BROOKHAVEN BULLETIN
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BROOKHAVEN NATIONAL LABORATORY

BNL Biologists Unravel Secrets of Key Virus Protein

By scattering beams of x-rays off tiny crystals of pure protein, BNL researchers have taken a major stride toward a better understanding of how viruses reproduce and may have found new potential targets for antiviral drugs.

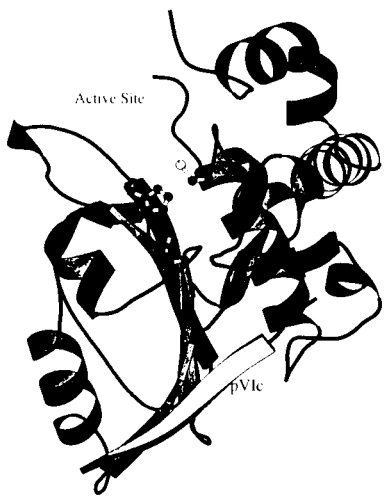
Their achievement, reported in the cover article of the April 15, 1996, edition of the Journal of the European Molecular Biology Organization, *EMBO J*, is the discovery of the atom-by-atom structure of an important enzyme: the protease of the human adenovirus.

But the finding goes far beyond one enzyme in one virus.

The researchers say their finding opens the door to the use of the adenovirus protease as a model for the study of other proteases, including those from the viruses that cause AIDS, hepatitis and the common cold. This could lead to new antiviral drugs.

Roger Stoutenburgh

In the Biology Department lab where the adenovirus protease was studied are: (clockwise from bottom left) Wally Mangel, Bill McGrath, Jianzhong Ding and Bob Sweet. Missing is Diana Toledo.



The atomic structure of the human adenovirus's protease enzyme, as discovered by BNL researchers working at the National Synchrotron Light Source. While most of the protease is shown as strands and ribbons, to emphasize the unique folding patterns of its chain of amino acids, the important amino acids in the active site groove are shown as small circles on sticks. Attached to the protease, but quite far from the active site, is one of its two helpers, pVIc. The active site and the pVIc binding site are two potential targets for antiviral drugs.

Scientist Wally Mangel, who has studied the adenovirus protease as a target for antiviral therapies for seven years, headed the project. When Mangel's group reached the point where structural analysis of the protease was possible, they joined forces with the structural biology team headed by Scientist Robert Sweet at the National Synchrotron Light Source (NSLS).

The collaborators for this interdisciplinary research included graduate student Jianzhong Ding, postdoc Bill McGrath and biology associate Diana Toledo.

Cellular "Scissors"

The protease, a kind of protein-snipping "scissors," is crucial to the adenovirus's ability to reproduce and cause acute upper-respiratory, eye and intestinal tract infections. Such infections are a leading cause of death among infants in developing nations.

Already, the protease structure is helping the search for new adenovirus treatments. In early lab tests on cell cultures, at least one novel compound has halted the construction of new virus particles, stopping the infection.

"Many viruses use proteases at different stages in their life cycle. In adenovirus, the protease performs the key action that allows newly assembled virus particles to become infectious," said Mangel. "If you keep the protease from doing this, the adenovirus dies. The same is true of the AIDS virus. This is why viral proteases are attractive targets for antiviral drugs."

Toward Stopping Resistance

Protease inhibitors, drugs that block the action of proteases, have been in the medical spotlight lately as new and powerful AIDS drugs. While these drugs appear promising, most scientists expect that they will lose efficacy over time, as the AIDS virus mutates and the protease becomes resistant to them. A similar scenario has arisen with the AIDS drug AZT.

Part of the reason for this drug resistance may lie in the ability of the current protease inhibitors to go after

(continued on page 2)

Lab's Resources Foster Discovery

While this week's news on the adenovirus protease (see main story) was published by four BNLers, it has plenty of other BNL connections:

- Lab researchers have been **working on this particular enzyme for several years**, ever since Wally Mangel and Carl Anderson, both of the Biology Department, began a joint study that led to their patent on the protease. Their publication in *Nature* in January 1993, with coauthors Bill McGrath and Diana Toledo, first detailed the protease's need for two helper molecules — the virus's own DNA and a short peptide.
- A **unique system for checking for the presence of protease**, developed and patented by Mangel, was used in much of the adenovirus research. The approach uses an amino acid-rhodamine compound that becomes fluorescent, or glows, when the protease cuts it.
- Another BNL-patented technique, the **T7 expression system**, which was patented by William Studier, John Dunn and Alan Rosenberg of Biology, and two others, was also used in the research. It allowed Mangel's team to produce huge quantities of the protease.
- The solving of the protease's structure at beam line X12-C of the NSLS depended on the **user-friendly apparatus and software** assembled by BNL's Salvatore Sclafani and John Skinner.
- Finally, a BNL-based resource of another kind, the **Protein Data Bank** (PDB), will contain the three-dimensional atomic structure of the adenovirus protease, along with more than 4,000 other such structures. Because the PDB's entire contents are available to researchers worldwide via the Internet and CD-ROMS, the structure will be available to pharmaceutical companies for use in developing treatments for adenovirus and studying other viruses.

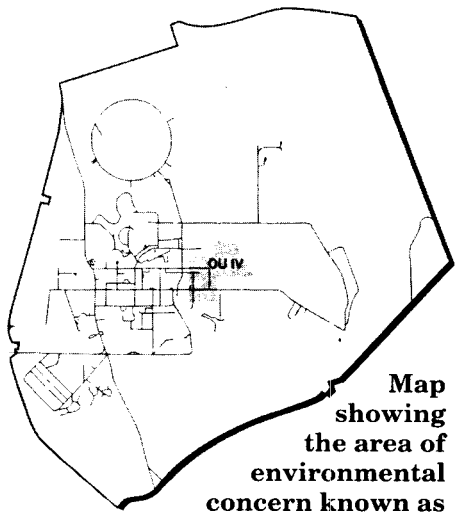
— Kara Villamil

DOE Reaches Interagency Agreement on Cleanup Action on Site

The U.S. Department of Energy (DOE) has reached final agreement with the U.S. Environmental Protection Agency (EPA) and the New York State Department of Environmental Conservation (DEC) on remedial action for a specific area of environmental contamination on the BNL site. This agreement is formally known as a Record of Decision under the federal Superfund law.

The specific area of environmental concern, known as Operable Unit IV, is located in the central part of the 5,300-acre BNL site. This area encompasses the Lab's steam plant, used to heat and cool buildings, as well as a decontamination facility used in the past to clean radiologically contaminated clothing and equipment.

The remedy, said Project Manager A.M. Topé, Office of Environmental Restoration (OER), addresses chemical contamination associated with a 1977 oil and solvent spill and with a fuel unloading area, as well as radiological contamination at the decontamination facility's sump and sump outfall.



Map showing the area of environmental concern known as Operable Unit IV.

Topé explained that the remedial action consists of the following measures:

- Soils contaminated with volatile organic compounds will be remediated by a soil-vapor extraction system.
- Groundwater contaminated with volatile organic compounds will be remediated by a combination of air-sparging systems and soil-vapor extraction. Air sparging is basically bubbling air into contaminated groundwater to remove dissolved volatile compounds.
- As an interim action, areas with radiological contamination in the soil will be fenced off and monitored. A final remedy for radiological soils will be selected under another project, known as Operable Unit I.

Environmental remediation at BNL is carried out under requirements of the federal Comprehensive Environmental Response, Compensation and Liability Act of 1980, commonly known as the Superfund law. The Lab is on the Superfund list primarily due to past operations that have resulted in soil and groundwater contamination that potentially threaten Long Island's sole-source aquifer. Remediation work is conducted under the framework of an interagency agreement among the DEC, EPA and DOE. DOE has jurisdiction over the BNL property and pays for all cleanup costs.

The first public meeting on Operable Unit IV took place in 1991, when a draft work plan for investigating the area was presented. Since then, four public notices have been published and three informational letters have been mailed to community members.

Most recently, on December 6, 1995, a second public meeting was held to discuss remedial alternatives that were under consideration and to solicit comments from the public on the preferred alternatives. The selected remedial action is protective of human health and the environment.

The Record of Decision document is available at BNL's Research Library, Bldg. 477, as well as at public libraries in Shirley and Middle Island. For more information regarding this document, contact OER Community Relations Coordinator John Carter at Ext. 5195, or DOE Project Manager Gail Penny, Ext. 3429.

— Mona S. Rowe

Cannonball Unearthed Near Curie House

While excavating to install new electrical lines in the Curie House, the visitors' dormitory on Mitchell Lane, on Friday, April 12, a construction crew unearthed a surprise: They found a rusted iron ball, about five inches in diameter and weighing about six pounds — and suspected it might be a live munition.

Within minutes, BNL Police responded to their call, then immediately called the Suffolk County Police Emergency Services to investigate the object.

The Emergency Services unit x-rayed the device in its specially outfitted vehicle used for testing explosives and found it to be solid, and, therefore, nonexplosive. Sergeant Bruce Peyton from Emergency Services believed that the object was a cannonball dating from the Civil War, or perhaps even earlier.

A soldier uses a cannon at Camp Upton, in this photo from January 1941.

Roger Stoutenburgh

After the cannonball was deemed safe, BNL Police Captain George Mission (left) inspected it, while Sergeant Bruce Peyton, Suffolk County Police Emergency Services looked on and Diane Greenberg, Public Affairs Office, took notes on the situation.

But Janet Tempel, Supervisor, BNL Museum Programs, shed some new light on the history of the object. She found some old photographs of a cannon in front of what used to be the old post headquarters — now Security Headquarters, Bldg. 50 — when BNL was the site of Camp Upton during World Wars I and II.

"During both World Wars, the U.S. Army apparently used some old artillery from previous wars," Tempel said. "So, it is possible that the cannonball may date back to the Civil War or before. We will include it in our Camp Upton Historical Collection in the BNL Science Museum — for the public to see."

Live artillery has been discovered on site several times in the past. So, Alfred Berretta, Manager of BNL's Police Group, cautions that anyone finding an unusual-looking object that they suspect might be a munition should not touch it. Instead, call Ext. 2222 to alert emergency personnel. Also, leave a marker, like a stick or rock nearby, to help authorities locate the object. — Diane Greenberg

Get the FACTS!

BNL fact sheets are available in the Public Affairs lobby, Bldg. 134, or in large quantities from Quick Copy, Ext. 2950.

To make suggestions for new or improved fact sheets, call Ext. 5658.

Meet the Brookhaven Council for 1996-97

Established in 1962, the Brookhaven Council's charge is to advise the Laboratory Director on matters concerning the scientific staff.

The 15 council members are elected from BNL's tenured scientific staff for three-year terms to make recommendations on staff appointments, tenure, involuntary terminations and other matters on which the Director may request advice. The council is also an avenue whereby scientific staff may bring their concerns to the Director's attention.

Roger Stoutenburgh

Pictured at a meeting on April 8 is the 1996-97 Brookhaven Council: (seated, from left) Ilan Ben-Zvi, National Synchrotron Light Source Department; Ignatius Tang, Department of Applied Science (DAS); Joanna Fowler, Chemistry Department; and Council Secretary Trevor Sears, Chemistry; (standing, from left) Bernard Manowitz, DAS; John Dunn, Biology Department; Thomas Ludlam, Relativistic Heavy Ion Collider Project; Meyer Steinberg, Department of Advanced Technology (DAT); Sara Dawson, Physics Department; Betsy Sutherland, Biology; Daniel Slatkin, Medical Department; and Council Chairman Samuel Aronson, Physics. Missing are: Peter Johnson, Physics; Philip Pile, Alternating Gradient Synchrotron Department; and James Powell, DAT.

Addled Addresses

- Brookheaven Natl Lab
- Brookline National Laboratory
- Brookham National Lab
- Brookhaven National Lamp
- Brookhaven Natural Lab
- Blue Haven National Labs

Key Virus Protein (cont'd.)

only one "Achilles' heel" on the AIDS virus protease: the active site, where the enzyme binds to and cleaves proteins.

Adenovirus's protease also has an active site, which contains the chemical machinery for snipping proteins. But, said Mangel, "We showed three years ago that the adenovirus requires not only a protease with an active site to get the job done, but also two cofactors, or helpers. One is a short peptide, and the other is the virus's DNA.

"The binding sites for these cofactors are also potential targets for anti-adenovirus drugs," he continued. "If drugs can be made against each of these three targets, the likelihood that adenovirus could resist all three drugs gets much closer to zero."

This approach to pharmaceutical development, the use of a known molecular structure to devise treatments, is known as rational drug design.

Such a tactic takes into account the actual bumps and crevices that dot the protein's surface, and the chemistry of the atoms in the active site and other targets. Drugs are then selected to target specific, unique sites, like a sniper with a rifle, instead of using "shotgun" drugs that might interfere with other, beneficial proteins with similar active-site chemistry.

Structure Full of Surprises

Mangel and his colleagues started their research by harvesting the adenovirus protease from a common bacterium containing a transplanted adenovirus protease gene. They then crystallized the enzyme, which entailed meticulous work that took two years to accomplish and resulted in crystals much smaller than the period at the end of this sentence.

Next, Sweet's group scattered beams of x-rays from the tiny crystals — work that could be done only with the intense x-rays from a synchrotron such as found at the NSLS. As the x-rays encountered the atoms of the protease, they bounced off, only to have their signals captured by surrounding detectors.

Powerful computers were then used to interpret the scattering pattern of the x-rays, yielding a three-dimensional image of the protease that shows the position of each atom and, in turn, each bend and fold in the protein's internal structure.

Those folds held a surprise for the researchers. "We knew this would be an unusual protein because the gene that codes for it is unlike any other gene," Mangel said. "Still, we were surprised when we saw its structure on the computer screen — the folding pattern was completely unique, too. These days, with the structures of so many proteins being investigated at the NSLS and other facilities, it's rare that a new folding pattern is discovered."

One of the deepest crevices they saw in this new structure forms the protease's active site — the first possible target for future anti-adenovirus drugs. Also visible in the structure is the short peptide that binds to the protease, which they had added before crystallizing the protease. Strangely, this peptide seems to perform its function — to activate the protease further — by binding to a site far from the active site.

The location of the third binding site and potential drug target, which attaches to the virus's DNA, is still unknown. The researchers are currently trying to grow crystals of protease bound to DNA to examine them with the Light Source's x-rays.

Viruses and Papayas

Another strange twist to the adenovirus findings came when the researchers compared the structure of the virus's protease to that of papain, a protease found in the fruit of the papaya plant and used to clean soft contact lenses. Both proteases, though completely different in internal structure, were found to have nearly the same amino acids in their active sites.

"This is a dramatic example of convergent evolution," said Sweet. "These two enzymes probably didn't evolve from the same ancestor, but arose independently to do similar jobs."

Another example of this kind of phenomenon is found in the eyes of mollusks, insects and vertebrates like humans, which all evolved separately but ended up using the same chemical to absorb light.

The research was funded by the U.S. Department of Energy's Office of Health and Environmental Research, the National Institute of Allergy and Infectious Diseases of the National Institutes of Health, and the National Science Foundation. — Kara Villamil

Amati Quartet to Complete BERA Concert Series

The Amati Quartet, an internationally acclaimed ensemble from Switzerland, will end the 1995-96 BERA concert series with a performance on Wednesday, April 24, beginning at 8 p.m., in Berkner Hall.

Founded in 1981, the quartet has won several prestigious awards, including the 1982 Premier Grand Prize of the International Competition of Evian, the 1983 Arts Prize of the City of Zurich, the 1986 First Prize of the Karl Klinger Competition in Munich, as well as the distinguished Prize of German Record Reviewers for two of its CD recordings.

The program for the BNL concert includes Mozart's String Quartet in D Minor, KV 421; Haller's String Quartet No. 3; Szymanowksi's String Quartet No. 2, Op. 56; and Schubert's String Quartet in D minor, D. 810, *Death and the Maiden.*

At $14 general admission, $9 for students and senior citizens, and $5 for those under 18, tickets may be purchased at the door the night of the performance.

Amati Quartet

Welcome BNL Daughters to Work

Today is the last day that BNL employees and guests can register their 9-to-15-year-old daughters to participate in Take Our Daughters to Work Day next Thursday, April 25. For information or a registration form, contact Susan Foster, Ext. 2888.

Foster, who is organizing the day's events, encourages all employees to get involved. Even if you're not hosting a daughter, leading a tour or otherwise formally involved in the activities, Foster hopes that employees will welcome girls to their workplaces and take some time to explain their jobs to the young visitors.

Arrivals & Departures

Arrivals

Alireza Javidfar.....RHIC
Gary J. Polonski.....Central Shops

Departures

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

Michael Botlo.....Physics
Eva S. Bozoki.....NSLS
David A. Whitehouse.....Physics

IBEW Meeting

Local 2230, IBEW, will hold its regular monthly meeting on Monday, April 22, at 6 p.m. in the Knights of Columbus Hall, Railroad Avenue, Patchogue. There will be a meeting for shift workers at 3 p.m. at the union office. The agenda includes regular business, committee reports and the president's report.

National Organ & Tissue Donor Awareness Week

Liver Transplant Saves Retiree's Life

Ed Heins

In 1985, when he retired from the Physics Department as a technical associate I in 1985 after 30 years of service, Ed Heins moved to South Carolina and had eight years of quiet retirement before he had any warning that something was wrong with his liver.

He explains, "In 1993, I had an attack that almost killed me, but I recouped from that to have another attack in 1994, at which time I was diagnosed with a liver disease and given a year to live if I didn't have a transplant."

At 65, though Heins was over the age limit for transplants, he was decreed healthy enough to receive one. On July 1, 1995, he got a call to report to Carolinas Medical Center in Charlotte, South Carolina: A liver was available, and Heins was one of three or four possible transplant recipients eligible for it.

After a long wait, at 6:20 p.m., he learned that the liver was to be his, so ten hours of surgery involving three teams of surgeons and nurses followed. As was discovered during the surgery, Heins learned that his liver problem was due to a birth defect: cogenital hepatic fibrosis.

Two days after the surgery, he was up and walking around — and, with the exception of another brief hospital stay to correct a problem with his incision, Heins has been walking ever since, having resumed his favorite exercise. As he summarizes, "I have been transplanted for over six months and am feeling very good."

National Organ & Tissue Donor Awareness Week begins Sunday, April 21. Given his life-saving experience, Heins says, "I appeal to people to become organ donors. The organs from one deceased person have the capability of saving about seven other people's lives — and what is a greater gift than giving life to someone who is waiting to die? So, as an organ-donor button says, 'Don't take your organs to heaven, for heaven knows we need them here.' "

— Marsha Belford

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

Telephone Tip

You don't have to run down the hall to answer a phone you thought was yours. Make your phone stand out from the others. You can change your phone's ring tone to any one of eight tones. Simply get a dial tone, dial *572, and then a single digit (1 through 8) to hear various tone pitches. The last tone you hear before you hang up will become the ring tone of your phone.

Take a *Showboat* To *Sunset Boulevard*

Last week's Bulletin announced that BERA is going to return to Broadway on Saturday, June 1, to see the hit revival of the musical *Showboat*. The day's plans have been revised, however, to offer theatergoers a choice of two shows that same day: *Showboat* or *Sunset Boulevard*.

For those opting for *Sunset Boulevard*, the per-person price for the full day's activities is $105; for *Showboat*, the per-person cost is $120.

The cost includes: round-trip bus transportation, orchestra or mezzanine seats for the selected matinee, a full-course dinner at a theater-district restaurant, and a visit to South Street Seaport.

A $50 deposit to reserve tickets is due now at the BERA Sales Office, Berkner Hall, weekdays, 9 a.m. to 1:30 p.m. For more information, call Andrea Dehler, Ext. 3347, or Kay Dellimore, Ext. 2873.

Aviation Club Trip

The BERA Aviation Club will sponsor a trip to Block Island on Wednesday, May 15, and all are invited to book a seat. They will leave Brookhaven Airport at 8 a.m. that day, and, after participants tour the island, the return will be around 6 p.m. Each one-way trip is about 45 minutes.

If all seats are booked, the cost for flying will be $40 per person. For reservations, call Lou Addessi, Ext. 4672, or Victor Castillo, Ext. 3772.

ANS Meeting

At the next meeting of the Long Island Section of the American Nuclear Society (LIANS), David Becker, who is a professor of radiology and medicine at New York Hospital, will speak on "Childhood Thyroid Chancer Following the Chernobyl Accident." The meeting will take place on Thursday, April 25, at the Three Village Inn, Stony Brook.

Following cocktails at 6 p.m. and dinner at 7 p.m., the speaker will be introduced by LIANS vice president Frank Patti, BNL's Reactor Division.

All are welcome. To make reservations, call Vera Meier, Ext. 7702, by Tuesday, April 23.

In Memoriam

Randolph Hudson Jr., who had retired from the Lab as a nuclear reactor operator in on September 29, 1995, died on April 1, six days before his 65th birthday. Spending his entire Lab career in the Reactor Division, he had begun work at BNL on May 28, 1962, as a pile operator trainee, but was voluntarily laid off on May 15, 1970, as a nuclear reactor operator IV. Hudson came back to Brookhaven on December 16, 1985 as a nuclear reactor-operator trainee, and he was promoted to his final position on December 11, 1989.

PSI Will Meet On Secretaries' Day

Wednesday, April 24, is Professional Secretaries Day, the highlight of a week dedicated to recognizing the secretarial profession. For that day, the Upton Chapter of Professional Secretaries International (PSI) has scheduled a meeting featuring guest speaker Judy Anderson of Anderson Consultant and Training. At 7 p.m. at Borders Books & Music, 5151 Sunrise Highway, Bohemia, Anderson will discuss "Teeing off to the Green: Using Golf as a Business Tool."

Meeting attendees can obtain 15% discount coupons to purchase books and music that night. Get them at Borders, from PSI's Susan Carlsen, before and after the meeting, beginning at 6:30 p.m.

To RSVP or for more information, call Carlsen, Ext. 7647.

Coming Up: Goldhaber Prize

The Gertrude S. Goldhaber Prize will be presented to Q. Joan Harris, a graduate student in Physics at the Massachusetts Institute of Technology, on Wednesday, April 24, at 3 p.m., in the large seminar room of the Physics Department, Bldg. 510.

After presentation of the $500 prize, which is administered by Brookhaven Women in Science, Harris will give a talk about her work on "Synchrotron Studies of Random Magnets," done at the National Synchrotron Light Source. A reception will follow.

Computing Corner

The Computing & Communications Division (CCD) is offering the following:

WordPerfect Users

The WordPerfect for Windows Users' Group will next meet on Tuesday, April 23, from 10 to 11 a.m. in the CCD Seminar Room, Bldg. 515, to discuss basics and how to create forms using tables. New users are encouraged to attend. To reserve a spot, call Donna-Ree Rodriguez, Ext. 7261, or e-mail donnaree@bnl.gov.

Explore the Web

CCD's Personal Computer Resource Center will repeat its demonstration on "Exploring the World Wide Web With Netscape," on Thursday, April 25, from 2 to 3 p.m. in the second-floor CCD seminar room, Bldg. 515. For more information, call Laurie Pearl, Ext. 5520, or e-mail pearl@bnl.gov.

PC Training

The following personal comuter (PC) training classes will be offered in May: intermediate ACCESS, beginner Lotus 1-2-3, basic Windows, and beginner DOS. To register for a class, contact your department or division training coordinator, or call Pam Mansfield, Ext. 7286.

Basic CAD Training

Basic training in computer-aided design (CAD) using AutoCAD R12 will be offered over five days during the week of May 20. Class size is limited, so registration will be accepted first-come, first-served. For more information, to learn the fee charged and to register, call Chris Neuberger, Ext. 4160.

Bowling

Red and Green League

J. Griffin 234/231/612 scratch series, R. Mulderig Jr. 231/216/620 scratch, H. Frei 233, A. Warkentien 232, J. Cuccia 228, D. Fisher 219, R. Wiseman 212, W. Powell 203, K. Koebel 200.

White and Purple League

M. Meier 246/202/191/639 scratch, S. Frei 227/211/203/641 scratch, R. Wiseman 226/213/190/629 scratch, D. Riley 212/200/187, R. Larsen 258/184/606 scratch, E. Sperry IV 225/214/626 scratch, A. Almasy 210/190, R. Picinich 192/191, M. Guacci 186/180, S. DiMaiuta 210, K. Botts 208, J. McCarthy 189, Donna King 187, K. Batchelor 186, Don King 186, J. Flanagan 181, J. Meier 181, A. Pinelli 181, D. Klein 180, D. Botts 171, A. Pinelli converted the 6/7/10 split, P. Manzella converted the 5/7 split.

Basketball

Championship game on April 11

Mustangs 58		Magic 57	
Wayne Cummings	23	Terry Buck	25
Jim Garrison	12	Troy Mayo	23
Kiley Reynolds	12	Ray Jackson	4
Jim Desmond	7	Mitch Williams	3
Charlie Edwards	4	Al Langhorn	1
		Robert Singleton	1

Three-point shots: Garrison (4), Mayo (2), Buck, Cummings, Williams

BNL Joins Long Island Earth Day Celebration

BNL will participate in a "Community Dialogue on Brookhaven Lab" at the Long Island Earth Day celebration at Southaven County Park on Sunday, April 21, from 11 a.m. to 5 p.m. The dialogue is scheduled from 1:15 to 1:45 p.m.

In addition, BNL will host an information table featuring displays showing how BNL contributes to a healthy planet through research programs aimed at finding solutions to environmental problems besetting the Earth.

Also, staff from the Public Affairs Office and the Office of Environmental Restoration will be on hand to answer the public's questions about environmental problems the Lab is currently facing and provide fact sheets.

Southaven Park is on the North Service Road of Sunrise Highway, Route 27, between Yaphank Avenue, Exit 57, and William Floyd Parkway, Exit 58. Employees are welcome to stop by the Lab's table and share in all of the day's events.

Camera Club

The BERA Camera Club will next meet on Monday, April 22, at noon in Room C, Berkner Hall, to view the Kodak instructional videotape "Creative Uses of Filters," after which there will be a question-and-answer session.

In addition, planning will take place for a Sunday field trip to New York City to photograph such landmarks as Rockefeller Center, the World Trade Center, Central Park and the Empire State Building.

All are invited to attend. For more information, call Ripp Bowman, Ext. 4672.

Volleyball

Standings as of April 12

Open League

Playoffs:
Spikers 2, Bud Hitters 3

League I

Finals:
Bikers 'n Spikers 3, Scared Hitless 1

League II — Finals

Spiked Jello	54-9	Jolly Vollies	27-36
Safe Sets	49-14	Nuts & Bolts	25-38
Fossils	35-28	Volley Folly	16-47
Monday Nite Live!	35-28	Night Court	11-52

Tiebreaker: Fossils 5, Monday Night Live! 4
Held to resolve equal record of 0.556.

League III — Finals: Silver Bullets 3,DO-DAT 0

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 Human Resources Division lists new placement notices. The purpose of these listings is, first, to give employees an opportunity to request consideration for themselves through Human Resources, 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 (344-7744), for a complete listing of all openings.

Current job openings can also be accessed via the BNL Home Page on the World Wide Web. Outside users should open "http://www.bnl.gov/bnl.html", then select "Scientific Personnel Office" for scientific staff openings or "Employment Opportunities" or "BNL Human Resources Division" for all other vacancies.

SCIENTIFIC RECRUITMENT - Doctorate usually required. Candidates may apply directly to the department representative named.

SCIENTIST - Trained in experimental physics (preferred) or computer science, with experience in implementing complex data-acquisition systems involving multiple processors and high data rates. Requires familiarity with C, C++ or other object-oriented language, the UNIX operating system, and maintenance tools. This position is for an individual who will develop software for data acquisition for STAR, one of the large experiments at RHIC. The successful candidate will participate in the design, documentation, implementation and testing of the software architecture, as well as provide support for ongoing hardware development projects. Contact: Micheal LeVine, Physics Department.

SCIENTIST - Trained in experimental particle-accelerator physics with experience in the development of software application programs for accelerator control. Activities will be directed to the operation and improvement of the existing storage rings at the NSLS. Important areas of work are the study of injection, orbit stabilization and beam intensity limiting effects, and the development of the related hardware and diagnostic instrumentation. Contact: Samuel Krinsky, National Synchrotron Light Source Department.

OPEN RECRUITMENT - Opportunities for Laboratory employees and outside candidates.

DD 6182. TECHNICAL POSITION - (term appointment) Requires an AAS in electromechanical technology or equivalent, and experience in electrical and control wiring, 480 Vac, and the design and installation of control circuits. The ability to work from prints, rough sketches and verbal instructions is necessary. Electronics experience, as well as experience with public address systems, is desirable. Responsibilities will include hooking up and disconnecting beam-line magnets. Alternating Gradient Synchrotron Department.

NS 4513. TECHNICAL POSITION - Requires a BS in electronic/computer technology, or equivalent work experience. Also requires computer knowledge sufficient to support the Computer Controls Group, which runs diagnostic programs, installs software and maintains and administers networks and control systems. Will assist in analyzing and resolving problems, troubleshooting hardware, installing software, and setting up computers and related hardware. National Synchrotron Light Source Department.

Motor Vehicles & Supplies

91 PONTIAC GRAND PRIX - red, ac, p/w, stereo, excel. cond., $5,000 neg. 632-8114.

91 DODGE DAKOTA PICKUP 4x4 - 8' bed w/cap, V-8, a/t, p/s, p/b, extras, excel. cond., $9,300. Bill, Ext. 4201 or 567-5631.

90 DODGE SPIRIT - 4-dr., ac, am/fm, 55k mi., black, excel. cond., $4,950. 472-1479.

89 JEEP WRANGLER - 5-spd., 79k mi., white/gray, new tires, ac, extras, excel. cond., $7,100. 884-0226.

88 PONTIAC GRAND AM - 4-dr., a/t, ac, 85k mi., Quad 4, 2.3L, orig. owner, $2,600. Tony, Ext. 3637.

87 HONDA PRELUDE - low mi., 62k mi., sunroof, ac, $3,000. Ext. 5753 or 345-9046.

85 CHRYSLER FIFTH AVENUE - 4-dr., V-8, fully loaded, leather int., 83k mi., v.g. cond., $2,100. Marvin, 791-4342.

84 CORVETTE - 64k mi., a/t, ac, black, 17" wheels, mint, $8,000. 293-4985.

84 TOYOTA CAMRY LE - brown, 4-dr., a/t, p/s, p/b, p/w, p/l, p/mirrors, p/moonroof, 107k mi., runs well, needs some work, best offer. Kevin, 331-4487.

84 ESCORT - diesel, 87k mi., new engine at 40k mi., v.g. mech. cond., $1,050. 751-0345.

84 PONTIAC FIREBIRD TRANS AM - black w/gold trim, 5.0-liter eng., V-8, 5-spd., $1,700 neg. Rich, Ext. 5893 or 744-4816.

79 FORD F350 4x4 - new engine, 12/12 warr., new clutch, western plow, new carb., many new parts, $4,900 neg. Nancy, Ext. 7976.

64 POP-UP CAMPER - hi-lo, sleeps 4, gas, refrig., oven, stove, heat, all working appl., potty, independent brakes, good cond., $600. MaryEllen, Ext. 2979.

RAG TOP - for a '93 Geo Tracker, white, excel. cond., $120. John, 395-5922.

TIRES - 4, used, LR-245/75R16, 10-ply, good for work truck. Bill, 589-3372.

Boats & Marine Supplies

26' SEARAY SUNDANCER - 1985, 1994 Mercury 260, windless, galley, head w/shower, sleeps 5, Loran, plotter, FF, $16,000. Ron, Ext. 7588.

22' WINNER - cuddy cabin, dual batt., fish well, captain's chair, 175-h.p. rebuilt Evinrude, galv. trailer, new steering, $3,500. 997-4515.

21' BAYLINER - 1985 Trophy OMC i/o, cuddy, mooring, marina maint., FF, Loran, extras, ready to go, $4,500. 821-0644 after 5 p.m.

18' SEA KAYAK - 1-person, Kevlar, 30 lbs., 2 hatches, fg paddle, 2 yrs. old, orig. $1,700, best offer. Carlee, Ext. 3125.

BOW RAIL - from Luhrs, 32', stainless, full length, $125. Russ, Ext. 7186.

MOTOR - electric trolling, 15-lb. thrust, excel. cond. Ken, Ext. 5110.

JET SKI - 1991 Kawasaki X2, 2-seater, low hrs., clean, 650cc., very fast, $2,800. David, Ext. 5217.

WINDSURFER - centerboard, complete, $150. 632-8114.

Furnishings & Appliances

DISHWASHER - Whirlpool, under the counter, $75; director's chairs, 4, leather, $75/ea.; sofa, matching sofa bed, $200/both. Albert, Ext. 4442.

ENTERTAINMENT CENTER - 3-pcs., w/panel doors, back light, slide-out drawers, TV mounting, oak, $800. Rich, 929-8514.

FRIDGE - Excellence, 1.5 cu. ft., perfect mini fridge for dorm room, asking $50. Carol, Ext. 7686.

DINING ROOM - trestle table, dark pine, 6 chairs, 2 leaves, $300. 698-5762 after 6 p.m.

DINING ROOM TABLE - round, wood, w/2 leaves, 4 captain's chairs, matching hutch, $175. Joan, 928-5291.

DESK - oak, $250; clothes cabinet, 4'x2', solid wood, $75; sofa bed, floral print, $75. Joe, 281-8943.

FUTON - and frames, like new, queen-size, $165; full-size, $130; other furnishings for sale. John, Ext. 7882.

HUTCH - China closet, solid pine, brown stain, 6'8½"h x 6'8"l x 22"w, $350 neg. Tony, Ext. 7521.

RECLINER - blue, like new, $250; table, oak, 18"x18", $25; captain's chairs, maple, $50/ea.; table, oak, $300. 281-8943.

STONEWARE - Mikasa, 8-place setting, Strawberry pattern, $70; pine hutch, custom-made, 30"w, $100; blueprint machine w/stand, $75. Rich, 929-8514.

SOFA - leather, 2-seat, off-white, excel., $200; rug, 9'x12', cotton, black, Pier I, $40; 2 small prayer rugs, Turkey, $25/ea. 929-5742.

SOFA BED - full-size, excel., $150; freezer, big, old model, Sheluador, upright, $75; dining room table, 4 chairs, small China closet, 40+ yrs. old, $225. Lynn, 289-6639.

SOFA BED - $200 neg.; portable washer, $180, both 2 yrs. old. 632-8114.

Tools, House & Garden

ANNUALS - flowers, $10/flat, $5.50/½ flat, vegetables, $1/pack. Ray, 727-6818 after 4 p.m.

ASPARAGUS ROOTS - grocery bag full of over 20 large roots, fresh dug, $10/bag. Tom, Ext. 4507 or 878-1060.

DOORS - 7, interior solid wood, antique gas stove, both circa 1930, best offer. Tony, 298-1932.

FIREPLACE - free-standing, gas or wood, ideal for summer cottage or workshop, make offer. Mrs. Winsche, 286-0517.

LADDERS - 20' fg, 24' alum. extension, $100/ea.; 8', slap brake, $200; tarp, 20'x40', blue, $25. Tony, 298-1932.

PATIO SET - 6-chairs w/cushions & matching umbrella table, 40"x90", green PVC, light fix., covers for all, orig. $2,000, now $1,000. John, 395-5922.

TREES/SHRUBS - white pines, $2/ft.; Greek arborvitaes, $3/ft.; dwarf Alberta spruces, $4/ft., all nursery grown. John, 744-5867.

WOOD CHIPPER - 1990, 12-h.p., elec. start, chips 5" dia. logs, gar. kept, excel. cond., $1,500. Rich, Ext. 3354 or 589-9103.

Sports, Hobbies & Pets

BICYCLE - Schwinn, 3-spd., women's 26", new tires, $25. Ron, Ext. 2525 or 286-0353.

BICYCLES - 2, 10-spd., Schwinn, $25; Dawes alum. alloy, $45; scuba gear, $150; wet suit, men's, medium, $50. Chris, Ext. 4163.

BICYCLES - both Schwinn, men's 10-spd., women's 5-spd., lights & generators, good cond., $50/ea. Rau, Ext. 3864 or 286-4774.

BICYCLE - 18-spd. Motobecane, less than 1 yr. old, blue, 23", mint, asking $275. Viorel, Ext. 7104.

EXERCISE GYM - w/stair stepper, bench, butterfly, press, leg extensions, good cond., uses rubber bands, no weights, $50. Brian, 878-4356.

EXERCISE MACHINE - Body By Jake, hip & thigh, $80. Donna, 878-2425 after 6 p.m.

EXERCISE MACHINE - Weslo Cardio glide plus rider, used 1 mo., paid $250, now $150. Jim, 286-1358.

EXERCISE MACHINE - flex & cross-training system w/stepper, butterfly press & more, like new, $200. Donna, 929-0351.

GOLF CLUBS - Smith, metal woods 1-3-5, 2 yrs. old, ask. $165. Ext. 2539.

GOLF EQUIPMENT - 3 metal woods, 3 PW irons, First Flight, ping bag, used 18 mos., v.g. cond., paid $460, now $145. Rau, Ext. 3864 or 286-4774.

KAYAKS - touring, Slalom, very stable weights, 34-lbs., good cond., $300/ea. Ernie, Ext. 2371.

GAMEBOY - Nintendo w/Zelga tape, $20. Ext. 4247.

SEWING MACHINE - early 1900s Singer, wood cabinet, working cond., best offer. Doug., 345-6992.

SNAKE - Boa, 3½', w/30-gal. tank, heat rocks, light, eats frozen food, hand-tamed, ask. $230. KC, 878-9331.

TELESCOPE - 10", Meade Newtonian, reflector, motor drive, $550. 467-1343.

DOG RUN - 6'x6'x10', welded chain-link sections, located in Shirley, $125. 540-297-1776.

GOLF CLUBS - Smith, metal woods 1-3-5, 2 yrs. old, ask. $165. Ext. 2539.

KENNEL - 36"w x 22"d x 24"h, for medium-sized dog, w/removable pan, $40. Gary, Ext. 3751 or 589-5490.

PHOTOGRAPHY EQUIPMENT - 3 white lightings w/access., excel., $1,000; backgrounds & stands, $300; 17 instructional photo books, $50. Pat, Ext. 3275.

PHOTOGRAPHIC EQUIPMENT - Besler drums, 8"x10", 11"x14", agitator, color filters/calculator, color printing book, $125/all. Ext. 4538 or 286-8904.

R.C. CAR - Bush Devil, 1/10 scale, pickup, Futaba control, variable charger, extra set of tires, manuals. Rich, Ext. 2410.

SEWING MACHINE - mini lockstich Color Stitch, w/carrying case, good for child or for mending, never used, $30. Linda, Ext. 2733 or 395-6784.

Audio, Video & Computers

CD PLAYER - Yamaha, single disc, $100. Tom, Ext. 7287 or 744-4535.

CAMCORDER - Sony Video 8 Pro, w/accessories, extra tapes, $250 obo. Bill, Ext. 3278 or 281-6365.

COMPUTER - IBM compatible, 386/40 tower 4/130 modem Paradise, 1 MB, video car, Synmaster .28, Windows 3.1, monitor mouse, loaded w/software, $600. 744-9664.

MODEM - 14.4 Global Village, gold, $65. Dave, Ext. 5465.

STEREO - Yamaha amp/tuner w/Yamaha speakers, Sharp cass., $75; JVC turntable, $50; 60s-80s LPs, $1. Chris, Ext. 4163.

TASCAM - 4-track porto./studio & Roland R8MKII drum machine, fully programmable, paid $1,650, now $700 neg. John, Ext. 7340 or 732-2702.

TV - Zenith, 25", color console, $50. Ron, Ext. 2525 or 286-0353.

TYPEWRITER - Sterling, elec., hardly used, paid $79.99, now $30 obo. Carly, 727-6714.

VIDEO GAME - Nintendo, deluxe joystick, NAS Advantage, controller, 18 games w/color TV, $300. John, 395-5922.

BASS HEAD - Gallien Kruger 200 rb, 100 watts, 3-band eq., chorus, $115. Jim, 924-7374.

CD PLAYER - high-end Sony, crown 1c 150, preamp, factory refurbished, best reas. offer. Cathy, Ext. 7099.

COMPUTER - Atari 1040ST, games, 2 joysticks, mouse, color monitor, word processor, spreadsheet, printer, $200 obo. Mary, Ext. 2066.

COMPUTER - 486DX33 w/8MB RAM, 135MB HD, CD-ROM, VGA color monitor, 3.5" floppy, $575. Tom, Ext. 5258.

COMPUTER - Pentium, 75MHz, 16MB RAM, PCIBUS 1GB HD 4X CD ROM, 14.4 modem, speakers, Windows '95, midtower, $1,200. Mei-Lan, 951-2064.

PRINTER - StyleWriterII, Macintosh, orig. box, incl. software, manuals, 3 cartridges, 1 refill, 1-yr.-old, $250. Ext. 4538 or 924-2012, leave message.

PRINTER - for Macintosh, Seibosha model, w/stand and ribbons, excel., $100 obo. 929-5742.

TV - Sharp, 19", $90; VCR, Panasonic, $90; both 1½ yrs. in use; bicycles, Raleigh, $20. Ext. 7830/1021.

Miscellaneous

BABY'S SWING - $10. Frank, 399-7309.

CRIB - Childcraft, solid oak w/mattress, v.g. cond. Ext. 5868 or 924-5230.

DRUMS - 8, 55-gal., $5/ea. Albert, Ext. 4442.

WEDDING DRESS - size 12, plenty of room for alterations, w/slip & headpiece, $550. Pat, 878-9117.

Free

COAL - w/coal bin. Steve, Ext. 4555.

KITTENS - calico, 8 weeks old, weaned & trained. Steve, Ext. 4414 or 968-4476.

Wanted

CLOTHES TREE - wooden. Bob, Ext. 4048 or 924-9662.

COSTUMES - dress-up for children for Upton Nursery School; large indoor climbing toys. Penny, 929-5797.

DOORS - old pre-hung, old kitchen cabinets, Sheetrock, insulation, studs. Rich, 929-8514.

GUITARS - 467-1343.

HOMES - for BNL visitors/guests, furn. apts., condos, houses for short-term rentals. Marie, Ext. 4489.

HOUSE TO RENT - full year, 2-3 bdrm., 2 adults, nonsmoking, no pets, Center Moriches to Westhampton. Russ, 325-0563.

HOUSE TO SIT - avail. July, Aug. & poss. Sept. to care for your home, refs. furnished upon request. Susan, Ext. 7414.

HOUSEMATE - share 3-bdrm, 2-bath, 2-car gar. house, walk to beach, 2 mos. security, refs., $500/mo. + util., 369-5119, leave message.

SKI EQUIPMENT - cross-country, for 4-7 yr. old child and woman w/size 9 foot. Penny, 929-5797.

TV - color, good cond., reasonable. 929-5742.

TRUMPET - for student, reasonable. Ext. 3751 or 589-5490.

VIEWERS - to watch *Beast* mini-series, Channel 4, starring my daughter Karen Sillas, April 28 & 29. Janet, Ext. 2345.

Classified Ad deadline is noon Friday for publication Friday of the next week.