BROOKHAVEN BULLETIN
Vol. 48 - No. 26 July 1, 1994
BROOKHAVEN NATIONAL LABORATORY

DAS Researcher Dives Deeper Into Coral-Algae Relationship

Reef-building coral animals are strict landlords who keep a remarkable rein on the growth of symbiotic algae that inhabit their cells, and they die when pollution sabotages this control, according to research by Paul Falkowski, a senior biologist in the Department of Applied Science, and his colleagues from several universities.

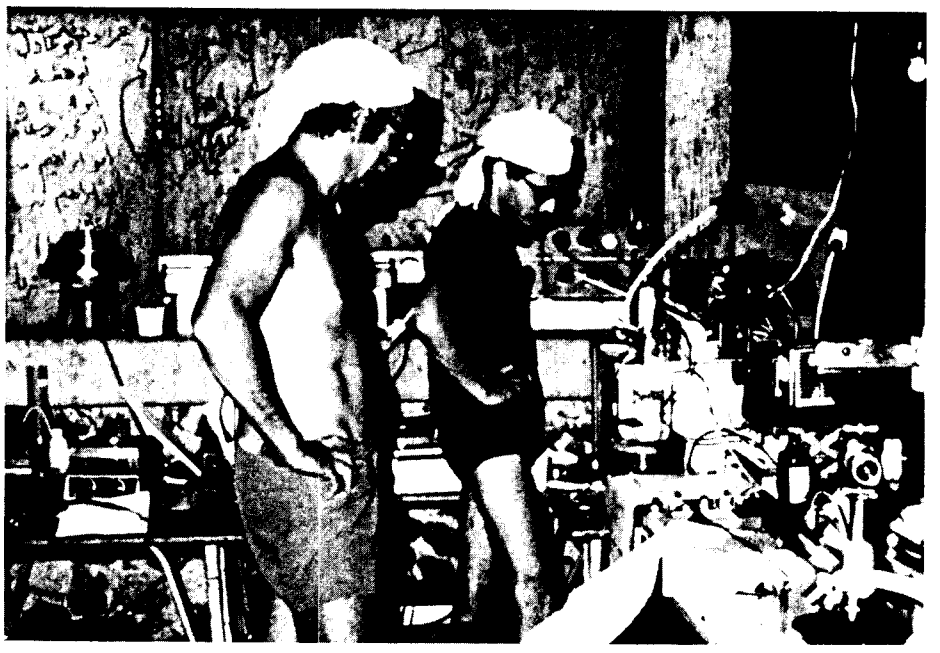
Corals are a mutually beneficial symbiotic association between a tiny animal and single-celled, photosynthetic algae called zooxanthellae. The algae provide the corals with organic carbon, while the animals in turn provide the algae with nutrients they need to live.

"Corals are probably one of the most important symbiotic associations, certainly in the marine environment, because they are at the beginning of the food chain in tropical coastal oceans, and there is no other source of photosynthetically produced carbon on the reef," said Falkowski, who is in DAS's Oceanographic and Atmospheric Sciences Division.

He and his colleagues have discovered that reef-building corals control the amount of nitrogen they provide to symbiotic algae for growth, limiting the algae to an average of one million cells per square centimeter of coral.

An electron micrograph of a single-celled zooxanthellae alga.

This tight control results in a stable, healthy balance between the two organisms. In fact, corals die when their control of nitrogen levels is sabotaged by environmental release of nitrogen-rich inorganic compounds, such as those found in sewage or industrial wastes.



Paul Falkowski (right) and Zvy Dubinsky brave the extreme heat of the Sinai Peninsula in their tent laboratory while pursuing research into the coral-algae relationship.

"High levels of inorganic nutrients turn corals into a system out of control," Falkowski said. "The algae outcompete the animal, and the animal starves to death because the algae grow and do not give carbon to it. The impact of society is basically to destroy coral reefs by causing them to lose control of their own symbiotic system."

If coral reefs are destroyed, vast parts of the food chain of tropical coastal oceans, including fish that depend on corals, would be lost as we know them, according to Falkowski. The good news is that reefs in Hawaii and the Caribbean that had been damaged by sewage outfall are recovering since the problem was stopped.

To learn more about symbiotic relationships, Falkowski began studying control of algal populations by corals in the Red Sea in 1987, along with Zvy Dubinsky of Bar Ilan University in Israel, Leonard Muscatine of the University of California, Los Angeles, and Lawrence McCloskey of Walla Walla College in Washington.

The team of researchers braved 120-degree heat during the day while living in tents near a Bedouin village on the Sinai Peninsula. They conducted experiments on coral reefs surrounding the area.

"These reefs are extraordinarily beautiful, and they have the most diverse corals of any in the world," Falkowski said.

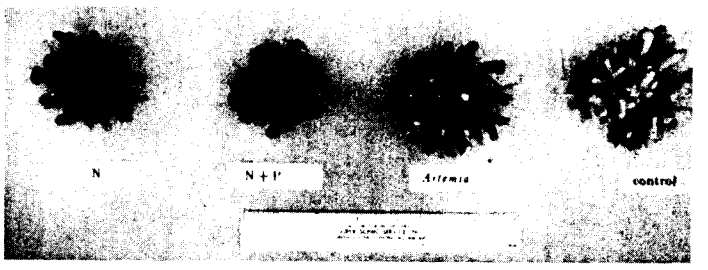
The researchers placed specially constructed chambers around individual branches and whole heads of coral, then added dissolved inorganic nitrogen in the form of ammonium to the chambers.

They observed that the corals began to turn chocolate brown and had markedly low carbon-to-nitrogen ratios. Having lost control of their algae population levels, the treated corals had 2.5 times more algae per unit area than untreated corals.

"The system had become unbalanced," Falkowski said. "There are more zooxanthellae per unit area of corals, and the more nitrogen added to the system, the less carbon the algae give to the animal host."

The dark brown color change in

(continued on page 2)



Corals after 18 days of chronic exposure to elevated levels of (from left to right) ammonium, ammonium plus phosphate, larvae of brine shrimp, and a control exposed only to seawater.

New Fire Alarm System Now Protecting Brookhaven Site

Don't be alarmed if your building's familiar fire-alarm main panel looks a little different than it used to.

It just means that your area is one of the first to zoom onto the fire-information superhighway, otherwise known as the Lab's new Site Fire Alarm System (SFAS).

BNL's fire safety officials hope you will never have to use the pull boxes that are connected to them, but the new panels are actually the most obvious component of an entirely brand-new system.

Completed last month, the system uses 1,200 miles of cable to link 180 alarm-control panels in more than 150 BNL buildings to central computers. It now controls fire, radiation, gas detection and evacuation alarms around the site 24 hours a day.

In addition to BNL's nearly $3 billion in property, the $1.08 million system protects employees and others who work on site, as well as those who live in on-site housing, says James Vaz of the Fire/Rescue Group of the Safety and Environmental Protection (SEP) Division. Vaz, the SFAS Manager, has day-to-day operational responsibility for the system.

Roger Stoutenburgh

As BNL firefighters Raymond Archbold (left rear) and James Yerry respond to an emergency call, James Vaz (left) and Paul Larsen, Safety and Environmental Protection Division, monitor the controls of the Lab's new fire alarm system.

The groundwork for the new SFAS was laid several years ago, under the guidance of Fire Protection Engineer Joseph Levesque and Senior Project Engineer John Deitz, both SEP.

"Already, I think the system is working very well," said Vaz. "The proof is in the pudding — we had a string of electrical storms recently, which would have set off the old system, and the new system held up. It even tells us when we have a problem. So, I'm quite pleased."

The new SFAS replaces one that was also state-of-the-art — a century ago. The clunky "birdhouse" pull boxes of the old telegraph system are disappearing, replaced by sleek new panels using modems and telecommunications.

"We're getting them out one by one," said Vaz, who added that the Plant Engineering (PE) Division's Fire Alarm Electricians Group, supervised by Stephen Waski and overseen by Lance Warren, has been very helpful in ringing out the old system and ringing in the new.

The new SFAS database was completely customized to meet BNL's needs by its manufacturer, Thorn-EMI. The cable plant was upgraded by PE and Fujitsu Business Communication Systems, a contractor on site.

Whenever any local device goes into alarm, the signal zips first to the building's fire alarm panel, ringing local bells. From there, the panel transfers the exact information to the system's "brain" at the Firehouse, Bldg. 599.

There, the Lab's firefighters can locate the alarm's origin precisely on the computer screen, using the graphic map software developed and maintained by Vaz. Alarm signals are more reliable because of redundant communications channels. Typically, the signal is received within eight seconds, speeding response.

The BNL Fire/Rescue group responds to an average of one alarm every day, including calls that turn out to be false, smoke alarm and sprinkler activations, and gas or heat detection, as well as signals from pull boxes.

Aside from the Firehouse, remote computers reside in other areas where fast alarm response is crucial: Police Headquarters and the Alternating Gradient Synchrotron's main control room and target desk.

The 30-megahertz controllers in each of these computers may not seem powerful in comparison with the sophisticated computers used by BNL's scientists and engineers. But they're powerful enough to accommodate expansion as BNL adds areas that need protecting, such as the Relativistic Heavy Ion Collider. — Kara Villamil

Play With Light, Sound and Electrons During BNL's Summer Tours

Science can be a hair-raising, electrifying, sound- and light-bending experience, especially if you are on a tour of BNL this summer.

Every Sunday from July 10 through August 28, between the hours of 10 a.m. and 3 p.m., visitors, students and employees are invited to join the public on a free tour of BNL and the Science Museum.

"Summer Sundays will bring us about 7,000 visitors, mostly families, enjoying scientific demonstrations and interacting with hands-on exhibits," said Janet Tempel, museum administrator. "It's a fun time and people go away with a very positive attitude about science, BNL and the research done here."

No reservations are required and tours begin in Berkner Hall about every 10 minutes, depending on the size of the crowd. There, visitors will see *Quest*, a 10-minute multimedia presentation, which includes a history of the Lab and a brief overview of BNL research.

Intrigued by a giant pitch pipe, one of the new interactive science stations at the Science Museum, are: (from left) Sara Fernow, Allison Rowe and Nicholas Gmur.
—Photos on these pages by Roger Stoutenburgh

Next on the agenda is a guided bus tour of the site, which passes and includes a brief description of all the Lab's major facilities before stopping at the Science Museum.

Housed in the building formerly dedicated to the Brookhaven Graphite Research Reactor, the Science Museum contains more than 20 interactive exhibits, allowing visitors to experience science rather than just observe it.

From the shrieks of delight, laughter and "oohs" coming from the museum on past tours, you'd think children visiting the exhibits were at an amusement park instead.

"We want the kids to be exposed to things that will hopefully stir their interest in science," said Lawrence Nye, a fifth grade math teacher at William T. Rogers Middle School in Kings Park, whose class visited the museum earlier this month. "There are some very interesting things here."

"It's good," agreed fifth-grader Robert Lynn. "I like the big ball," he said of the Plasmasphere, a tiny electrical storm of glowing gases in a globe, which responds to the touch of human hands by arcing a current of blue lightning toward the point of contact. But don't worry, it's not a shocking experience unless you pass those extra electrons onto an unsuspecting neighbor!

At another exhibit visitors are stopped in their tracks by the opportunity to "catch their shadows" at a phosphorescent wall where shadow images are frozen in place by a strobe light.

New this summer are interactive science stations where, for example, visitors can search for an invisible laser beam or play with liquid crystals to see who has the hottest hands.

Once again, there will be demonstrations by museum guides, some of whom are science teachers and college students, in each of the major sections of the museum. For example, how would you look with all your hair standing on end? You can find out if you are picked by a tour guide to demonstrate how static electricity works.

If you are still baffled by the metric system, there will be a special display called "The Metric Me" on loan from the U.S. Department of Energy through July.

History buffs should not miss the Camp Upton Historical Collection, which includes extensive photos and memorabilia from World Wars I and II, when the Brookhaven site was the Army's Camp Upton. A video, "From Basic Training to Basic Research" describes the site's early history.

The fun doesn't have to end with the tour. The museum's Science Shop is stocked with science-related toys, experiment kits and other items, so you can bring the fun home with you.

— Georgia Moore

Equipment Demo

On Monday, July 11, in the CCD Seminar Room, Bldg. 515 at 1:30 p.m, IBM will present an overview of the latest models of the RISC System/6000 processor family, including Power2 and the PowerPC. Also to be discussed is the N40 Power notebook. For more information, call Ken Hammer, IBM, Ext. 7311.

Water Aerobics

Two classes of water aerobics — one for beginners and one for advanced students — are being organized for this summer, to begin the week of July 11. Both will be held at the BNL pool, Bldg. 478, from 5:15 to 6 p.m., and, while there is no fee for the class, participants must either have a season pool pass or pay the $2 daily pool fee for each class.

The beginners' class will be held Mondays and Wednesdays, for five weeks beginning Monday, July 11. The advanced class will be held Tuesdays and Thursdays, for six weeks beginning Tuesday, July 12. To register, call Health Promotion Specialist Mary Wood, Ext. 5923.

Cafeteria Menu

Monday & Tuesday, July 4 & 5
Independence Day Holiday —
Snack bar service 9 a.m.- 2 p.m.

Wednesday, July 6

Soup: Split pea	.80/1.10
A la Carte: Tortellini carbonara	3.45
Fitness: Cod Florentine	3.85
Deli: Roast beef sandwich	2.95
Grill: Monte Cristo	2.95

Thursday, July 7

Soup: Egg drop	.80/1.10
A la Carte: Mandarin chicken	3.85
Fitness: Stir-fry beef	3.85
Deli: Turkey sandwich	2.95
Grill: Cuban sandwich	2.95

Friday, July 8

Soup: Manhattan clam chowder	.80/1.10
Display Cooking: omelet	2.75
Fitness: Founder w/julienne vegetables	4.25
Deli: Corned beef sandwich	2.95
Grill: Fried clams w/cheese roll	3.25

BROOKHAVEN BULLETIN
Published weekly
by the Public Affairs Office
for the employees of
BROOKHAVEN NATIONAL LABORATORY

ANITA COHEN, Editor
MARSHA BELFORD, Assistant Editor

Bldg. 134, P.O. Box 5000
Upton NY 11973-5000
Tel. (516) 282-2345; Fax (516) 282-3368

Weight Watchers

Registration for the on-site Weight Watchers program will be held on Wednesday, July 13, from noon to 1 p.m. in the south dining room of the Brookhaven Center.

Weight Watchers teaches participants how to eat real foods yet still lose weight and how to develop permanent habits so participants can reach and maintain their goal weights.

The seven Wednesday sessions will start July 20 at noon. The fee for BNL employees is $62, since BNL pays $10 for each participant and Weight Watchers has reduced its fee for the summer. For further information, call Mary Wood, Ext. 5923.

Softball

Standings reported as of June 24

League E1		League M1	
Blue Jays	9-1	Goodtimers	4-1
Phoubars	9-2	Sting Rays	4-1
Magnuts	4-5	Snakebites	3-2
Six Pax	3-6	Personnelities	3-2
Ravens	3-6	Just-4-Fun	3-3
Cocoon	2-4	Simply Awesome	2-3
Up & Atom	2-7	Parke Avenue	1-4
		Strike Force	1-5
League E2		**League M2**	
Titans	10-0	Well Heads	6-1
Older Butt Wiser	8-2	Varmints	4-2
Lights Out	7-3	What's On Second	4-2
Hy Tech	7-3	Stray Cats	3-2
Lunatechs	7-3	Lead Bottoms	2-4
Sure Fire	7-3	Service America	1-2
Medical	5-5	Skeleton Crew	2-5
Out Of Control	5-5	Tandooris	1-5
Hammerheads	5-5		
Big Sticks	4-6		
Scram	4-6		
Phase Out	1-9		
Bombers	0-10		
The Feds	0-10		

Time to Thank Tour Volunteers

When college groups and various professional and technical visitors tour the Lab, they are escorted by volunteer tour guides and informed by speakers who also volunteer their time. These volunteers were the guests of honor at a thank-you luncheon organized by Museum Programs of the Public Affairs Office, at the Brookhaven Center, on May 18. Shown here are: (bottom V, from back left) Victor Gutierrez, Mark Walker, Kevin Smith, Lynette Finlay, Ann Marie Luhrs, Diane Fisher, Sue Monteleone, Jackie Larrie, Janet Sillas, Gerry Van Derlaske, Tom Dickinson, Al Campbell, Gerhard Redelberger, Stuart Kern; (front V on platform, from back left) Frances Scheffel, Sue Cataldo, Michiko Tanaka, George Gharabeigie, Museum Programs Head Janet Tempel, Victor Gonzalez, College Tour Coordinator Elaine Lowenstein, Hue-Anh Pham, Jackie Mooney, Graham Smith, Barry Karlin, Andy Ackerman, Linda Di Pierro, Thelma Dawson; (back, from left) Eileen Morello, Andy Feldman, Martha Simon, Vera Mott, Peter Mendolia (behind Mott), Evelyn Ritter, Dave Comstock and Frank Dusek.

A New View of Science

Science museum directors and administrators see things a different way! BNL recently hosted the annual meeting of the New York State Science and Technology Museum Consortium — some of whose members from all over the state are shown here wearing prism glasses, an item used in a BNL museum program for children. BNL Museum Programs Head Janet Tempel (front, third from left), Public Affairs Office, welcomed representatives of the New York Hall of Science, which cofounded the consortium along with BNL: Director Alan Friedman (back, second from left) and Consortium President Peggy Ruth Cole (front, fourth from left). Other attendees included directors and administrators from the Science Museum of the Shoreham/Wading River Schools; the New York State Museum, Albany; the Vanderbilt Planetarium, Centerport; and the proposed Long Island Museum of Science and Technology.

Holiday Notes

In observance of Independence Day, the Lab will be closed on Monday, the 4th of July, and Tuesday, July 5. As a result, the following schedules will be in effect:

• **Brookhaven Bulletin** — There will be no Bulletin next week; the next issue will be published on Friday, July 15. The classified ad deadline for that issue is 4:30 p.m. on Friday, July 8.

• **Credit Union** — The Teachers Federal Credit Union will be closed on July 4, but will be open for normal hours, 9 a.m. to 4:30 p.m., on July 5. The automatic teller machine in the foyer of Berkner Hall will be open throughout the holiday.

• **Food Services** — The Cafeteria will offer only snack bar service on July 4 & 5. The Brookhaven Center will be closed Sunday through Tuesday, July 3-5, then reopen Wednesday, July 6, from 5 p.m. to 9 p.m. The vended food service in Bldg. 912 will be in operation throughout the holiday.

• **Gym & Pool** — The swimming pool will be closed from Saturday, July 2, through Tuesday, July 5. The gymnasium will also be closed through July 5.

• **U.S. Post Office** — The Upton Branch of the U.S. Postal Service will be closed on July 4, and window service will be available on July 5 from 8 a.m. to 1 p.m. only.

Public Auto Auction

Forty-nine BNL vehicles, located at Warehouse T-87, are to be sold at a public auction on Wednesday, July 20, at 10 a.m. in Berkner Hall.

Those interested may inspect the vehicles on Monday and Tuesday, July 18 and 19, between 9 a.m. and 3 p.m. For further information, call Ext. 4527.

CRAY Fortran Training

Following the arrival of the parallel-vector CRAY EL92 supercomputer in BNL's Compute Farm this May comes a two-day CRAY Fortran workshop — because UNIX is not the same on all platforms.

While some workstations have virtual memory, CRAY has real memory; while some workstations are superscalar and use scalar cache memory, CRAY machines use registers, different functional units and vectors. CRAY computers have their own arithmetic, which is not IEEE. And, CRAY has made I/O efficient by adding features not found in standard UNIX systems.

The Computing & Communications Division (CCD) is offering the workshop, from 9 a.m. to 5 p.m. on July 14-15, in the CCD seminar room, Bldg. 515. Instructor Etan Scherger of CRAY Research will cover such topics as the features of the CRAY cf77 compiler and moving code from other platforms.

Seating is limited, so reserve your space ASAP by calling Maria Gatz, Ext. 5196, or Ed McFadden, Ext. 4188.

In Memoriam

Richard T. Adams, who retired from BNL on March 31, 1989, with 41 years of service, died on June 15. He was 67 years old.

Dick Adams joined the Lab on March 15, 1948, as a guard in the Security Office, where he became a patrolman two years later. He joined the Reactor Division in May 1953, as a technician, becoming a pile operator for the Brookhaven Graphite Research Reactor in 1956, then a nuclear reactor operator in 1964. He was a reactor shift supervisor at the High Flux Beam Reactor from 1969 to 1984, when he assumed his final position of Senior Reactor Support Specialist at the Brookhaven Medical Research Reactor.

He is survived by his wife Elinor Adams, Associated Universities, Inc.; son Peter Adams; and stepchildren Lisa Grenci and Donald McCaw.

Physics 2, Juiced-Ball Advocates 0: Batters Are Swinging at the Same Old Ball

Hey batter batter, hey batter, hey batter, why are you hitting so many home runs?

That's what inquiring sports minds want to know and a question Richard Larsen, a physics associate in the Physics Department, was called upon to answer.

Batters have treated fans with heads up and hands outstretched to more home-run balls so far this season than in previous years. In April, 41 percent more home-run balls left the bat than during that month over the last couple of years.

Sports buffs say the balls are "juiced up," meaning they are more energized and perform better.

Since manufacturers are required to make all baseballs to the same strict specifications, down to the exactly 216 hand-sewn stitches used to close them, and since those specifications haven't changed since 1926, the implication is that either balls are not being made to specifications or they are being tampered with.

To settle this enduring debate, by special request, Larsen tested baseballs in 1987 and again in 1994. His most recent tests show that baseballs made in 1994 are not significantly different from those made in 1987, when players hit fewer home runs.

In 1987, concerned that someone was "tampering with the beauty and honesty of baseball," then baseball commissioner Bart Giamatti asked his old friend Robert Adair, then BNL Associate Director for High Energy and Nuclear Physics, to test baseballs. After enlisting Larsen to conduct the tests, Adair interpreted the data.

Larsen dropped baseballs from a height of 25 feet and measured how high they bounced. Because environmental conditions, such as heat, cold and humidity, affect how balls perform, he repeated the test with balls that had been frozen or heated and then returned to room temperature.

The researchers found no significant difference in bounce height between balls kept at room temperature. The ones that were frozen or heated, however, bounced differently. Previously heated balls bounced higher and frozen balls lower than those kept at room temperature.

"The temperature tests showed a remarkable difference in how high the balls bounced," Larsen said. "If you want to significantly change a game, you could do things like heat or freeze the balls before the game." Manipulating balls in this way, however, is against the rules.

Larsen's efforts are chronicled in Adair's 1990 book *The Physics of Baseball*, now in its second edition.

In May, during a fresh bout of juiced-ball debates, *USA Today* requested that Larsen repeat the tests, this time comparing the 1987 balls previously tested with 1994 American League balls.

This time, Larsen tested six 1994 official American League balls and two from the 1987 test. The researchers struck down claims of juiced balls once again: Physics 2, juiced-ball advocates 0.

The '94 balls kept at room temperature bounced an average of 92.42 inches and the '87 balls averaged 92.83 inches. This means that if a player hit a 400-foot home run, the '87 ball would go seven inches farther than the '94 ball, according to Adair. Based on these results, Adair estimates in his book that a normal ball hit 375 feet would travel more than 400 feet if heated and about 350 feet if cold.

"If the balls are being manipulated, then it's the best-kept secret in the world," Larsen concluded. "I do not believe there is a conspiracy to hit more home runs by manipulating the balls. I think it's a natural evolution of the game due to the changing physical attributes of the batters."

Richard Larsen, with a few of the baseballs he's tested this year.

The fact that more players are working out to increase their upper-body strength and undergoing more extensive spring training, resulting in increased bat speed, would account in part for an increase in home runs, he said. Bat speed translates directly into how far the ball travels.

Secondly, the cyclic nature of the game would also account for periodic increases in home runs and the accompanying debate about juiced balls that has gone on since the early 1900s, Larsen said.

During periods when there are a number of less experienced pitchers on the mound, more home runs are hit. As pitchers become more experienced, they shut out batters more and less home runs are hit.

"The second time around in the league, the pitchers begin to catch up and improve," Larsen said. "In the long-term, qualified pitchers begin to dominate the game again as good pitchers will."

In 1955, after a stint in the U.S. Navy, Larsen came to BNL in order to create lab equipment that existed only in the minds and dreams of physicists and himself. "I didn't want to operate machines — I liked to build them," he said. "How should we do this experiment? How do we put the pieces together? That's what I wanted; to figure out how to do things."

Currently, he's building a device to measure the anomalous magnetic moment of the muon, a subatomic particle. He is also developing a device to focus the beam in the muon storage ring, at BNL's Alternating Gradient Synchrotron.

So when Larsen was asked to test the game he'd played and studied all his life, he was especially glad that he could finally tell his kids what daddy did at the office, he said.

Responding to the charge made by one journalist that the juiced-ball debate still has not been sufficiently settled, Larsen smiled and said, "That's the beauty of baseball — everybody has the right to his opinion. — Georgia Moore

Coral-Algae (cont'd)

corals exposed to plenty of sunlight is a good early indicator of a pollution problem, he explained. Some corals not exposed to much sunlight are dark brown or even black, but are still healthy because the dark coloration is due to increased amounts of pigment in algal cells at low light levels and not an increased number of algal cells.

"There are normally few nutrients in water around coral, the water is clear," Falkowski said. "If sun-exposed corals turn black, they are telling you there is nitrogen in the water."

Back at BNL, Falkowski is currently delving further into the depths of the relationship between reef-building corals and their symbiotic algae. He is studying the molecule secreted by corals called "host factor," which triggers carbon release from zooxanthellae algae.

The algae release an astonishing 90 to 99 percent of the carbon they fix during photosynthesis to their coral host. In an even more bizarre twist of nature, the corals use only about 20 percent of the released carbon for growth and respire the rest. They are using the carbon as a quick source of energy — like junk food.

"It's like the animal is eating Twinkies all day," said Falkowski. "We call it the junk-food hypothesis."

Research has shown that host factor is a low-molecular-weight, heat-stable compound that binds to the algal membrane, Falkowski said. The binding triggers a change in the permeability of the membrane, allowing "massive amounts" of carbon to leak out of the algal cell.

"We want to isolate, purify and characterize host factor," he said.

Because it causes algal cells to leak, host factor could possibly be used commercially to extract desired products from algal cells, Falkowski said. For example, beta carotene from algae, a vitamin A precursor used as a food additive, is already a $20 million industry. — Georgia Moore

Special Edition Coming Soon

A new Special Edition of the Brookhaven Bulletin devoted entirely to the National Synchrotron Light Source will be distributed on site on a Wednesday later this month. For additional copies of this publication, contact the Bulletin office, Ext. 2345.

Hospitality News

The next Hospitality Committee get-together will be Tuesday, July 12, at 9:30 a.m., at the playground in the apartment area. If it is raining, the group will meet in an apartment on site, and a note stating which apartment to go to will be taped to the playground picnic table.

This may be a good time for newcomers to the apartment area to meet their neighbors. Spouses and children of Lab employees and guests are welcome. Lemonade and iced tea will be provided.

Cafeteria Job Opening

Service America Corporation (SAC), which manages the Cafeteria, is seeking a part-time server to work evening hours at the Brookhaven Center. SAC is an equal opportunity employer. To apply, call Ext. 3541.

Classified Advertisements

Placement Notices

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

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

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

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

LABORATORY RECRUITMENT - Opportunities for Laboratory employees.

MK 108. TOOL CRIB ATTENDANT - (temporary o/a 7/18/94-9/30/94) Will be responsible for receiving and issuing supplies, material, tools, and equipment. Maintains necessary records and paperwork, assists in inventory and checks condition of items in tool crib. Knowledge of tools and equipment is desirable. Plant Engineering Division.

OPEN RECRUITMENT - Opportunities for Laboratory employees and outside candidates.

NS 6173. ENGINEERING POSITION (Quality Management) - Requires bachelor's degree in engineering, science or computer science with a minimum of five years' experience with quality-management programs. Responsibilities will include assisting departments/divisions with quality-management initiatives, training and facilitating quality-improvement teams, assisting in the implementation of quality programs for research and support organizations, and assessing implementation. Director's Office.

DD 2880. TECHNICAL POSITION - Requires AAS in electronic/nuclear technology or equivalent experience with calibration, troubleshooting and repair of process/electronic instrumentation. Will perform maintenance and repair tasks on the HFBR, its auxiliary equipment and its experimental facilities. Previous experience as an instrument technician in a nuclear facility highly desirable. Must be able to obtain and maintain a security clearance and successfully complete certification examinations. Reactor Division.

DD 2560. TECHNICAL POSITION - Requires an AAS and several years' health physics or industrial-hygiene technician experience. Participation in respirator, industrial hygiene and general safety training programs is required; may also require shift work. Safety and Environmental Protection Division.

Motor Vehicles & Supplies

93 HYDUNDAI SONATA - black, V-6, anti-lock brakes, p/sunroof, anti-theft stereo, tinted windows, 4 yrs. on ext. warr. Ext. 2459 or 287-3262 after 5 p.m.

92 BUICK LESABRE - burgundy, V-6, ABS, full power, climate control, 29k mi., $16,000. Richard, Ext. 3804 or 286-3471.

88 HONDA PRELUDE 2.0 SI - a/t, all power, moon roof, white, v.g., $6,500. Jeff or Allison, 286-1348.

87 TOYOTA SUPRA - loaded, excel. cond., best offer. Ext. 3695, leave message.

83 NISSAN PULSAR NX - runs well, looks bad, needs clutch & head gasket, best offer. Rich, Ext. 2386.

RIMS - Ford pickup truck, alum., '69 Mustang rear, seats, like new, cheap. Wayne, Ext. 7238.

TIRES - P225x75R14, 2, excel., $35/ea.; P225x75R15, brand-new, $35/ea. 698-9274.

91 ISUZU PICKUP - V-6, 4wd, 5-spd., hi/low, p/w, sunroof, abs, more, 40k mi., $13,500 firm. Dennis, 727-9007 after 7 p.m.

90 NISSAN SENTRA - 2-dr., gray, ac, new brakes, am/fm cass. stereo, excel., $5,500. Aoki, Ext. 1062.

87 VIKING POP-UP - 16½', sleeps 6, sink, stove, ice box, $1,500 neg. Sue, Ext. 7235 or 395-3529.

86 SUBARU TURBO XT - white, 5-spd., sunroof, stereo, ac, highway mi., good cond., $1,400 or best offer. Hwu, 758-8123.

86 ISUZU IMPULSE - black, 2-dr., ac, 5-spd., cruise, am/fm stereo, new eng., brakes, clutch, batt. & alt., ask. $3,800. Guiying, Ext. 5704 or 399-7309.

86 ISUZU TROOPER II - for parts, good tires, had fire in engine compartment, doesn't run, $750. John, Ext. 3292 or 286-1348.

85 CUTLASS CIERA - 4-cyl., 100k mi., dependable, needs minor mech. work, ask. $1,100. Joe, Ext. 5139.

85 JEEP RENEGADE - a/t, 6-cyl., hardtop, new tires, needs work, $2,500 neg. Barbara, Ext. 7426.

85 PORSCHE 911 - Carrera conv., white, black top & leather int., ac, p/s, p/w, new brakes & sensors, new Yoko ZR-16 tires, mint, $26,000. Jim, 289-0876.

85 RENAULT - 88.6k mi., 2-dr., m/t, runs well, need brakes, $1,000 neg. 366-6236 after 5:30 p.m.

85 S-10 PICKUP - black, a/t, w/cap, needs some work, ask. $2,700; '81 Audi 5000S, a/t, very tight motor, ask. $1,500. Chas, Ext. 5462 or 288-2080.

84 TOYOTA CELICA GT - liftback, a/t, EFI, full power ac, sunroof, new ties, brakes, exhaust, runs well, $1,500. Mike, Ext. 2386.

84 NISSAN SENTRA WAGON - 5-spd., am/fm cass., 90k mi., excel. cond., must sell, asking $1,700. Zoltan, Ext. 5341 or 341-1021 eves.

84 CHEVY CELEBRITY - 89k mi., mech. excel., needs paint, $1,100. Ext. 4084.

81 MAZDA - '76 Dodge Aspen, both station cars, run well, $200 ea. 475-9265.

81 CORVETTE - red/tan, 4-spd., all power, mirrored T-top, gar., $9,500. Diana, Ext. 4262 (M/W/F).

79 DATSUN 280ZX - 84k orig. mi., mechanically sound, $1,650. Rick, 821-4183.

76 CHEVY PICKUP C-20 4x4 - new tires, exhaust, clutch, turn key & go, $2,800 or trade for Blazer. Frank, Ext. 2343.

71 PONTIAC LEMANS - conv., 76k orig. mi., new top, tires & brakes, excel. cond. 878-1178.

69 MUSTANG - convertible, 3-spd., 6-cyl., am/fm cass., new tires, brakes, shocks, good cond., $6,200. Tirre, Ext. 3288 or 281-0360 after 6 p.m.

53 BUICK - 2-dr., m/t, good running cond., $4,000. Joe, 878-8703.

CONVERTIBLE TOP - for Jeep Wrangler, top of the line, all parts, used once, $225. John, Ext. 2294.

NOSE BRA - for '91 Toyota MR2, never used. Nancy, Ext. 3519.

WHEELS - alum., for Mazda or Nissan, good cond., $150. Al Mack, Ext. 4095.

TIRES - 3, Michelin MXL 175/70R13, excel. cond., $25 ea. Ext. 4706.

MOTORCYCLE HELMET - black, lightweight, medium size, w/visor, like new, cost $200, asking $50 firm. Pete, Ext. 5320.

HONDA MOPED - red, battery, needs charging, good cond., $350. Ext. 2352.

DODGE COLT - 81k mi., new tires, asking $400. Erika, 929-5781.

HYUNDAI - 4-dr., a/t, elec. moon roof, 54k mi., excel. cond., $1,700. Ext. 2982.

Boats & Marine Supplies

16' STARCRAFT - 35-h.p. Evinrude, Cox galvanized trailer. 325-0447 after 6 p.m.

15' JY15 SAILBOAT - '91, one design, class legal, main & jib, excel. Paul, Ext. 2872 or 928-1485 eves.

24' WOODEN SAILBOAT - 1930s, gaff sails, polyester covered hull, 6-h.p. ob., ask. $700. Michael, 689-6697.

23' PUMA SAILBOAT - all fg, sleeps 4, galley, fixed keel, mooring dinghy, motor, sails, good shape, extra sail, $2,000. Mike, Ext. 7861 or 698-3967.

22' CATALINA SAILBOAT - 6-h.p. Johnson motor, new furling, genoa and main sail, w/trailer, $3,900. Barbara, 329-2467.

19' LIGHTNING SAILBOAT - trailer, cover, mooring, full sails, good cond., $2,500. Marcia, Ext. 7129.

19' FIBERFORM - 1976, V-8, Mercruiser i/o, V-bunk, DF, VHF, radio. Ext. 5286 or 298-9594.

17' HOBIE CATAMARAN - wings, trailer, roller furling jib, $1,800. Peter, Ext. 7657.

17' O'DAY - w/trailer, jib & main 2-h.p. eng., plus access., excel. cond., $2,500. Sonja, Ext. 3575 or 261-5290.

16' BAHA - *Capital Punishment*, custom paint job, 1983 115-h.p. Evinrude, p/trim & tilt, new seals & bearings, bucket seats, $2,500. Alex, 878-2577.

14' SUNFISH SAILBOAT - new rudder, tiller, centerboard, autobailer, extras, excel. cond., $675. George, Ext. 3061 or 751-0265 eves.

12' SEA EAGLE - 1993 inflatable, hard floor, wooden transom, will take up to 15-h.p. motor, used twice, trailer, orig. $750, sell $625. 732-9118.

10' METZELER AZTEK - 4-person, inflatable rubber boat, w/2-h.p. motor, like Zodiac, not a toy, $400. 744-4611.

KAYAK - for small adult, river & surf, good cond., $300. Ernie, 281-7873.

ANCHOR - 10 lb., v.g. cond., $8. Jiri, 929-8409.

OUTBOARD - 85-h.p. motor, w/controls & new water pump, also boat tilt trailer. 369-8683.

OUTBOARD - Ted Williams, 5-h.p. motor, air-cooled, good cond., $165 firm. John, 281-4866.

Furnishings & Appliances

AIR CONDITIONER - Amana Super-thrust, 13,300 Btu, 9.5 EER, slide-in chassis, excel., $300. 473-6546.

COFFEE TABLE - Col., trestle-style, 1½" thick dark pine, $25. Nick. Ext. 7307.

BED - youth, water bed, super single, red Lamborghini car frame, waveless mattress, heater, $120. Bob, 737-9726.

BED - adjustable, orig. $1,385, now $195; sewing machine, multistitch, $55; accordion, $120; Magnavox 25" TV, $25. Marty, 286-0478.

BED - captain's, storage drawers, excel. cond., asking $100. Pete, Ext. 7955 or 929-3847.

BED - single frame, mattress, desk, chairs, table, iron, ironing board, lamps, etc. Ext. 5704 or 399-7309.

BEDROOM SET - maple, single bed, dresser, chest, night stand, $500; gas range, $100; maple dry sink, $50. Van, Ext. 7039 or 289-8428.

BEDROOM SET - king-size water bed, Colonial; l/r, pecan end tables, child car seats, more. 473-6432.

BEDROOM SET - king headboard, dresser, hutch mirror, chest of drawers, 2 night tables, $500; king water bed, pine head & footboard, $400. 286-1290.

DISHWASHER - GE, 3 yrs. old, almond, v.g. cond., $200; GE washer & dryer, elec., good cond., $150/both. Bob, 737-9726.

DESK - pine, matching chair, 2-drawer file cabinet, $75; VCR, plays back only, $15. Judy, 924-7077.

DINING ROOM - china closet, table w/3 leaves, 6 chairs, light tone, $400. 744-1706.

DINING ROOM TABLE - white Formica, drop-in leaf, 6 swivel armchairs, $200 neg. Don, Ext. 7237 or 744-2921 after 5:30 p.m.

DRYER - Maytag, apt.-size, $50; Sears apt.-size washer & dryer, like new, $400. 265-6542.

FLATWARE - sterling silver, Gorham's Camellia, service for 8, monogrammed S, $800. Kathy, 363-5170.

FUTON - full-size, good cond., navy cover, $40. Barbara, 928-8006.

HEAD & FOOTBOARD - twin, light wood, good cond., $18. 475-7454.

The Brookhaven Bulletin is printed on paper containing at least 50 percent recycled materials, with 10 percent post-consumer waste.

MICROWAVE - Sharp Carousel II, 0.6 cu. ft., like new, $45. Jiri, 929-8409.

MICROWAVE - convection oven, Sharp, turntable, $100. Jim, Ext. 3932.

TABLES - brass/glass, stack, three-tier display rack, wine cart, floor lamp, magazine rack, make offer. 345-5365.

Tools, House & Garden

POOL - a/g, 24', 2 yrs. old, sand filter, pump, cover, bubble, extras, $100. 543-6402.

TREES - Japanese maples, $10-$45+. Mauro, 265-6542.

CHARCOAL GRILL - $10; w/cover, side tables, set of 4 chair pads, $10. Fran, Ext. 2092.

DECORATIVE GARDEN TIES - w/crown, 23, new, treated, 3"x4"x8', $50. Ben, Ext. 4333 or 929-6984.

LAWN EDGER - Black & Decker, elec., excel. cond., $30; elec. bug killer, like new, $30. 475-7454.

PATIO DOORS - sliding, thermo-pane, white frames, best offer. Ext. 5983.

RIDING LAWN MOWER - 7-h.p., Briggs & Stratton, 32" deck, 4-spd., $200. 765-2847 after 4:30 p.m.

TABLE SAW - Craftsman, 1¾ h.p., cast alum. extensions, many blades, access., $250. Tom, Ext. 2823.

VACUUM - Wet & Dry Shop Vac, like new, $25. Jiri, 929-8409.

Sports, Hobbies & Pets

FISH TANK - 70-gal., filter, light, gravel, etc. 588-9325.

BACKPACKS - 1 child's $5, 1 adult $10; bowling ball & bag, men's, $20. Pete, Ext. 5320.

BASEBALL CARDS - all Hall of Fame players, reprints, Mantle, Mays, Koufax, etc. Pete, Ext. 2800.

CLARINET - Bruno, carry case, good for beginner, excel. cond., $75. Teri, 924-6575 or Dave, Ext. 5741.

COCKATIEL - beautiful gray bird, home-raised, very healthy, friendly, $75. 473-6432.

DALMATION PUPPIES - 5 wks. old, shots, papers, fine lineage, champion lines, males & females. 924-8558 after 5 p.m.

FISH TANK - 55-gal., no access., $60. 732-9118.

GOLF SHOES - leather, woman's size 7M, excel. cond., $25; Coleman sleeping bag, for 1 adult, $10. Linda, Ext. 2733 or 878-8491.

JET SKI - 1987, excel. cond., $1,100. 878-1178.

KEYBOARD - Casio CT-655, electronic, auto accomp., MIDI, stand, like new, $200 or best offer. Ext. 5704 or 399-7309.

PUPS - APBT & game dogs, registered, 7 males, 3 females, all colors, ready by July 4. Mike, 281-7873.

SKIS - Olin, 180cm, Solomon 444 bindings, run-away straps, great for beginner, $20 neg. Don, Ext. 7237 or 744-2921 after 5:30 p.m.

WEIGHT BENCH - $20; infant bike helmets, $2. Fran, Ext. 2092.

WET SUIT - scuba, hood, gloves, boots, weight belt, weights, molds, $100. Charlie, Ext. 2407.

Audio, Video & Computer

COMPUTER - 8088, 640K, 360K, 32MB, 2400 modem, flight stick joystick, mon. monitor, 101kb, tons of software, $175. Lee, Ext. 2639 399-9246.

COMPUTER - IBM PS1, 386/25, 6MB, 129MB HD, fax modem, 14" color, 3.5 FD, software, $500; 380 M.S. ext. CD ROM, $100. Bob, 929-3325.

DESK REFERENCE - NY Public Library, PC version, DOS, 3½" disks, unopened. $10. Ext. 5983.

LPs - Franklin Mint Collection, favorite waltzes & overtures, classic violin, romantic concerti, hardly used. Janet, Ext. 2345.

TV - color, 19", remote, excel. cond., must sell, $100 neg. Zoltan, Ext. 5341 or 341-1021 eves.

VCR - Emerson, 19" Sharp color TV, central unit, $300/all. Ext. 5704 or 399-7309.

Miscellaneous

CHILD'S CAR SEAT - $20; high chair, $20. Phil, Ext. 5669.

COLLECTIBLE PLATES - Hamilton Series wildlife and Indian issue, orig. $30, sell for $18/ea. Pete, Ext. 5320.

FUR JACKET - cheetah, large, woman's, orig. $330, sell for $75. Pat, Ext. 2922.

PLAYPEN - $15; bassinet, $10; walker, $5; play desk, $2; double stroller, $5. Nancy, Ext. 3519.

SUITCASE - $5; headboard bookcase, $30; vacuum, $15; stereo, $20; planter, $8; VCR TV cabinet, $20. Kathy, 744-2203 .

TICKET - 1, Country Western Jamboree, in hills Ohio, 7/14-17, $30. Pat, Ext. 2922.

PHOTOGRAPHY VIDEO SET - 14, wedding, instructional, orig. $700, sell for $350. Pat, Ext. 3275.

WATER TREATMENT SYSTEMS - NSA50C countertop, NSAZ100S under sink. Ed, Ext. 5914.

WESTERN BOOTS - woman's size 8-8½, suede & leather, 3 pr. like new, ask. $10-$15/ea. Pat, Ext. 2922.

WEDDING GOWN - white, full length, size 7/8, worn once, must see, best offer. Simone, 581-2961.

On-Site Services

OMEGA LEISURE TRAVEL - 5 percent rebate when booking certain cruises, tours, more. Travel Rep. Kerry Fitzergerald, Ext. 5918/5958.

TEACHERS FEDERAL CREDIT UNION - lease an auto through TFCU from now till Sept. and ride payment free for 30 days. Ext. 2790.

Free

BAMBOO - bring shovel and remove. Joanne, 244-7284.

BOAT - 23' Thunderbird, f.g. hull, excel. cond., cuddy cabin, no motor or trailer, you haul. 281-1832 eves.

DOG - 3 yrs. old, male, German shepherd, good temperament, needs good home. Brian, 821-4234.

KITTENS - born 6/1 in sewer drain, Town pound will kill them, please adopt. Bob, Ext. 3509, or Laura 289-9533.

RABBIT - brown, lop-eared male, w/hutch. Ext. 5983.

Yard & Garage Sales

MILLER PLACE - 7/1-4, 9 a.m.-6 p.m., big yard/house sale, furn., clothes, etc., call for directions. 928-7732.

Lost & Found

FOUND - baseball glove on field. Kevin, Ext. 3082.

Car Pools

BOHEMIA-E. ISLIP-OAKDALE-SAYVILLE - needs 1 more driver, call for interview. Frank, Ext. 2314.

CUTCHOGUE AREA - need ride, will pay expenses, work 8 a.m.-4:30 p.m. Rich, Ext. 3351 or 734-5066.

DEER PARK AREA - or from LIE Exit 52, one person. Ken, Ext. 7311.

LIE EXIT 36 - need 4th for carpool. John, Ext. 5181.

Wanted

AIR COMPRESSOR - 60 gal., 220V, 1 PH; Mig. welder, 200A or larger, 220V, 1 PH; parts washer, tire-mounting machine. Rich, 929-3209, eves/wknds.

BOAT TRAILER - 14'-16' in decent condition. Ed, Ext. 5529.

CAR - visiting scientist would like to rent car for local use for 4 weeks from August 2. Fern, Ext. 3969.

HOUSE TO RENT - in SWRSD, 3-4 bdrm., by responsible, former owners, nonsmokers w/no pets, relocating to LI. Ext. 3698 or 821-4326.

HOUSE TO SIT - long or short-term, dependable, profess., avail. immed. Bill, Ext. 4408 or 369-7887.

MOTORCYCLES - mopeds and scooters, bent or broken, any age or cond. Kevin, 281-8031.

PORCH SWING - bench-like, chain-suspended, for 2 or 3 people. John, Ext. 7671.

REFRIGERATOR - small size for dorm room. Dave, 751-1474.

SAXOPHONE - for student, good cond., reasonably priced. Peter, Ext. 7657.

Services

*Services are listed in the first **Bulletin** of every month as a courtesy to BNL employees. They are neither screened nor recommended by the **Bulletin**. Services forms are available in the **Bulletin** lobby, Bldg. 134.*

BABY-SITTING - in N. Shirley home, avail. days and nights, some weekends, refs. avail., reasonable. Johanna, Ext. 878-6378.

BRICKWORK - masonry, patios, walks, swimming pools, retaining walls, landscaping ties, Belgium block, 25 yrs. exp., Lab disc. Tony, 698-9274.

CATERING - for every occasion, no affair too small, free delivery, call for menu, stands & sternos incl. Dave, 696-1927.

CERAMIC TILE - installations, kitchens, baths, foyers, etc., tile and marble, quality work. Patrick, 289-7807.

CHILD CARE - exp. mother w/grown children will watch your child in my Holtsville home, Lab & other refs. & others. 472-3254.

DRIVEWAYS - before you call a paver, call the driveway saver, pavement-restoration services, free estimate. Artie, 289-7115.

ELDERLY CARE - on weekends in their home, I give TLC and stay overnight, a break for the family, reasonable. Susan, 286-4225 eves.

ELECTRICIAN - outets, switches, lighting, repairs, service upgrades, additional circuits installed, licensed. Steve, 758-7002.

HOUSECLEANING - reliable, honest, hardworking, reasonable, refs. Terry, 475-8516.

JEWELER - special orders, repairs, honest, affordable, no job too large or small. Kelly, 821-5239.

KAYAK LESSONS - touring, river playboats, $85/5 hrs., equip. supplied, intro to kayaking, $30/2 hrs. Ernie, 281-7873.

LAND CLEARING - trees, stumps, brush removed, topsoil graded and raked w/450 loader, $70/hr. Tom Muller, 878-1060.

LANDSCAPE DESIGN - sod, exotic plantings, railroad ties, slate walls, lawn maintenance, pruning, Bobcat for hire. Randy, 286-1330.

LAWN CARE - mowing, weekly or bi-weekly, hedges trimmed, cleanups, etc. Tom, 434-9345.

LAWN MOWERS - and lawn tractors, repairs, fast service, reasonable rates, have trailer, will travel. Dan, 698-7322.

LAWN MOWING - by dependable student. Dave, 751-1474.

LEATHER REPAIR - restoration or color enhancement for all genuine leather products, hand-tooled belts, any size, color or design. John, 399-6325.

LOCKSMITH - sales & service, 10% Lab discount, keys cut during lunch. Pete, 399-2813 after 5 p.m.

PAINTING - int./ext., Sheetrock, tape, spackle, wallpaper, gutters, roofing, power wash, insured, refs. James, 399-4912.

PARTY TENTS - we set up & take down, call for details, sizes & combinations. Fred, 588-2268.

PLUMBING & HEATING - alterations & repair work by retired BNL employee. Jim Morris, 472-1205.

REPAIR - TV/VCR, computers, printers, monitors, o'scopes, electronic test equip., appl.; computer installation, configuration, training. Steve, 698-5260.

SHEETROCK - plaster, wallpaper removal, painting, int./ext., appliance & bathtub spray, window cleaning. Dennis Foster, 929-5524.

SHEETROCKING & SPACKLING - free estimate. Kevin, 567-6621.

SOUTHWEST ITEMS - for country-western dancing, decoration, handmade belts, bolos, jewelry, dream catchers, foil art. Laurel, 399-6325.

TRAINING - personal computer appl., word pro., spreadsheets, graphics, databases, desktop publishing, DOS, Windows. Gina, 929-3649.

VIDEOGRAPHER - capture those precious moments on video, will tape weddings, parties, all occasions. Larry, 281-7240.

WINDOW CLEANING - all work squeaky clean, reliable, refs. 928-3189.

WORD PROCESSING - WP 5.1/6.0 DOS, manuscripts, resumes, term papers, etc., spell-checked, proofread, accurate. Sue, 447-5557 after 6 p.m.

In Appreciation

What's love got to do with it? Everything! Thank you BNLers for your acts of love following my recent accident. — Frances Ligon

I would like to thank all of you who called or sent cards and/or gifts during my recent hospitalization. — Richard Spellman

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