses balloons, which are filled with a radioisotope and pumped in and out. But as the rubber balloons age, their contractibility changes; thus, the Vanderbilt phantom becomes less accurate as it grows older. Another phantom, named the Ticker, uses a plate sliding back and forth over a radioactive source and produces a left ventricular function curve in the shape of a sine wave. However, the shape of this curve in humans is not sinusoidal: the human heart contracts rapidly in the systolic phase and relaxes more slowly in the diastolic phase.

In a collaborative study with Long Island Jewish Medical Center, the dynamic cardiac phantom is being tested at five cardiology centers on Long Island and in Brooklyn and Queens. When testing is completed, the phantom can be used to calibrate nuclear cardiology cameras, to assure that such cameras and their associated computer hardware and software are functioning accurately, to test new equipment and to train nuclear cardiology technicians in taking data.

— Marsha Belford

Service Awards

The following employees received service awards during the month of March:

Thirty Years

Barry G. Galen ..... Applied Science
Harold W. Marshall ..... Biology
Louis K. Potter Jr ..... Applied Math
Richard K. Stoehr ..... AGS
Allen J. Weiss ..... Nuclear Energy

Twenty-Five Years

Francis W. Drell ..... Instrumentation
Edward A. Fowler ..... Medical
Helen L. Masem ..... Plant Eng.
Robert C. Zigrosser ..... Plant Eng.

Twenty Years

Clinton J. Coone ..... Supply & Mater.
James A. Goode ..... Safegrds. & Sec.
Arthur M. Hansen ..... Plant Eng.
Eugene A. Kern ..... Central Shops

Ten Years

Bernard F. Brennan .. Safegrds. & Sec.
Julius B. Brooks ..... Plant Eng.
Pauline Dixon ..... Nuclear Energy
Cleveland J. Dodge ... Applied Science
Francine M. Donnelly .... Applied Sci.
Rafael Jiminez ..... Plant Eng.
Edward Kaplan ..... Applied Science
Michal Kolpak ..... Plant Eng.
Vincent LaForte ..... Plant Eng.
James R. Lemley ..... Nuclear Energy
Joseph Mead ..... Plant Eng.
Laurence W. Milian ... Nuclear Energy
David J. Millener ..... Physics
Frank R. Miller ..... Plant Eng.
Karen G. Natoli .... Manage. Info. Sys.
Michel J. Perrier ..... Supply & Mater.
Ronald J. Reyer ..... Reactor
Madeline R. Stawski ..... Plant Eng.

It's a fact: The Long Island Farm Bureau lists 24 varieties of fish available from Long Island waters: anglerfish, blackfish, bluefish, butterfish, cod, eel, flounder, fluke, hake or ling, mackerel, pollock, porgy, sea bass, sea robbins, shad, skatewing, lemon sole, squid, striped bass, sundials, swordfish, tile fish, weakfish and whiting (silver hake).

If You Wonder About Thunder

Cloud Meteorologist Margaret LeMone will speak on "The Structure & Evolution of Mesoscale Convective Systems," on Monday, March 31, at 3:30 p.m. in the Hamilton Seminar Room, Chemistry Department. The talk, which is sponsored by Brookhaven Women in Science, is open to the Laboratory community.

Mesoscale convective systems include very large thunderstorms that move vertically along temperature gradients. Such thunderstorms can cover an area the size of Missouri and live six to 24 hours. The clouds in such a storm assume their own circulation, and LeMone has studied those that form simple lines and arcs.

By combining data from the Midwestern United States, West Africa, equatorial east Atlantic and Venezuela, LeMone and her colleagues at the National Center for Atmospheric Research (NCAR) are beginning to understand the structure of these large thunderstorms as a function of environment. She heads the Mesoscale Interactions Group of the NCAR's Convective Storms Division.

Margaret LeMone

A dinner in LeMone's honor will be held at a local restaurant the evening of the talk. Those interested in attending can make reservations by calling Ext. 3336.

Patents Awarded

U.S. Patent #4,529,670 was issued to **Eugene Findl,** a former BNL employee, for inventing a fuel cell having either a dual electrode anode or a dual electrode cathode. Such a fuel cell can produce electrical energy simultaneously from a gaseous fuel and a liquid fuel, in the case of a dual electrode anode, or to simultaneously reduce a gaseous oxidant and a liquid oxidant, in the case of a dual electrode cathode.

•

Donald P. Brown, ADB, was awarded U.S. Patent #4,548,053 for inventing a combined cold compressor -ejector helium refrigerator. The refrigerator apparatus has an ejector operatively connected with a cold compressor to form a two-stage pumping system. This pumping system is used to lower the pressure, and thereby the temperature, of a bath of boiling refrigerant (helium).

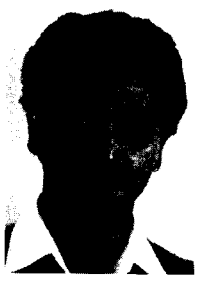
Brown's invention is particularly useful in raising refrigeration efficiency and capacity in refrigeration systems that are operated to produce cooling below 4.2 degrees kelvin.

Speaking Out

Reporter: Anita Cohen
Photographer: Peter Horton

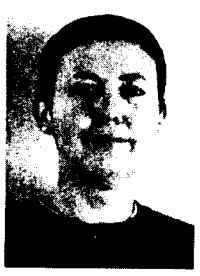
Halley's Comet is now visible in the southeastern sky, at about 4 o'clock in the morning. But, as it dips lower on the horizon, it's becoming more difficult to see. By the end of April, it will be more favorably located in the evening sky, but fainter. Before it leaves our view completely at the end of May, the BNL Astronomical Society will host a "Farewell to Halley's Comet" celebration, on May 2. Have you had a chance to see the comet yet?

Pat Dwyer (Instrumentation) — Every night I've tried has been too cloudy to see it. Maybe I'll see it tomorrow morning. I know it's going to start to fade pretty soon. I try to look from my roof in Lake Ronkonkoma.



Bhupinder Bawa (Central Shops) — I am planning to see it whenever I can get up that early. It's a curiosity.

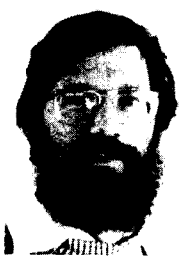
Colleen Daily (S&S) — I haven't seen it yet. Whether I get up early to see it depends on whether I have to go to work the next day. But I'd like to see it. It's a learning experience and only comes around every 76 years, and when it comes up in a discussion, I'll know what they're talking about.



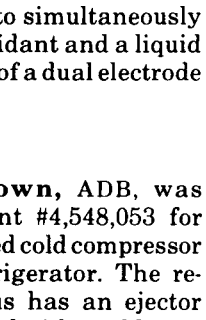
Cindy Morgan (Plant Eng.) — Yes, I saw Halley's Comet the first time it came around, during December and January, in my back yard and also at Smith Point. We used binoculars to find it, then we set up a telescope to look at it. It looked like a fuzzy tennis ball. But I think it's a worthwhile thing to see, just to say you've seen it.

John Heiser (DNE) — I don't know if I've seen it. In January, my wife and I went out and looked in the sky with a pair of binoculars, right where the weatherman told us. We saw something up there that looked like a bright star, but I don't know if it was the comet. We'll probably try again because my wife really wants to see it.

Gerry Morgan (HEF) — I saw it about eight hours ago, right here at the Lab astronomy site. I was delighted to finally see a tail on a comet. I saw Halley's before it went behind the sun, but it didn't have a tail then, at least not that I could see through the telescope. I got up at 3:30 and it was definitely worth it. If I try to see it again, it won't look as good because it's supposed to be fading, but it might be worthwhile to try to get a good picture of it.

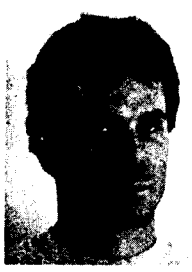


Stephen Schwartz (DAS) — Yes, I've seen it. It was gorgeous. I saw it on Wednesday morning, the 12th, amongst other times, but that was the best. It was brilliantly clear. I got my wife and son up, and they were excited. I wouldn't have missed it for anything. It really looked like a comet. You could see it with the tail. It was bright enough to see with the naked eye, if you count eyeglasses. I saw it this morning also. The tail is getting dimmer now, but I'm in a very good location to see it [Center Moriches].



Roger Taneus (Reactor) — No, I haven't seen it, but I am interested in seeing it because I would like to see what is in our solar system. I called the astronomy club last month because my wife is very interested in it. They set up three days to see it, but the weather just wasn't good. I heard the best place in the world to see it is Australia.

Elaine Lowenstein (Public Relations) — Just today, I went to see Halley's Comet at Smith Point. The South Country School District Middle School went down with four buses of students and about 20 private cars. The kids hit the beaches somewhere about 4:10 in the morning. The comet was clearly visible through binoculars — a little fuzzy white spot with a tail coming out the back. We stayed about 15, 20 minutes, until the sun started to rise. I'm not going to be around here in another 76 years, and I'm glad I've seen it.



Dan Sheppard (Central Shops) — I haven't seen it. I understand you can only see it from the South Shore right now, and, unfortunately, I live on the North Shore. To be perfectly honest with you, I doubt that I could make it to the South Shore at that time of the morning. But from what I understand, it's not nearly as spectacular as it was the last time it visited the Earth.

BERA News

BERA Board Winners

Congratulations to Rosalie Piccione and Doris Terry who were elected winners of the 1986 BERA Board election. On May 1, they will replace outgoing members Micky Haller and Ken Sutter, and join incumbents John Connelly, Lois Marasica, Richard Scheidet and Ed Taylor.

The Board would like to thank all those who contributed to the success of the election, including the nominating committee, the other candidates, Skelly Frei and George Sintchak, and, of course, all the voters.

Members of the Brookhaven Employees Recreation Association Executive Board are elected by you to act as your representatives. You are encouraged to discuss with them suggestions or complaints you may have relating to recreation activities.

Swim Club

The BNL Swim Club will meet on Thursday, April 3, at 5:15 p.m. for a graduated workout. All those who can swim two laps of the pool without stopping, using the crawl stroke, are invited to attend. The Swim Team will hold a practice on Thursday, April 10, at 5:30 p.m. For more information, call Marsha Belford, Ext. 3327, or Mark Catan, Ext. 2504.

Basketball

Game #1

Hollywood — 53		Longshots — 40	
G. Mack	13	L. James	6
R. Domenech	4	P. Brown	6
E. Meier Jr.	18	J. Garrison	2
B. Gunther	8	L. Walcott	12
K. Rogers	2	E. Taylor	6
B. Jasper	2	B. Johnson	4
D. Nordstrum	6	A. Anderson	4

Game #2

Runaways — 99		Coasters — 63	
T. James	24	M. Williams	11
P. Johnson	29	P. Ratzke	9
R. Moran	8	L. Lawrence	10
J. Desmond	19	L. Snead	4
J. Ripka	17	R. Doty	29
A. Stillman	2		

Bowling

Red/Green League

High games were bowled by E. Sperry IV 224/204/604 scratch, J. Muller 224, R. Larsen 213, C. Bachsmith 210, K. Riker 204/200, J. Petro 200.

Purple League

Rich Larsen had a 256/205, Gene Fales 222/221/210/653 scratch, Joe Ferrante 201, Pat Oster 194, Lee Barberich 191, Sharon Smith 191.

White League

Ed Sperry IV had games of 243/212/646 scratch, Dick Adams 222, Vito Manzella 206, Nate Carter 200, Kay Conkling 202, Fern Coyle 193, Karen Vogel 191.

L.I. Industrial Tournament

The BNL team finished sixth handicap and seventh scratch out of 16 teams. Jim Morris rolled a 247/208/621 scratch, Rich Larsen 221/204/604 scratch

Model Plane Club

The regular monthly meeting of the R/C Model Airplane Club will be held on Tuesday, April 1, at noon in the cafeteria. All interested are invited to attend.

Volleyball

League I	W-L
Dinkers	46-4
Up Fagrabs	35-15
X-Rayted	25-25
Bumpers	24-26
Net Results	11-39
TNT	9-41
League II	
Phoubars	50-0
Nuts & Bolts	29-21
Fossils	24-26
Chungas Revenge	23-27
Cannonballs	20-30
Upton-Ups	4-46
League III	
Print-outs	36-18
Foul-ups II	35-19
Screwballs	29-25
The Buddys	26-28
Light 'n Lively	19-35
Couples	17-37
Open League	
Odds & Sods	40-5
Dakota	38-7
Phoenix	30-15
Court Jesters	22-26
Rowdy Radicals	17-31
Generic	13-35
Out of Control	2-43

Plan Your Retirement

The Personnel Division will again hold a Pre-retirement Planning Seminar for eligible employees. The seminar will be held during the last two weeks in April and will be conducted by Alan Entine, founder and director of the Mid-life Assessment Program at the State University of New York at Stony Brook. Laboratory employees who have reached, or will reach, age 55 this year, and their spouses, will be invited to attend. Employees over age 55 who were unable to attend past seminars and would like to be included are asked to contact Mary White at Ext. 7994, or Pat Knisely at Ext. 7631, by April 8.

Hospitality News

Come to the next Hospitality Committee get-together on Tuesday, April 1, at 9:30 a.m. in the Brookhaven Center and learn how to do patchwork quilting. Beth Pile and her colleague from the "Hands All-Around" quilting group will present a demonstration on the techniques of patchwork quilting. They also will provide some materials for you to work with.

Spouses of Laboratory employees and visitors are welcome. Coffee, tea and danish will be served. Please come and bring the children. Babysitting will be provided free of charge.

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To Your Health

To inform BNL employees about Acquired Immune Deficiency Syndrome (AIDS), Ed Mittler, an educator with the Long Island AIDS Project, will present the next Health Promotion Seminar entitled "AIDS: Fact & Fiction." The talk will be given on Thursday, April 3, from 12 to 1 p.m. in Room B, Berkner Hall.

AIDS is an illness that impairs the body's natural ability to fight infection and leaves a person susceptible to certain diseases and infections. The majority of those who contract AIDS are homosexual and bisexual men and intravenous drug users. Since first being identified in 1981, the number of AIDS cases has increased dramatically, with approximately 19,000 cases reported nationally. More recently, the disease has been perceived as a potential threat to the heterosexual population as well.

Mittler will discuss the medical evidence that indicates that AIDS is transmitted chiefly by specific sexual practices or by sharing contaminated intravenous-drug syringes. He will also talk about prevention and education as the major offensive to combat this feared disease.

The Long Island AIDS Project, one of eight AIDS information and support groups set up by the New York State Health Department, is located at the School of Allied Health Professions at State University of New York at Stony Brook. The project operates a hot line, which may be reached by calling (516) 444-AIDS; all inquiries are confidential, and callers may remain anonymous.

Arrivals & Departures

Arrivals

Daniel Carneiro ..... Plant Eng.
Michael L. Fulkerson ..... NSLS
Richard Ruggiero ..... Physics
Madeline Votta ..... NSLS
James R. Braun ..... Sfgds. & Sec.
Leonard J. Butera ..... Sfgds. & Sec.
James M. DeVito Jr. ..... Sfgds. & Sec.
Peter R. Mendelsohn .... Sfgds. & Sec.
Dov Maor ..... DNE

Departures

None

NYC Train Trip Special Notice

Those who have tickets for the train trip to New York tomorrow, March 29, should take note that the trip will be aboard the 9:08 a.m. train from Patchogue, rather than the 8:31 a.m., due to a change in the LIRR schedule. This change will also be in effect for future Saturday train trips.

It's a fact: Four buildings at BNL were built before World War II. Bldg. 30, the Brookhaven Center, and Bldg. 51, which houses the Atmospheric Sciences Division of the Department of Applied Science, were both erected in 1934. Dating from 1917, the Lab's oldest buildings are 455 and 482, which are now used for storage.

Cafeteria Menu

Week of March 31

Monday, March 31

Cream of chicken & rice soup	(cup)	.65
	(bowl)	.85
Baked pork chop w/choice of 1 veg.		2.45
Fish and chips w/choice of 1 veg.		2.50
Hot Deli: Grilled Reuben sandwich		2.45

Tuesday, April 1

U.S. Senate bean soup	(cup)	.65
	(bowl)	.85
Pot roast of beef w/potato pancake and 1 veg.		2.50
Baked chicken w/choice of 1 veg.		2.50
Hot Deli: Smoked turkey grinder		2.40
Hot Deli Special: Chili dogs $.85 each		

Wednesday, April 2

French onion soup w/croutons	(cup)	.65
	(bowl)	.85
Baked meatloaf w/choice of 1 veg.		2.45
Vegetable lasagna w/garlic bread		2.50
Hot Deli: Roast beef garden club		2.45

Thursday, April 3

Beef noodle soup	(cup)	.65
	(bowl)	.85
Spaghetti & Italian sausage w/garlic bread		2.45
Fresh ham w/choice of 1 veg.		2.45
Hot Deli: Steak & onions on roll		2.45
Hot Deli Special: Tacos $.85 each		

Friday, April 4

Cream of mushroom soup	(cup)	.65
	(bowl)	.85
Broiled fresh fish w/choice of 1 veg.		2.65
Seafood crepes Mornay w/1 veg.		2.50
Beef stew w/choice of 1 veg.		2.50
Hot Deli: BBQ beef on onion roll		2.45

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 and/or appropriate bargaining unit, 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.

THE VACANCY LISTED BELOW HAS BEEN EXEMPTED BY THE DIRECTOR'S OFFICE FROM THE CURRENT FREEZE ON OPEN REQUISITIONS.

LABORATORY RECRUITMENT - Opportunities for Laboratory employees only.

2415. SPECIAL ASSISTANT TO THE ASSISTANT DIRECTOR - Reports to the Assistant Director for Financial Management (ADFM). Responsibilities include, but will not be limited to, the development and implementation of those policies and procedures under the jurisdiction of the ADFM and functioning as the primary assistant to the ADFM in carrying out specific assigned responsibilities. Position will require frequent communications with all levels of Laboratory personnel and with officials of the DOE and other organizations. Requires a BBA/MBA or equivalent, demonstrated leadership qualities, technical competence in administrative and financial functions and excellent analytical and communications skills. Extensive knowledge of Laboratory operations and BNL and DOE policies, procedures and practices is required. Director's Office. Please submit resumes to Marsha R. Kipperman, Personnel Division, Building 185.

Autos & Auto Supplies

75 GRANADA - 4 dr., 4 spd. stand., well maint., am/fm, new battery, snows, $600. Ext. 4785 or 475-1844.

79 FORD PINTO - a/t, p/s, a/c, $1,400. 363-6940 eves.

84 COLT VISTA - wagon, a/t, a/c, am/fm, 35k mi., $6,900. Minato, Ext. 5367 or 3193.

79 FIREBIRD - 301 V8, p/s, p/b, a/c, am/fm cass., good cond., $2,700. Doug, Ext. 2760 or 732-9292.

73 CADILLAC - Coupe DeVille, good run. cond., clean int., full power, $595. Frank, Ext. 2022 or 399-4480.

80 CHEVY MONZA - p/s, p/b, a/c, good cond., $2,300. 878-0786.

80 ELDORADO - dark blue, spoke wheels, fully loaded, runs well, $7,200 neg. 585-1931 after 6 p.m.

81 DODGE OMNI 024 - 4 WD, sunroof, am/fm stereo, cc, h/b, 74k mi., excel. cond., $2,500. 878-6274 after 5 p.m.

74 VW BUS - 7 pass., 110 HP eng., 20k mi., am/fm, $1,200. Ext. 2965 or 744-0960.

79 FORD COUNTRY SQUIRE - sta. wagon, all power, a/c, 72k mi., excel. cond., $2,800. Ext. 3187, 2823 or 4510.

82 HONDA ACCORD - 4 dr., 5 spd., 63k mi., silver, excel. cond., $6,200. Russ, Ext. 3059 or 698-9364.

79 OLDS DELTA 88 - a/c, p/s, p/b, cruise, new tires, brakes, excel., $2,600. Ray, 289-0883.

76 FORD GRANADA - 6 cyl., a/c, p/s, new brakes, exhaust, $600. 765-2085.

74 DATSUN PICKUP - w/cap, excel. cond., new clutch, exhaust, tires, no rust, $1,495. Ted, Ext. 7992.

72 OLDS - very good cond., best offer. 924-0582 eves.

79 HONDA CX500 - blue, water cooled, 26k mi., helmets, c/c, $1,100; 77 Dodge ext. van, p/s, p/b, c/c, a/t, paneled, carpeted, roof rack, $1,500. 281-9172.

76 HONDA CIVIC - manual trans., excel. mech. cond., 74k mi., $750. 744-5096.

67 CHRYSLER - a/t, p/s, p/b, p/w, new top & seats, 383-V8. Tony, 698-9274.

80 BUICK RIVIERA - all power, V8, 30k mi., new brakes, velour, int. mint cond., $5,500; 80 Datsun 210 SL, h/b, 5 spd., 40 mpg, new tires, brakes, starter, mint, $3,100. 589-6803.

78 DODGE PICKUP - cap, couch, ice box, dual tanks, running boards, mag wheels, Ariba tires; insulated cap, slide-in unit, fits all 8" bed pickups, ice box, $675. Bruce, Ext. 4173.

77 PONTIAC LEMANS - p/s, p/b, 2 dr., high mi., very dependable, $995.00. 472-1479 after 3 p.m.

TIRES - 9.50x16.5 lt, (2) reg., (2) snows, $60. Ken, Ext. 4515 or 289-8212 eves.

76 MALIBU CLASSIC - 2 dr., V8, p/s, p/b, a/c, a/t, clean, 90k mi., runs great, $1,600. Ext. 4081 or 874-3844.

73/74 BLAZER - fiberglass top, complete w/windows, $100. Ext. 2171 or 957-7159.

74 DUSTER - a/t, p/s, new starter, good tires, $500 or best offer. Dave, Ext. 4360 or 269-5319.

(Continued on page 4)

Autos & Auto Supplies (Cont'd)

81 TOYOTA CELICA - front end damage, $1,100. Ext. 2175 or 399-4387.

72 PLYMOUTH DUSTER - p/s, p/b, 6 cyl., $550; 79 Ford Fairmont, p/s, 4 cyl., $1,400. Ines, Ext. 3449.

84 FORD LTD SQUIRE WAGON - p/s, p/w, p/locks, a/c, c/c, tilt wheel, 12k mi., excel. cond.; 81 Toyota Corolla Liftback, 5 spd., excel. cond., $3,500. 538-0798.

77 HONDA CIVIC - 2 dr., a/t, 68k mi., excel. cond., $1,375. 878-2394.

77 MONTE CARLO - p/s, p/b, a/t, 77k mi., excel. cond., $1,950. Jim, Ext. 4758.

70 FORD LTD. WAGON - 9 pass., mech. sound, body good, reliable transp., $595. 475-2598 after 5 p.m.

74 BUICK APOLLO - a/t, p/s/ p/b, a/c, am/fm, 4 dr., 90k mi., very good cond., $900 or best offer. Ext. 3701 or 751-8128 eves.

83 MINI CHEVY BLAZER - 34,148 mi., $8,200; flatbed utility trailer, 4x6, $60. 878-8901 after 5 p.m.

77 DODGE ASPEN - V8, a/c, p/b, good cond., $1,000. 281-6052 after 5 p.m.

74 DODGE DART - 318 V8, 2 dr., lt. blue, a/t, p/s, p/b, a/c, 84k mi., $650. Ext. 3896 or 475-0396.

79 SABARU - 4 WD, GL-wagon, 4 spd., am/fm, roof rack, 65k mi., $1,500. Peter, Ext. 4923 or 821-9513.

72 VOLVO - parts only, new 15" radials. Dick, Ext. 4255 or 744-6794.

80 CHEVY MONTE CARLO LANDAU - p/s, p/b, a/t, a/c, am/fm, rear def., new tires, excel., 66k mi., $3,200. Mike, 288-3736 after 6 p.m.

80 HONDA CIVIC 1500 DX - 5 spd., am/fm, 8-track, new exhaust, 40 mpg, clean, reliable, $1,400. Yen, Ext. 3871 or 3073.

75 PONTIAC LEMANS - 4 dr., p/s, p/b, V8, a/t, $550. 281-7485 after 4 p.m.

79 HONDA CIVIC - semi-auto., 72k mi., many new parts and recent repairs, $2,000; 75 Ford LTD, 351, a/t, p/b, p/s, new parts, 88k mi., good cond., $1,800. Edy, Ext. 3336 or Frank, Ext. 7200 or 473-9379 after 6 p.m.

TRAVEL TRAILER - 18', sleeps 6, self-contained, new tires and brakes, $2,500. Artie, Ext. 4988 or 325-0743.

82 HONDA ACCORD - 4 dr., 5 spd., 63k mi., silver, excel. cond., $5,900. Russ, Ext. 3059 or 698-9364.

71 DODGE WAGON - parts, 318 engine, reb. heads, timing chain, $125. Bob, Ext. 4629.

76 VOLVO GL 264 - 4 dr., sunroof, estate car, mint cond., 79k mi. 472-0612 after 6 p.m.

Boats & Marine Supplies

OUTBOARD - 65 HP motor, 4 cyl., OMC, new pump, lower unit resealed, $325. 475-8504 after 5 p.m.

POLE HOLDERS - (4) flush mount, angled, chrome or brass, $15 ea. Bill Espensen, Ext. 3992.

27' TARTAN - 9 sails, VHF-FM, DF, RDF, Autohelm compass, refinished top, side, extras. Ext. 4258 or 699-9202.

16' TRAILER - Penn Yan Holzclaw, $175. 399-3712.

16' TRI-HULL - 1972 MFG, full canvas; 1979 Mercury 50 HP motor, elec. start, 1983 Cox galvanized trailer, extras, $2,800. 281-8458 eves/wkends.

12' FIBERGLASS SAILBOAT - and trailer, very stable, fun boat, $400. 475-5849 after 5 p.m.

TRAILER - for 16' boat, good cond., $250. 475-4199.

1/2" MOORING CHAIN - galvanized, proof coil, new, $2.25/ft. Bob, Ext. 7197 or 399-1679.

16' ALUMACRAFT - 30 HP Chrysler outboard, trailer, $1,500. Ext. 4312.

18' MARQUIS OPEN-BOW - 1979, 85 HP Johnson w/power tilt, fully canvassed, galv. trailer w/power winch, all good cond., $4,200. Arnie, 289-1870.

16' TRAILER - lg. wheels and spare, $200; outboard motor, 7.5 HP Eska, good cond., $200. Page 921 or 744-9429.

23' O'DAY - 1980, 7.5 HP Honda, 6 sails, full race equip., keel ctr. bd., electronics, extras, excel., $15,400. Lloyd. Ext. 3381 or 286-1024.

19' SEARAY - 1974, 225 HP OMC, I/O, aqua colored trim tabs, extras. Roger, Ext. 2384.

14' FIBERGLASS TRI HULL - Sears, motor, trailer, $400. 878-8901.

HEATER - Boat Pal w/alcohol, $25; Boatswains chair, new, $25. Ext. 4745 or 722-4076.

23' ALBERG SEASPRITE SLOOP - 1979, full keel, main, jib, Genoa, 6 HP Evin., instruments, extras. 538-0798.

Miscellaneous

R/C AIRPLANE - Falcon 56, Citizenship radio, engine, $100. John, Ext. 2269 or 281-2623 after 6 p.m.

STEREO AMPLIFIER - Fischer X-100-B, walnut case, needs some tubes, best offer. 751-3551.

JUVENILE FURNITURE - girl's, white, 2 sets, good cond., $250 and $125. 281-5753.

PALMER GOLF BAG - lg., used once, perf. cond., brown leather hood, $70. 941-4328.

TRAINS - Santa Fe Marx, yr. 1952, boxed set, (2) engs., #1095, pass. (1) #3152, (3) #3195 tin type tracks, 8 trans. $65; cocktail table, hardwood, maple, 56" x 21", (2) draws, excel. cond., $95. Al, Ext. 4615 or 751-8462 after 6 p.m.

KID'S TURTLE POOL - w/slide, $15; infant car seat, up to 20 lbs., $20; baby elec. feed dish, $5; baby tub w/sponge, $7; all excel. 744-9677.

BW TV - $30; Izon, $10; fan, $15; bike, $5. Willie, Ext. 3118.

DINING ROOM TABLE - oak Victorian, (6) chairs, matching sideboard, curved glass china closet. Gordon, Ext. 4095.

STEP LADDER - alum., 5', $5. Bill, Ext. 2047.

RIDING LAWN MOWER - w/snow plow, B&S 8 HP eng., John Deer tractor, $175 takes all. Bob Sr., 689-9234 eves.

LIGHT - ceiling fixture w/white globe, $2. Jim, Ext. 2432.

STEREO RACK SYSTEM - Sansui, extras, $700; fish tank; alum. storms & screens. Mark, Ext. 5350.

REFRIGERATOR - Gibson, 18.6 cu. ft., side-by-side, frost free, copper, excel., $200. 281-7844.

SNOW THROWER - Sunbeam Snow Champ, 12", elec., new, $175. Kevin, 878-4285 after 5:30 p.m.

CHAIN SAW - Homelite Super 2, 14", excel., $100; 21' alum. ext. ladder, perfect, $50. Ext. 4745 or 722-4076.

CLUB CHAIR - gold leaf design, very good cond., $55; Hoover floor polisher, $25; crystal and brass chandelier, $25. 273-5574.

TRICYCLE - Powderpuff, 4-wheel cycle, Play-Skool, very cheap. Chandra, 924-0582.

SOFA - 85", Haitian cotton, tuxedo type, contemp. style, excel. cond., comfortable. Carol, Ext. 4398.

MAXELL DISKS - (10), ds/dd, 5-1/4", new, $10; port. typewriter, $25; lg. fireplace screen, $10. Jim, Ext. 3372.

CHILD'S ROCKING CHAIR - all wood, plays music, excel. cond. S. Spark, Ext. 4111.

FULL BED - pot bell stove; table; R-R tape; boots, women's size 7, make offer. Roger, Ext. 3578 or 878-9864.

NINTENDO ROBOT ENTERTAINMENT SYSTEM - sells for $140, never opened prize, sell for $95. Larry, Ext. 4295.

CANADIAN HEMLOCKS - up to 4 ft., nursery grown, you dig, $4/ft. John, 744-5867 after 5 p.m.

R/C AIRPLANE - Falcon 56, Citizenship radio engine, $100. John, Ext. 2269 or 281-2623 after 6 p.m.

BUNK BED FRAME - colonial. 758-6892 after 5:30 p.m.

DELTA COMMERCIAL JIG SAW - 24" throat, compl. motor, stand and light, very good cond. Ray, 281-3758.

FRUIT JUICER - Oster Deluxe, new, $30. Victor, Ext. 2395.

TRAILER HITCH - class A, $20. Ext. 2514 or 757-3178.

BAY WINDOW - Anderson, 4' picture, 2' casement, side units at 45°, Thermopane, incl. screens, excel., $450. Lloyd, Ext. 3381 or 286-1024.

WOOD SHAPER - 1/2" spindle, w/3/4 HP motor, stand, (3) extra wing cutter knives. Ray, 281-3758.

ELECTRIC RANGE - w/2 ovens, electric and microwave, in one, GE, self clean, 30". George, Ext. 5125.

COMPUTER MONITOR - color RGB only, for IBM, Commodore C128 or other. Roy, Ext. 4664 or (212) 691-4396.

BLAUPUNKT STEREO - radio/cassette w/booster amp, $275; driftwood coffee table w/glass top, pear shaped, $175; air-tight coal stove, 3 yards of coal, $200. 878-8901 after 3 p.m.

SHOP SMITH - needs little work, $150. Slim, Ext. 3084.

COLOR TV - 25" Magnavox, console, $150. 234-1480.

KENMORE MICROWAVE - 1.4 cu. ft., like new, cost $360, sell for $175. Ext. 2514 or 757-3178.

COLOR TV - 19" Emerson, like new, $100. King, Ext. 7837 or 3073.

SOFA - gold, excel. cond. Ext. 4192 or 751-7787.

WATER BED - king size, colonial, compl. w/capt. draws, $450; dk. pine bunk beds w/ladder, can be used as twin beds, $100. 281-7485 after 5 p.m.

COLOR TV - 19", some lines on screen but good color, $100. Judy, 289-7292.

DACHSHUND - pedigrees, beautiful, mini males and females, black or tan, $400 ea. 281-7798.

MONITOR - Panasonic, amber composite, $50; Radio Shack LP-7 printer, $75. firm. 744-9677.

DRAPES - lined, 120x84 & 60x84, brocade valance, gold, $100; (2) pr. drapes, Sears Thermalguard, w/matching king size bedspread, $50. Harry, Ext. 3675 of 744-2581 eves.

BEDFRAME - adj. metal, $5. John, Ext. 3675 or 924-3528.

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 Rent

SHIRLEY - 1 bdrm. apt., priv. ent., walk to beach, cable, single mature woman only, no pets, util. included, 1 mo. sec., $475 mo. Ext. 2905 Wed., Thurs. or Fri.

MEDFORD - studio apt., full kit. and bath, l/r-b/r. combo, pvt. ent., deck, all new, 1 mo. sec., no pets, $450 mo. incl. all. Ray, 289-0883.

SELDEN - 1 bdrm., l/r, lg. eik, full bath, $500 mo. incl. util. 689-6120.

WADING RIVER - lg. 1 bdrm. apt., 1,500 sq. ft., pvt. beach, cable, 10 min. to Lab, $475 mo. incl. util. 929-4729.

HILTON HEAD, SC - 2 bdrm. condo., beach, pool, tennis, golf, $300 wk. before 4/15, $400 wk. after 4/15. 585-9149.

RONKONKOMA - near LIE and beach, immac. 3 bdrms., l/r, d/r, eik, w/w, storage room, $725 mo. plus util., avail. 5/1. Ext. 2676 or 543-0487.

MEDFORD - 2 bdrms., l/r, d/r, kit., f/p, w/w, appl., garage, fenced yard, landscaped, extras, no pets, $795 mo. + util. 698-0576 after 9 a.m. and 286-2005 after 12 p.m.

SHIRLEY - studio apt., 10 min. from Lab, walk to shopping, $475 pays all. 281-7187.

SHAWNEE VILLA - vacation resort in the Pocono's, full accomodations for 6, week starting 6/7 thru 6/14, $400. Charlette, 348-2856 or 286-0913 after 5 p.m.

For Sale

OAKDALE - Idle Hour section, near water, 2-story tudor, 4 bdrms., 2 baths, attached garage, full apt. w/priv. ent., on 1/2 acre, deadend st., $210,000. 363-6940 eves.

WADING RIVER - 2 bdrm. ranch, w/attched garage, eik, 1/4 acre, large fenced-in yard, decked, beach rights, walk to beach and state park, $119,000. 929-8876 after 6 p.m.

MIDDLE ISLAND - 9 rm. Colonial, l/r w/fp, central air, garage, fin. basement, heated in-ground pool, $128,500. 698-8667.

SAYVILLE - 3-4 bdrm. Calif. ranch, brick front, 2 full baths, garage, central a/c in house and full basement, eik, d/r, l/r, fam./rec. rm., lg. patio w/outside shower, poss. m/d, near golf course, $146,990. 589-2681.

PORT JEFF. VILLAGE - 2 bdrm. circa, totally renovated, comm. zoned, 5 appl., bsmt., ideal for prof., $199,000; Shoreham, 4 bdrms., 2 baths, farm ranch, f/p in den and l/r, fin. bsmt. oversized garage, 1/2 landscaped acre, $210,000. Ext. 4853 p.m. or 821-2932 after 6 p.m.

OTSEGO COUNTY - 3 bdrm. house, mod. kit. and bath, furn., w/1-1/2 car garage, 17-1/2 wooded acres, incl. stream, $51,900. 929-8287.

Lost/Found

LOST - Linear Accelerators, by Lapostalle, P.M., & Septier, A.L., return to AGS Library, 911C, no questions asked.

FOUND - car key for Volvo. Ext. 2345.

Free

CHEVY ENGINE - 350 ci. Ext. 3992 or 298-4172 eves.

CAT - long haired, gray, male, altered, 8 mos., has shots, playful. Ext. 2050 or 473-6432.

POODLE - 6 yr. old, well behaved, smart, loveable, healthy w/shots, AKC; cat, 8 mo. spayed, shots, tabby color, very clean, playful, must adopt, allergies. Eva, Ext. 2197 or 269-6543.

Car Pools

MASTIC - off Montauk Hwy., Nelson Pl. off Fulton St., willing to pay, may be able to work out eventual car pool. Jody, Ext. 2907 or 395-3963.

Wanted

TUTOR - to teach English to Chinese visitor, send resume to D. Fischer, Bldg. 510E.

ROOMMATE - to share house in N. Shirley, 7 min. to Lab, $250 plus 1/2 elect. 395-1084.

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

PERSON TO SUBLEASE - upstairs apt., Rocky Point, 2 bdrms., kit., bath, fenced back yard, other tenant, BNL employee, $500 mo. Jurg, Ext. 3422, or Amin, Ext. 4570 or 821-3243/3240.

CAR TO RENT - 3/28/86-4/14/86, max. $90 wk. Harry, Ext. 3967.

GARDEN ROTOR TILLER - Ext. 2487 or 928-6930.

BOY TO MOW LAWN - in/or near Shoreham, must have own machine. Ext. 3486.

TIRES - 15" G78 or F78 or equivalent. Ext. 4192.

HOUSE SITTINGS - mid April, mid May, will give ref. 821-1435 or Ext. 2731.

HOUSE TO RENT - Bellport Village or nearby, 2 bdrms. min. Bill, Ext. 2378.

ROOMMATE - to share 3 bdrm. apt. on 1-1/2 acres, 5 min. walk to Sound, clean non-smoking couple or single, $450 mo. plus util. Ext. 7178 or 744-6059.

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

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).