

Washington Activity On ISABELLE Project

Laboratory Director George Vineyard spoke last week on the importance of ISABELLE in the advancement of high energy physics before the Subcommittee on Advanced Energy Technologies and Energy Conservation, of the House Science and Technology Committee. The Chairman of this subcommittee is Rep. Mike McCormack (D-Washington).

Also on behalf of ISABELLE is an amendment to the federal budget, sponsored by Rep. Jerome Ambro (D-E. Northport), which proposes partial authorization of the accelerator in FY 1978 to the extent of \$10 million. Ambro is a member of the House Science and Technology Committee and of the McCormack subcommittee. The amendment is supported by Long Island Congressmen Wylder and Downey, also members of this Committee. Authorization of such funds also requires action by the full House and by the Senate. Appropriation of these funds is a further necessary step.

ISABELLE, the name given to Brookhaven's proposed intersecting storage accelerator, is currently estimated to cost a total of \$173 million, and would take five years to construct. To date, ERDA has provided \$1.75 million to the Laboratory for more detailed evaluation of the cost of the ISABELLE project.

Also testifying with Dr. Vineyard were Dr. W.K.H. Panofsky, Director of the Stanford Linear Accelerator Center, and Dr. R.R. Wilson, Director of the Fermi National Accelerator Laboratory.

Dr. Vineyard's statement is presented in full below. It is followed by excerpts from the testimony of Dr. Panofsky who emphasized the need for three major high energy physics laboratories in order to maintain the important element of diversity in research:

It is a privilege to appear before this Committee to present my views on a most important project in the frontier field of High Energy Physics. This is the field that endeavors to understand energy and matter in their most basic forms. It is carried out with the aid of machines of increasing sophistication which allow particles of matter to be brought into collision at the highest possible energies so as to probe the innermost constituents of matter and to uncover the fundamental laws which they obey.

The United States has long enjoyed a forefront position in this effort, and the Brookhaven National Laboratory has been a key part of the effort and the major eastern center for U.S. High Energy Physics since 1952. University teams from all areas have worked there, using its two major facilities. The first was the 3 GeV Cosmotron (which was the first machine in the world to exceed 1 GeV), the second was the 33 GeV Alternating Gradient Synchrotron (AGS). Among many important discoveries made at Brookhaven, I mention just two: The principle of alternating gradient focusing, which has made all accelerators of very high energy possible, was made there in 1953. (Its independent discovery in Greece was without influence because it did not become known to the scientific community.) The J/ψ particle was discovered in late 1974 at Brookhaven and simultaneously at SLAC and was recognized by the award of the Nobel Prize to its co-discoverers, Dr. Samuel Ting and Dr. Burton Richter.

Next Logical Step

As the next logical step in the national program of High Energy Physics, and as a key part of the worldwide effort, we are proposing to build a new accelerator, known as ISABELLE. This takes advantage of the colliding beam principle to bring high-energy protons into collision with high-energy protons moving in the opposite direction, thereby providing center-of-mass, or effective energies very much higher than those available anywhere else in the world. The basic design of ISABELLE provides an energy of at least 200 GeV in each proton beam, thus at least 400 GeV in the center-of-mass for proton-proton collisions. Our design is conservative and I emphasize that 200 GeV is a minimum value, and the actual energy may be substantially higher. Continuing research will be directed to finding ways to push this energy as much higher as possible. The machine will consist of two interlaced rings in which protons are accumu-



Laboratory Director George Vineyard

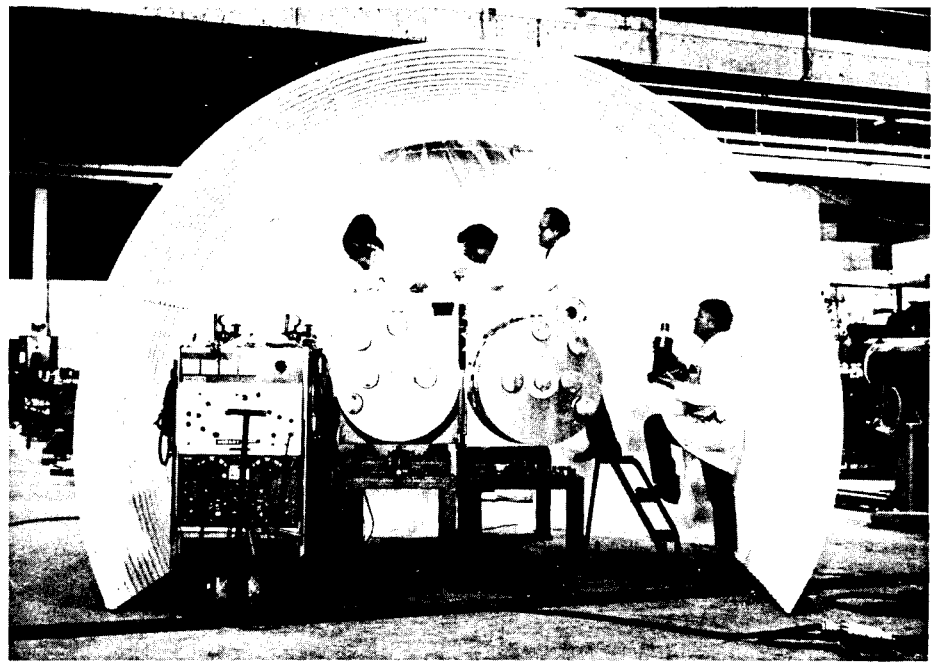
lated, accelerated, and stored, and which are fed by protons from the AGS at initial energy of 30 GeV. The rings intersect in six places at which experiments with the products of the collisions will be performed.

The most significant aspect of ISABELLE is its uniquely high center-of-mass energy. To provide an equal center-of-mass energy (400 GeV) when a moving proton strikes a proton *at rest*, the moving proton would need an energy of approximately 100,000 GeV.

The second important characteristic of ISABELLE is the rate at which collisions will occur. This rate, in each intersection, will be 50 times larger than the rate at the only other proton-proton colliding beam facility, the ISR at CERN, where the center-of-mass energy is 60 GeV. For the observation of the unusual particles and other phenomena expected at these high energies, this high rate is essential. The six different experimental areas will provide the capability for conducting some 8 to 12 experiments simultaneously. Thus ISABELLE will be a facility at which a large number of experimenters, from diverse institutions, will be served. This will insure the rapid and cost-effective exploitation of the machine.

Areas of Research

With ISABELLE, physicists will be able to probe more deeply the so-called strong interactions, which hold together all the



Simulation of the main ring tunnel arch of ISABELLE, as it would be underground, with two full size ISABELLE magnets.

massive particles of the universe. There is growing evidence that the proton and other similar particles have a grainy structure now explained in terms of "quarks" and "gluons." Related to this picture are the striking observations at CERN and Fermi-Lab of a cross section for proton on proton which rises with energy at the highest energies now available. Another important observation made at existing facilities is the production of various kinds of particles with large components of momentum at right angles to the axis of the collision. Higher energies are needed to understand the reasons for these phenomena. Although analogies are only suggestive, not rigorous, it is interesting to note a historical similarity: The scattering of alpha-particles through unexpectedly large angles by atoms of gold lead Rutherford, in 1910, to the discovery of the nucleus of the atom. One of the most important areas of research would be in the so-called weak interactions, where it should be possible to observe a new type of particle which has been hypothesized for many years as the agent responsible for the weak interaction, but never yet seen. This particle, the W^\pm , is now predicted to have a mass of about 65 GeV, well within the ISABELLE range. Observations of these phenomena are expected to bring together all three fundamental forces - weak, strong,

and electromagnetic - into a unified theory. And not to be forgotten, when exploring a whole new realm of energies, is the opportunity for finding novel and unexpected phenomena. When Columbus sailed west he expected to find India.

The ISABELLE, in common with all synchrotrons and storage rings, requires a large number of electromagnets to bend the orbits of its particles. In ISABELLE superconducting coils will be used in the magnets. Such magnets produce much higher fields than ordinary magnets, thus saving space and construction costs, and substantially conserving the overall electric power required for operation. The superconducting coils must operate at temperatures near absolute zero, requiring sophisticated refrigeration systems.

The technology of large high-field superconducting magnets is being advanced by the research on this project, and this is expected to have useful impact on other areas, such as magnetic fusion and magneto hydrodynamics. Other interesting frontier technologies are involved, including large-scale ultra-high-vacuum systems, and complex computerized controls.

Planning and Design

The basic design calls for two rings more
(Continued on page 2)

Excerpts From the Statement by Dr. W.K.H. Panofsky, Director, Stanford Linear Accelerator Center

... The health of high energy physics is generally excellent. The last 2 years have produced a veritable explosion of new information which indicates that there exist new entities within the fundamental particles of matter whose profound implications we can only surmise. ...

The recent discoveries have drawn their strength from the three major centers of high energy physics in the U.S. - Brookhaven National Laboratory, Fermi National Accelerator Laboratory, and Stanford Linear Accelerator Center - and I believe that the continued vitality of all three centers is essential to maintaining this high productivity in relation to the level of support the field has received. ...

To maintain the health of each laboratory, it is necessary to maintain a reasonable balance between the exploitation of the existing facilities and replacing older apparatus with new instruments giving new opportunities. The operation of accelerators and their efficient exploitation for research is expensive. The total cost of construction of each accelerator tends to be spent again within 2 to 5 years of operation in terms of the cost of operations and research equipment. Therefore, it is false economy to defer unduly new initiatives which can rejuvenate the productiveness of one of the three major centers. Specifically, I believe that construction of a proton-proton storage ring in the highest energy consistent with the state-of-the-art at Brookhaven should be supported. I note

that the High Energy Physics Advisory Panel of the ERDA Division of Physical Research has supported the construction of this installation since FY 1977.

Let me give you a brief progress report on PEP. [Positron-electron colliding beam project at SLAC]. The construction team has been fully assembled including an able architectural-engineering management firm. The first support buildings are under construction and geological studies are almost complete. Models of most of the critical subsystems are operating. It appears now that there is an excellent chance that the completion date originally targeted for April 1980 might be advanced to October 1979. ... We have received an excess of first-rate proposals incorporating many ingenious, innovative ideas, designed to exploit the new facility. ...

It will be difficult indeed, to decide among the major meritorious competing proposals, originating from many parts of the country, by the deadline we have set for ourselves which is April or May of this year. This situation illustrates the general problem foreseen in supporting the high energy physics community from all parts of the Nation. The expanded opportunities at Brookhaven provided through construction of ISABELLE permit exploration in detail of the highest energy collision processes. This facility is an essential element in ameliorating the overload on the facilities in the 1980's. ...

ISABELLE

(Continued)

than 2000 meters in circumference, housed in a single tunnel some 14 feet in diameter and completely shielded with earth. The existing Brookhaven site is quite adequate for the machine. The cost for the basic machine is estimated at \$125,000,000 with an additional allowance of \$17,000,000 for contingency and \$31,000,000 for inflation during the five years it would require for construction.

This project has been under consideration since 1971, and under intensive study in all of its aspects since 1974. During this period ERDA has supported the R and D with operating funds and in the last year has supplied construction, planning, and design funds in anticipation of authorization. The proposal has been reviewed and endorsed by a number of groups, including an international summer workshop in 1975, special panels appointed by ERDA for considering the entire national program in High Energy Physics in 1974 and again in 1975, and by the ERDA High Energy Physics Advisory Panel (HEPAP). Its support is strongly advocated by HEPAP and it is recommended by ERDA as the next major element of a balanced and desirable U.S. High Energy program.

Full scale superconducting magnets for ISABELLE have been built and tested at Brookhaven. They meet and surpass all of their specifications. Other crucial technological elements of the design have been fully explored. We are satisfied that the machine is ready for construction and that it would go far to assure the continuing vigor of this frontier field of scientific investigation. Even limited authorization for a modest sum in FY 1978 which would allow the start of detailed design, the start of priority construction, and procurement of some long-lead-time equipment would substantially advance the date of the machine's completion. I urge the Committee to help us exploit this important and urgent opportunity.

Arrivals & Departures

Arrivals

Keith D. Detmer Plant Engrg.
Charles Schmidt Accelerator
Steffen A. Utne Physics

Departures

Dipankar Chandra App. Science

Events At BNL

Sunday, March 13

Genetic Engineering for Nitrogen Fixation Conference begins, Berkner Hall, 7:30 p.m. (13-18)

Friday, March 18

SUNY at Stony Brook Physics Society Tour

Speaking Up Is Good For You

"An assertive person is healthier both physically and emotionally," said Francine Berger, a faculty member at Dowling College, during her lecture at Berkner Hall last week.

Ms. Berger was invited to address women employees on how to communicate more effectively, both on the job and in social situations. Although, in this instance, her lecture was aimed at women, she said assertiveness training was developed to help both sexes in more direct, honest communication.

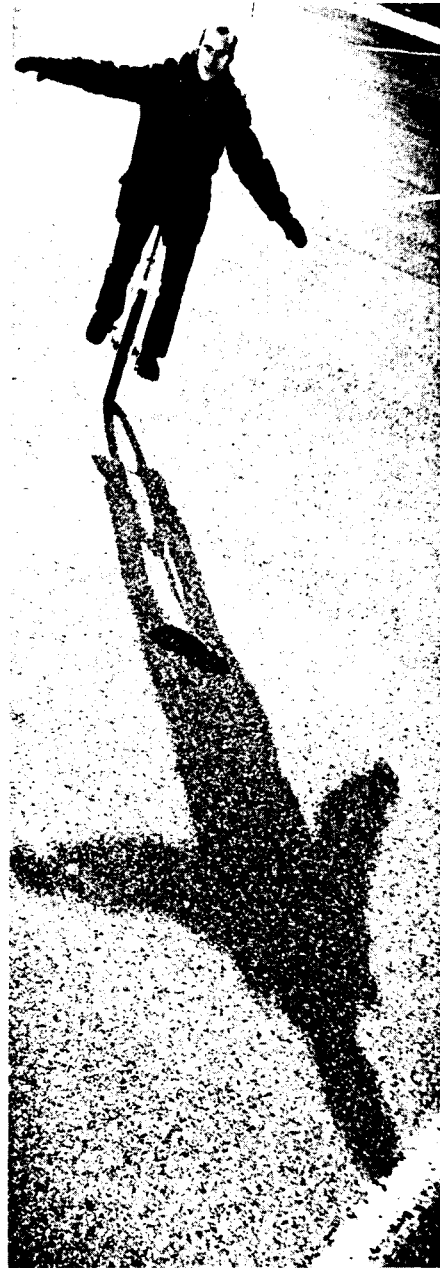
Ms. Berger's second lecture at the Laboratory will be open to both men and women employees; and the date will be announced during the next two weeks.

Assertiveness is not to be confused with aggressive behavior, she said. An aggressive person doesn't really care what the other person thinks, but an assertive person not only has respect for his own opinion, but for that of others.

In outlining the philosophy of assertiveness training, Ms. Berger emphasized three main concepts - change, choice and control.

One must accept the concept of change, Ms. Berger said, and, at the same time, realize that there will be resistance to change from those around you. This is a risk one must be willing to take in order to put new attitudes into effect.

One Wheeler



Michael Rowe, DAS, got a unicycle from his wife for Christmas a year ago. It is not something you can carry the groceries home on, but Rowe says he enjoys doing things that require skill. The part that is the most fun, he says, is learning how to ride it. You have to pedal all the time, no coasting. How do you stop a unicycle: "You jump off quickly." At the amateur level, he rates himself about seven, on a scale of one to 10. Rowe and his wife also enjoy another skill, white water kayaking. They recently took a biking-camping trip in Europe - but not on the unicycle.

Wanted

Anyone knowing the whereabouts of a blue three ring binder labeled "Brookhaven National Laboratory Records Management Manual," please forward same to Joan Perullo, Building 179B.

Genetic Engineering For Agriculture

Scientists meeting for an international conference next week at Brookhaven will focus on their use of genetic engineering, including recombinant DNA experiments. Their common goal is to enhance plant productivity by improving systems for nitrogen fixation through alterations in genetic codes.

According to Dr. Alexander Hollaender, (AUI) conference chairman, "This research program could lead to tripling agricultural production in areas where people cannot afford to purchase nitrogen fertilizer."

Brookhaven will host the conference on "Genetic Engineering for Nitrogen Fixation" from March 13-17. Special evening sessions are planned to discuss the legal, health, environmental, and social issues involved in this research.

"Nitrogen fixation" is the conversion of nitrogen gas from the air into ammonia and other useful nitrogen-containing compounds. Only a few types of bacteria presently have the capability to carry out nitrogen fixation in nature.

This fixed nitrogen enters the food chain of higher organisms through plants. Sufficient presence of this nutrient is the most common limitation on growth. Large

amounts are required by all forms of life.

These biologists are attempting to use recombinant DNA in genetic engineering to increase the efficiency of nitrogen fixing systems, which are genetically controlled in nature. Most of these efforts are directed at transferring the genetic codes that confer nitrogen-fixing ability.

A round-table discussion with the press will be featured on Wednesday evening. Robert Talbot of the National Institutes of Health (NIH) will outline the experience and outlook of the NIH in the development of guidelines for recombinant DNA. Virginia White, a science administrator and writer, will then moderate an open discussion between members of the press and conference participants.

A panel of journalists who specialize in science reporting will be featured in the dialogue between the press and the scientists. The panel will include John Behnk, Bioscience; Roger Field, WPIX and NBC; Peter Gwynne, Newsweek; Earl Lane, Newsday; Judy Randall, NY Daily News; and Robert Ubell, The Sciences.

The conference will be sponsored by the National Science Foundation and conducted by Associated Universities, Inc. (AUI).

Cooking Exchange
Quick, Easy and Cheap

What do you serve when the need arises to prepare dinner in a hurry? And how about when the budget is tight but you don't want to deprive your family of a delicious and wholesome meal?

How to resolve these dilemma situations will be the aim of the demonstrators* at the next meeting of the Cooking Exchange. Come to the Recreation Building at 12:30 on March 23 and be enlightened.

*If you have an idea you would like to share on this subject, it's not too late to call Donna Coleman at 363-8914.

Remember - volunteer demonstrators will all receive invitations to the International Dinner coming up in June.

Public Sale
Of Motor Vehicles

Three (3) vehicles, located at Warehouse T-87, will be available for Public Sale.

Inspection will be permitted from March 21 through March 25, during the hours of 9 a.m. to 4 p.m., except Saturday and Sunday.

Bids will be opened on March 29th, 1977, at General Services Administration, Business Service Center Bid Room, 26 Federal Plaza, New York, N.Y.

This will be an Informal competitive bidding. Bid forms may be obtained at Buildings 87 and 211. For further details, please call extensions 2302 or 2977.

Smoke Detectors

Due to the frequent enquiries regarding status of our order for Guardian Smoke Detectors, the BERA Board decided to publish the following information.

Difficulties are being experienced in obtaining delivery of the balance of the 560 units which were ordered last October for the following reasons. The manufacturer having negotiated with two large national organizations to sell their product under their respective brand names find that they are unable to make delivery to the small distributors with whom they have been dealing previously. We have orders placed with two local distributors both of whom have not received any deliveries for the past three months. Both have been given delivery dates of three to four months from now as the earliest time.

In light of these difficulties, the Board arranged for three other comparable smoke detectors to be evaluated by the Safety and Environmental Protection Division. Unfortunately none of these units could be recommended by that group for purchase by our employees.

As a result the Board has decided to wait for delivery of the original units. Anyone who wishes to cancel their order because of the slow delivery should contact Helen Keeley at extension 4649.

Deterring Crime

Russell Dietz, Edgar Cote and William Vogel of DAS, will each receive a \$200 bonus from ERDA for a patent recently issued for a technique to detect the presence of explosive materials, a problem of considerable concern in today's society.

Their invention, a method of tagging explosives with sulfur hexafluoride, is considered a vast improvement over other techniques now in use. The detection of explosives by using X-ray equipment, dogs trained to sniff certain types of explosives and physical searches has had only limited success.

The method devised by Dietz et al., is to tag an explosive by enclosing a source of sulfur hexafluoride (SF₆) within the blasting cap at the time of manufacture. The SF₆ is released from the cap over a period of time in sufficient amounts to permit detection. Because of the penetrating nature of the gas, tagged explosives within closed packages could be discovered by using a "sniffer" as a monitor.

The inventors have also been working on the modification of the sniffer, or chromatograph, and a prototype is expected to be completed in the next few weeks.

The tagging method could be particularly useful in detecting potential terrorist activities on aircraft and in areas where large numbers of people congregate. In addition, it could deter the theft of such explosive materials from manufacturing plants.

John C. Dempsey of ERDA's Division of Waste Management, Production and Re-processing, is also a co-inventor.

Cafeteria Menu

Week Ending March 18, 1977

Monday, March 14

Tomato Bouillon
Franks & beans 1.10
Barbecued fresh ham & 1 veg. 1.35
Hot deli - pastrami

Tuesday, March 15

Cream of chicken soup
Chopped steak & 1 veg. 1.10
Chinese pepper steak on rice 1.30

Wednesday, March 16

Puree of mongol soup
Shrimp chow mein on rice 1.15
Short ribs of beef & 1 veg. 1.30
Hot deli - Italian sausage & peppers

Thursday, March 17

Spanish omelet & fr. fr. 1.15
Hot deli - roast beef

St. Patrick's Day Special

cup of split pea soup
corned beef & cabbage
boiled potato or mashed turnip
choice of pie, small beverage
\$1.87 plus tax

Friday, March 18

Clam & celery soup
Seafood cakes & spaghetti 1.10
Pot roast & 1 veg. 1.30
Hot deli - smoke tongue

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Inside Info

• **Dr. Ursula Reincke**, Medical Department, appeared on the Leukemia Society of New York Marathon on WOR TV; February 27th. She has devoted a number of years to leukemia research and has been the recipient of awards and grants from the Leukemia Society.

• **Andrew Hull**, Head of the Laboratory's environmental protection and analytical services, and **Ferdinand Shore**, DAS consultant and Professor of Physics at Queens College, took the pro side in a debate on "Nuclear Energy: Necessary or Too Dangerous?" at the New York Society for Ethical Culture, last month. They were opposed by Dr. Steve Shafer, Member of the American Health Association and Mark Reisner, Editor of Publications, National Resources Defense Council. The open hearing was attended by about 100 persons.

• **Dr. Edith Forsyth**, former industrial physician at the Laboratory, and wife of Eric Forsyth, Accelerator Dept., has been appointed director of the Department of Family Practice, a major clinical service of Brookhaven Memorial Hospital.

French Song Session

There is a French saying that "tout finit par des chansons" ("everything ends in song"). This will be the theme of the next meeting of *Le Cercle Français du BNL*, which will take place on Monday, March 14, at 8 p.m., in the Recreation Hall (Apartment Area).

The songs in this case will have a common theme: they are all popular songs set to poems of Jacques Prévert. One of France's best-loved writers, Prévert is known as a poet as well as the author of several screenplays (including that of the classic "Les Enfants du Paradis"). Everyone knows his song "Les Feuilles Mortes" ("Autumn Leaves"), which is included among the selections we shall hear. Using a taped program supplied by the French Alliance of New York, we shall be able to sample a number of recordings made by old favorites such as Yves Montand, Juliette Gréco, and Les Frères Jacques. Copies of the French lyrics of the songs will be provided, to help us in understanding the singers (and for those who want to sing along). Refreshments will be served during the evening.

All members of the BNL community and their friends are cordially invited to attend. There will be a nominal charge, to help cover expenses, for those who are not members of the BNL French Group.

On-Site Resident Meeting

A meeting to discuss laundry facilities and allotment of garden plots will be held for on-site residents Wednesday, March 16, from 8 to 10 p.m., in the Recreation Building (apartment area). If there is anyone who still has a key to the shed where the garden tools are stored, we would appreciate your returning it at this meeting.

Mountain Club

There will be a meeting on Thursday evening, March 17, at 7:30 p.m. at the Brookhaven Center. Slides and pictures of the Everglades trip will be shown. Refreshments will be served. Everyone is welcome.

John Gould is leading a 3-day backpacking trip to the Adirondacks leaving on March 18. Hiking will include some snowshoeing. Anyone interested should contact him at Ext. 3951 or 4642.

Faces/Places



Veronica Brooks is Supervisor of Nurses in the Hospital of the Medical Research Center. She has been a nurse at BNL for 22 years and her first job was with Dr. Cronkite on hematology research. She has also been involved in the brain tumor programs and obesity studies. Early in her career she worked on the extra corporeal irradiation of blood as a scrub nurse to about 75 cows. "My farm upbringing came in handy," she says. Winter sports and gardening are her hobbies. She lives in Center Moriches with her husband and two daughters.



Artie White, an electronics engineer, is Repair Supervisor in Instrumentation. He came to the Lab in 1964 and for the first three years was a Reactor Operator. He transferred to Instrumentation in 1967 and became Technical Supervisor in 1972. "The people inside my department are cooperative, knowledgeable and friendly," he says, "and that's a hard combination to beat." He credits the Lab's tuition refund program with helping him to obtain his B.S. degree. His hobby is bowling. White lives with his wife and two sons in Mt. Sinai.

Won By A Whisker

Although a number of people matched the authors to the quotations, Bob Whisker (Patent Office) was the first to arrive on the scene with the correct answers, and he departed with two free tickets to the Cricket Ball.

Answers to Quotations:
1. Pope Pius XII
2. Ernest Rutherford
3. George Santayana
4. William Shakespeare
5. Oscar Wilde

In Recital

Beverly J. Price, a graduate student in piano at the Indiana University School of Music, will be heard in recital at the Congregational Church of Patchogue, 95 Main Street, Patchogue, on Wednesday, March 23, at 8 p.m. Her program will include Sonata in E^b, Haydn; Sonata in B minor, Chopin; and Five Preludes by Debussy. Admission is free.

Ms. Price, the daughter of Glenn A. Price, (Director's Office), presented a recital several years ago at the Laboratory.

Sports News Bowling

Purple & White League

The Flounders took seven points which puts them in first place followed by one point by the Penthos and the Odd Balls. The Odd Balls had a very good night setting a new league high gross series of 2479. Jim Petro was high for the men bowling 188, 210, 200/598 series; just missing a club award by two pins. Nice games also by Dick Murgatroyd 190, Al Laurine 184, and Bud Pollock 183. Hank Henck converted the 6-7-10 split. High bowler for the women was Betty Roche with a 180. Nice games by Diane Schug 171, Nancy Mayeski 166, and Nancy Overton 160.

Black & Blue League

The battle of the sexes continue with the ladies having the edge. Renee Flack was converting splits with ease, Arlene Hohmann and Ellie Kristiansen were bowling higher games than their husbands. High games were Ed Sperry 203, Renee Flack 174, Pat Oster 173. High gross pots were won by Renee Flack 224, Bob Holland 219.

Red League

The Old Timers took 7 and remain in first place. W. Reams had a 211 for the league leaders. The Designers took 8 and jumped into second. E. Sperry bowled 204. The Sandbaggers took 6 to remain in third place. E. Meier had a 209 game and R. Jones had the highest pinfall of the night, 578 scratch. R. Larsen bowled 200 for the 76'ers, currently in fourth place. The Cosmos are in fifth, followed by the Freon Loaders. The Bubble Boys are in seventh place followed by the Anachems. E. Gill had a 207 for the Anachems. What a turn-around from the first half!

Only five 200 games again this week in the Red. May be Spring fever!

Green League

2/15/77: The Super Cools moved into first place by taking eleven points from the Designers. J. Bartolomy had a 201 for the winners. The Blue Jays and the Charlie Browns battled together as the Blue Jays took seven and moved into second place. The Charlie Browns dropped into third. For the Blue Jays, J. Berech had a 203/216 and T. Iarocci a 229/603 series. For the losers G. Fales had 201, J. Scott 203 and P. Borzi 212. The Got-A-Hit-Ums took eight from the Pinball Wizards. L. Jacobson had a 226 while for the losers G. Meinken had a 202. The Pick-Ups took 6½ from the Anachems. The Sparks only took 5 from the Sandbaggers with G. Spira having a 201 game. The Trouble Shooters took 7 with S. Carrier having a 200.

3/1/77: The Super Cools battled the Freon Loaders to take eight. The Blue Jays had a hustle as they took eight from the Anachems. The Got-A-Hit-Ums took eleven from the Sparks. N. Parrinello lead the way with a 215/219/614 scratch series for the winners. The Pick-Ups took six from the Charlie Browns. R. Vignato had a 201 game. The Trouble Shooters managed seven points from the Cosmos. The Pinball Wizards only managed five points from the Sandbaggers.

Pink League

The Med Squad is still holding on to first place followed by the Gutter Getters and the Pinsplitters. High games for the night were L. Boyd 189/154, F. Scesny 181/235 gross game, J. Matkovich 171/223 gross game, G. Fales 159/150, J. Gazzola 159, M. Brenner 155/151.

The Long Island Industrial Bowling Tournament began on Saturday night (March 5) with 16 teams in the competition. After the first night of bowling, BNL is in 6th place in total pin-fall and 7th place in incentive bowling. High games were A. White 210/201, R. Larsen 201, J. Scott 201, J. Connelly 200.

Skin and Scuba Diving Course

Plans are being made to offer BNL employees and their dependents a course in skin and scuba diving. The instructors of the classes are from The Porthole Scuba Diving Center and are fully certified by NAUI, PADI and the YMCA.

Classes will be held on Saturdays (starting date has not yet been determined) and will consist of nine indoor sessions at the BNL pool, and three open water classes at local dive sites. Lecture topics will include all types of equipment, diving physics, diving physiology, repetitive diving, planning a dive and diving first aid.

A medical release, signed by a doctor, will be required at the time of registration. Students will be requested to come to the first session equipped with a bathing suit, towel, writing material, and the registration fee.

Cost per student:	
Registration Fee	\$35.00
Certification Card	4.00
*Rental Fees -	
Tank, Regulator & Pack	40.00
Wet Suit (3 sessions)	8.00
Bouyancy Compensation	8.00

All those interested in taking the course are asked to call the Recreation Office, extension 2873, as soon as possible.

*Rental fees will be applied to the price of equipment of the student desires to make a purchase.

Volleyball

Employee League

Undefeated Phoenix bowed to the fired-up Spikers on March 2, but retained first place in the standings. Walt Reams has a hot night for the Spikers using a well chosen variety of spikes and dinks as the Spikers took two from Phoenix (21-13, 15-21, 21-14). Phoenix had trouble handling the hot serves from Tom Petty, although Mike McDonell provided some nice spikes for Phoenix in their second game. Phoenix missed the vacationing Phil Bowles and injured Greg Donaldson.

In other games, the Cool Tools took two from the Atom Spikers (21-13, 20-22, 21-15) behind the hitting of big Lou Snead and Dave Miller. Jerry Levine led the Atom Spikers with some resounding slams. The Road Runners ran over the Circuits (21-3, 21-10, 21-11).

Results from February 23 are as follows: Phoenix over the Road Runners (23-21, 21-13, 21-5); the Spikers beat the Circuits (21-5, 21-12, 21-16); and the Atom Spikers defeated Chemistry (21-8, 21-4, 21-10).

Employees League Standings

	Won	Lost	Pct.
Phoenix	10	2	.833
Spikers	11	4	.733
Cool Tools	7	5	.583
Atom Spikers	8	7	.533
Road Runners	5	7	.417
Chemistry	3	9	.250
Circuits	1	11	.083

Mixed League Standings (as of 2/28)

Division A	Won	Lost	Pct.
Trolls	30	3	.909
Spikers	18	15	.545
Parton Props	17	16	.515
Oceanography	15	18	.455
Pushovers	11	22	.333
Upstarts	8	25	.242
Division B			
Nuts & Bolts	25	2	.925
Terabits	19	11	.633
Diamonds	16	11	.593
Lookin Good	14	13	.519
Nuke Power	13	17	.433
Center Crew	9	21	.300
Flashers	3	24	.111

Members of various teams hosted a group of players from SUNY Stony Brook over the weekend, much to everyone's enjoyment. It was reassuring to see that the quality of play was similar between the two teams.

Of interest to volleyball fans - the Men's Collegiate Regionals will be held at SUNY New Paltz at 9 a.m. on March 12. The NY Open Volleyball Tournament will be held at West Point Military Academy at 9 a.m. on April 2. People interested in coordinating rides to either of these events may call Greg Donaldson at extension 3722.

Classified Advertisements

Placement Notices

The Laboratory's placement policy is to select the best-qualified candidate for an available position, with consideration given to candidates in the following order of priority: (1) present employees within the department, with preference to those within the immediate work group; (2) present employees within the Laboratory as a whole; and (3) outside applicants.

Each week, the Personnel Office lists new personnel placement requisitions. The purpose of these listings is, first, to provide open placement information on all nonscientific staff positions; second, to give employees an opportunity to request consideration for themselves through Personnel; and, finally, for general recruiting purposes. Because of the priority preference policy stated above, each listing does not necessarily represent an opportunity for all candidates. As a guide to readers, the listings are grouped according to the anticipated area of recruitment, as indicated below. Except when operational needs require otherwise, positions will remain open for one week following publication date.

For further information regarding a placement listing, contact the Personnel Placement Supervisor, Ext. 2874 or 2882.

LABORATORY RECRUITMENT: Opportunity for present Laboratory employees.

98. INSTRUMENT ENGINEER - BSEE or equivalent with experience in failure analysis. Should have competence in hardware design and analysis and report writing. Reactor Division.

99. CUSTODIAN, GROUP LEADER - Approximately four months' duration. Staff Services Division.

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

100. TECHNICAL ASSOCIATE - BS degree or equivalent in biology. Experienced in sterile techniques and mammalian cell tissue culture. Seven-month position. Medical Department.

101. TECHNICAL ASSOCIATE - BS degree or equivalent in biology with specific experience in research utilizing adult sea urchins. Four-month position. Medical Department.

102. OFFICE SERVICES ASSISTANT - Excellent typing skills required. Library cataloging experience would be helpful. Technical Information Division.

103. REFRIGERATION & AIR CONDITIONING ENGINEER - Plant Engineering Division.

Autos & Auto Supplies

76 SUZUKI - 550 cc, 2500 mi, crash bars, windshield, vinyl saddle bags, excel cond. Howard, Ext. 3260, \$1500 firm.

70 DODGE VAN - New mtr, 6 cyl, auto, custom body, new paint, mint cond, must see. \$1600. 289-0689.

59 CADILLAC - 2 dr, 42,000 mi, orig mi, excel cond & appearance, must be seen. Alan Bieber, Ext. 2924, 924-4551.

TIRE - General Jet Air II, 6.95-14, mounted on Ford rim, excel cond. \$10. Mike, Ext. 2048.

58 VW PARTS - Gen, doors, some glass & misc parts. Brian, 732-1913.

70 FORD TRUCK - F250, 4 wheel dr, 66,000 mi, \$1600. Ext. 3468.

68 CHEVY BELAIR - 307, 4 dr, a/t, high mi, runs good, needs work. \$200. 286-3791.

4 SPD TRANSMISSION - For Dodge or Ply. \$100; (2) 33 hp VW engines, \$100 ea. Roger, 286-9197.

75 YAMAHA - RD 250B, bought new June 76, 55 mpg, 1600 mi, luggage rack. Asking \$150. Neal, Ext. 4019.

72 SUZUKI - Trail hopper, 50 cc, needs a little work. \$85. Frank, Ext. 4095.

SNOW TIRE - 650-13 w/rim. \$12. Ext. 3609.

73 GREMLIN - Good cond. 286-0874, 345-2463.

70 PLYMOUTH - Satellite convertible, automatic trans, ps. \$1000. R.L. Chase, Ext. 4232.

76 FORD TORINO STATION WAGON - 15,000 mi, auto, ps/pdb/pw, rr, cb radio, two pkg, hitch, excel cond. \$4500. 732-0917.

64 DODGE DART - 4 dr, ps, 6 cyl, auto trans. Ext. 2624.

69 DODGE DART - \$300. Erik, Ext. 2437, 878-9216 after 6.

71 VEGA HATCHBACK - 4 spd trans, radio, ac, options, extremely good cond. Asking \$850. 549-6041 days, 269-6344 eves.

69 DODGE DART SWINGER - 6 cyl, 2 dr, std trans, 4 new tires, rebuilt eng, good cond. \$650. Ext. 3390/3177.

69 FORD LTD - 4 dr, hdt, at/ps/pb, 302 eng, 16-20 mpg, new tires, battery, exhaust, extra wheels, excel trans. \$650. Ext. 2492.

73 VEGA HATCHBACK - New auto trans w/am/fm stereo 8 track, new Diehard battery, 25 mpg, excel cond. \$1595. 281-5448.

74 DODGE ¾ TON - 8' bed, 6 cyl, std trans, h/d suspension, radio, cb unit, cap, excel cond. Best offer. 475-8724.

69 BUICK RIVIERA - Excel cond, new paint job, mag wheels, ac. Asking \$1000. 475-9102 after 5.

74 MAZDA - Rx-4, rotary eng, wagon, 30,000 mi, ps/ac, auto trans, am/fm, roof rack, tinted glass. \$2995. Bill Lee, Ext. 2501, 698-7995 after 5:30.

59 MGA - 1500, restored. Asking \$2200. 473-7546 after 5:30.

47 FORD CLUB COUPE - Runnable, complete. \$450. John, 231-9879.

71 MG - Convertible, 4 spd stick, r&h, good rubber, low mi, \$1300. 727-0467, 727-3377.

70 VW CAMPER - Excel cond, tip top, sleeps 4, tent, trailer hitch, \$2200 firm. Fred Paffrath, Ext. 4407, 864-1214 after 6.

67 PLY STATION WAGON - Belvedere II, good running cond, just inspected, new valve job. \$275. Ralph, Ext. 3649.

73 VEGA HATCHBACK - Auto, ac, radio, new battery, excel cond. \$1250. Richard, Ext. 4501.

71 CAPRI - 4 spd, 2,000 cc, 60,000 miles, radial tires & snows. \$800. John, 981-6817 after 5.

70 CHRYSLER - 2 dr, ps/pb/p seats & windows, very good tires & snows, good cond in & out. Ext. 3319, 751-7140.

72 SAAB - 99 cm, 2 dr, std trans, am/fm stereo, good cond, 30 mpg. \$1985. 924-4237.

68 VW BUG - Fair cond, am radio, new starter, batt, clutch, recently tuned, some rust, good tires. \$350. Bob, 281-4475.

66 VW SQUARE BACK - Dealer rebt eng, good tires plus snows. \$500. Ext. 3319, 751-7140.

70 MGB GT - Yellow, orig owner, 65,000 mi, am/fm radio, rear defrost, new alternator, water pump, universal, all new clutch system, recently tuned. \$1600. 473-4491 eves.

Boats & Marine Supplies

18' SKIFF INBOARD - 4 cyl, 6 V, preservers, marine head, gauges, lights, anchor, extinguisher, pump, 20 gal tank. \$900. Tom, Ext. 3842, 325-1524.

16' ELECTRO RUNABOUT - 35 hp Evinrude elec start, tilt bed trailer. \$325. 286-0246 after 5:30.

PLYWOOD DINGHY - Good cond, needs a coat of paint, now is the time to get ready for spring. \$75. Ext. 3593.

22' THUNDERBIRD - F/g, twin 120 hp, i/o, d/f, cuddly cabin, canvas, extras, excel. \$3500. 281-2767 eves.

17' GLASPAR - Bow rider, 65 hp Evinrude trailer, new axel accessories, sleeps 2. \$1500 firm. 363-2475.

8' FIBERGLASS - Sailing dinghy. Mike, Ext. 2048.

8' PRAM - Sound condition, needs paint, excel duck boat. \$30. Ext. 3354.

50 HP MERC ENG - 1975, used one year, good cond. \$850. 286-8517 after 5:30.

15' SHARPIE - Good clam boat. \$150. 286-0761.

7.5 SEARS OUTBOARD - Good cond. \$50. 286-0761.

17' BOSTON WHALER - All year 1974, 70 hp Johnson elec, galvanized boat trailer, fully equipped. \$3000 firm. 765-5584 after 6.

18' THOMPSON - In/out board eng, elec winch, Cox tandem trailer, excel cond. Asking \$1800. 727-5912.

26' PEARSON SLOOP - Fiberglass, 6 sails, 9½ hp eng, many extras. 473-8426.

1975 MERCURY - 150 hp w/power trim, controls, cables, harness, tank & hose. \$1400. 281-8458.

31' BALTZER - Twin 125 hp Chrysler engs, camper back, ideal family/fishing boat, must sell. 331-1718.

PEMBROKE - 28' cabin cruiser, 1968, sleeps 4, refrig, stove, flying bridge, head, twin 190 hp Chevy engs, fresh water cooled, VHF, depth finder, surveyed 1976. \$7900. 928-5130, 928-2727.

15' GARVEY - Ideal for clamming, plus rebuilt Evinrude, trailer and extras. \$750. Ext. 2345, 472-1735 after 6.

Miscellaneous

When there is a backup of classified ads, miscellaneous ads that have been submitted more than once will not be repeated.

CAMERA - New Kodak trimlite Instamatic 18, flip flash. \$15 firm. Ext. 2500.

MOVING - 2-pc sectional sofa, 4 pc twin maple bed-rm set, 2 rugs, odds & ends. Karen, Ext. 4019, 727-2889 after 4.

MOVING - Air hockey game, portable ping pong table, 3 pc early Amer living rm set, odds & ends. Karen, Ext. 4019, 727-2889 after 4.

HAND LAWN ROLLER - Jackson, \$10; baby's basinet, \$4. 727-1329.

FULL SIZE BED - Box springs & mattress, \$15 both; Empire 398 turntable, Shure M55E cartridge, \$40; Whirlpool air cond, 8000 btu. \$50. Ext. 3790, 751-8158.

REFRIGERATOR - Large capacity, older style, perfect working order. \$20. 878-8952.

DESK - Large walnut, \$100; 2 single beds, \$25 each. Alan, Ext. 3369, 286-0259.

PEDESTAL TABLE - Solid black pine, 42" round, 2 capt & 2 mate chairs, 14" glass top. \$400. 722-4784.

CAR SEATS - Children's, 2 Ford tot, Guard. \$15 each. Ext. 4362, 744-7667.

CONN TRUMPET - 2 mouthpieces, case, good cond. \$90. 744-8765 after 3.

SCHOOL DESK - Wood top & seat, metal frame. \$10. 732-1298.

BICYCLE - Vista 10 spd, 23" frame, lugg rack, gen light, center pull brakes, excel cond. \$65. 732-1298.

RHUBARB & PEONY CLUMPS - Extra large, \$3 each; misc evergreens, dig your own, \$1 & up. 286-0246 after 5:30.

7' REDWOOD PICNIC TABLE - W/2 benches; Kaufman's ranch line, 2" thick, excel cond. \$35. 286-0246 after 5:30.

WASHER & DRYER - Sears portable w/stand, good cond. \$175. 744-0846.

SOFA - Rose beige, flex steel frame, excel cond, any reasonable offer; Kenmore sewing machine, 15 yrs old, works, needs cord, \$10. Ext. 2627.

BOWLING BALL - AMF #5. Ext. 3121, 744-5261.

DROP LEAF TABLE - \$25. 286-0246 after 5:30.

MOVIE CAMERA - & projector, 8 mm Japanese camera w/turret lens, light meter, Keystone projector w/zoom, variable spd. All \$65. 924-4740.

PENCIL SHARPENER - Elec, \$10; 2 men's suits w/2 pr straight leg pants, blue & green, 38-30. \$10 each. 475-0144.

POPPER - Popcorn, \$6, 4 wheeler tot's bike, plastic, \$5; candle craft hobby kit, new, \$5. 475-0144.

RADIO - Antique Philco, 1920's vintage, plays well, box of spare tubes, \$50. 286-0246 after 5:30.

MEN'S FULL SIZE BIKE - Raleigh 3 spd, racing handlebar, good cond. \$35. Gil, Ext. 3531, 473-9016.

DRILL PRESS - 15½" Craftsman w/½ hp motor, 8 spds, angle vice, excel cond. \$250. 472-1875 after 5:30.

APPALOSA STUD - Registered, 2 yrs old, 15.2 hands. Ext. 3468.

DRUM SET - 5 piece. \$125. 286-0761.

SHREDDER/MULCHER - MTD, 5½ hp, leaf ramp, great for spring clean up. \$140. Ext. 2497, 281-2767. eves.

SWIM POOL - 21', 4' deep, vinyl liner, 1976 model, excel cond, all accessories. \$700. 661-0402 after 5.

SKIS - Hart Javelin w/lock bindings. Gary, 1-5 pm, Ext. 4501.

AMPLIFIER - Phase linear 700B, 700 watts, \$450; Crown IC-150, pre amp, \$150. Ext. 4722, 475-6258 after 6.

KING SIZE BED - Console TV, dining rm set, moving, must sell. Bob, Ext. 3312.

FERTILIZER - 10-6-4, 50 lb bag. \$3.40. Izzy, Ext. 3696.

GRASS TRIMMER - Elec, used only 1 season. \$10. 924-3066.

DOOR LOCK - Double key, dead bolt, brass, like new. John, Ext. 4076.

8" CRAFTSMAN TABLE SAW - \$50. 727-6504 after 5.

ACCORDION - 120 bass, like new, cost \$425, selling for \$100. Linda, Ext. 3199, 727-7304.

SPINET ORGAN - Baldwin w/bench. \$365. 286-3647.

CHATTEAU TRAILER - 1973, 18' fully self-contained, refrig, oven, stove, shower, toilet, sleeps 6, screened-in room, excel cond. \$2500. Ext. 3278.

MATCHED CONCERT GRANDS - 2 Bozak, B410's, mint cond, cost \$2500, sacrifice \$1200. 475-4424 after 6.

GRILL - Weber, new, \$50; glass sliding door w/all parts, \$50. 475-4930 after 6.

YARD SALE - Moving, rugs, lamps, furniture, china, some antiques, East Gate Dr, corner Elm St, S Sayville, Mar 12-13.

TELESTAR TV GAME - Hockey, tennis & handball w/line voltage adapter, hardly used. Asking \$45. Dan, Ext. 3282.

12 GAUGE SHOT GUN - Browning automatic, model light 12, like new. \$300. Dave, 289-8236.

BOWLING BALL - \$5; 400 power microscope lab, \$10. 727-5912.

OLD BOOKS & DOLL - 727-5912.

MOVIE CAMERA - Bell & Howell w/sound, excel cond. \$150. 281-0268 before 4.

SEWING MACHINE - Morse zig zag w/3 drawer cabinet, deco stitches, button holes, etc. 589-6151 after 5.

SKIS - Spaulding 180 cm fiberglass w/bindings. \$45. John, Ext. 3354.

1972 POP UP TRAILER - Bravo, sleeps 6, hdt, stove, sink, ice box, 2 tables, excel cond. \$1200. Jerry, Ext. 3303, 475-5591.

DICTIONARY - Of electrical works, terms & phases, c. 1892, very good cond. \$24. Frank, Ext. 2022.

VICTORIAN CANED CHAIRS - Large folding banquet table/crystal stem ware. 472-0509.

MINK COAT - Natural, full length, size 14, very good cond. 472-0509.

CASSETTE TAPE RECORDER - Solid state, used less than 1 yr, good cond. \$15. 924-3066.

GOLF CLUB SET - 4 irons, 2 woods, 1 putter & carry bag, practically new. \$30. 924-3066.

VENDING MACHINES - Brand new, still in crate. 924-3066.

COMMUNICATIONS RECEIVER - Radio Shack model #DX160, excel cond. \$120. Ext. 2485.

HEADPHONES - Stereo, Koss Espg, electrostatic headphones, depth & transparency only electrostatics can reproduce w/energizer, \$60. 473-8426.

FURN - Colonial pine coffee table cobbler's bench, \$5; walnut dinette set, high back leather chairs, \$60; sofa bed, \$100; diamond dress watch, \$100. 924-6463.

BOY'S BIKE - High riser, 20", \$15; crib & mattress, \$15; stereo record player w/stand, \$10. 924-6463.

DINING RM SET - Old fashioned, high back chairs, Ext. 3688.

WATER DISTILLER - Ext. 3688.

HABITRAIL - For mouse w/big wheel & sky house. \$10. 744-5448.

PARTY & SHOWER INVITATION PKGS - Sharon, Ext. 3312, 924-5077.

CAMERA - Keystone movie 8 mm, excel cond, leather case, make offer. Ext. 2500.

MOVIE CAMERA - 8 mm w/sound. \$150. Excel cond. 281-0268 before 4.

WEDDING GIFTS - New dinner ware, 45-pc Kensington ironstone, olive gr, service for 8, \$40; 32-pc semi-vitreous, white w/floral pattern, service for 6. \$35. 928-1127 after 6.

ARCHITECTS - Paoli Soleri's ARCOLOGY book, lg format, \$20. 928-1127.

CHRISTMAS/WEDDING GIFTS - Never used, wok, elec, red, 12", \$30; fondue, elec, red, 1½ qt. \$20. Ext. 2948, 928-1127 after 6.

EARTH SHOES - Never used, high boot, size 10½, 1 yr old, \$30. light tan. 928-1127 after 6.

SHIP BUMPERS - Macrame covered, nautical motif wall decor, must see. \$100 ea. 928-1127 after 6.

EXERCISE BIKE - Like new, \$35. 473-7667.

SUPER BIKE - 19" diamond frame Peugeot 10 spd bicycle w/standard handlebars, brand new. Ext. 2482.

BICYCLE - 21" diamond frame, 2 spd Rudge sports, English bicycle, excel cond, recently restored. Ext. 2482.

Real Estate

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

For Sale

MOBILE HOME - 1974, 12x60, 2 bedrm, shed, fully landscaped, all appl, excel cond. Bill, 727-1706.

PATCHOGUE - Roe Blvd area, 3 bedrm, garage, deck, fp, w/w carpet, full basement. \$43,000. 331-1718.

N SHIRLEY - 4½ yr old high ranch, 9 rm, 3 bedrm, lg family rm, 2 baths, landscaped, elec kitchen, ½ acre, 10 min from Lab. \$36,500. 878-9022 after 5.

WADING RIVER - Charming cape on landscaped treed ¾ acre, 3-4 bedrms, 2 baths, muraled living rm, den, fp, formal dining, eat-in-kitchen, w/w carpet, full bsmt w/patio doors. \$54,000. 929-8313 after 5:30.

MASTIC BEACH - Living rm, dining/den, wood deck, corner lot, 2 bedrms, s&s, full basement, new kitchen, treed. \$29,500. 281-7763.

SELDEN - 6 yr old, 4 bedrm splanh, eat-in-kitchen, panelled den, formal dining, 1½ baths, basement, fenced. 732-6231.

MIDDLE ISLAND - 4 bedrm townhouse, 2 baths, storage area, all appl, cent ac, w/w carpet, clubhouse, pool, tennis, extras, 1 yr old. \$29,500 or best offer. 924-5457.

RIDGE - Strathmore, 3 bedrm townhouse, 1½ baths, fully equipped, \$28,000, low cash over 7½% mortgage. 924-3361.

COMMACK - 3 bedrm ranch, finished bsmt, ac, landscaped, fenced, eat-in-kitchen, garage, all appl. Asking mid 40's. P. Newhouse, Ext. 2042, 864-2536 after 6.

For Rent

RIVERHEAD - 2 bedrm house, 1 month security, no pets. \$225 + util. 727-5621.

MASTIC BEACH - Compact 3 bedrm house, quiet area, ideal for single or couple, rent about \$200, negotiable. 281-7531.

VERMONT VACATION - 3 bedrm mobile home, fp, near ski areas. 473-8186 after 6.

2 BEDRM DUPLEX - 5 min to Lab, living & dining rm, full basement. \$320/month incl heat. Ext. 3312.

APT - 10 min from Lab, 1 bedrm corner, fp, carp, dishwasher, priv at Pine Hills Country Club, avail Apr, May or June. 286-3333, 878-4794.

Wanted

HOME - For (5) 6 wk old German Shepherd puppies, great watch dogs. Ext. 3120.

TIRE - 165-15" Michelin steel belted radial, fair to good cond. 475-0144 after 6.

GARAGE - Separate from house for light auto reconditioning. 744-4047, Ext. 3143.

HOME - For male cat, white w/red tiger spots, very affectionate, will alter. Carlson, 727-7278.

HOME - For red