



The interrelationships among net migration, family income, estimated air pollution emissions and mortality are being investigated by a group in the Biomedical and Environmental Assessment Division of the National Center for Analysis of Energy Systems. The study is headed by Salvador R. Bozzo, M.D. (right) and he is assisted by Fernando Galdos (left) and Kenneth M. Novak.

Hydrogen Contract Let

The Laboratory has awarded a \$150,000 contract to Air Products and Chemicals, Inc., for the development of a new lightweight hydrogen storage system using metal hydrides. The hydrogen from the system would ultimately be used in automotive applications. Brookhaven is managing the contract on behalf of DOE's Division of Energy Storage Systems.

As an automotive fuel, hydrogen is essentially non-polluting and relatively abundant compared to gasoline. Although the contract is aimed at both commercial and personal transportation markets, the technical problems are magnified when applied to the personal automobile due to the need to store sufficient hydrogen fuel for long distance driving (200 miles or more).

Hydrogen in both liquid and gaseous forms has been used to power automobiles experimentally. However, there are many disadvantages to these approaches including the need for super insulation or extremely large and bulky tanks. In view of this, Air Products is pursuing an alternative approach based on the use of metal-hydrogen compounds known as metal hydrides. Storing hydrogen in the form of a metal hydride was first researched at Brookhaven by J. J. Reilly and R.H. Wiswall, Department of Energy and Environment.

The density of hydrogen within the metal hydride is equal to or greater than the density of liquid hydrogen. This permits safe storage of large quantities of hydrogen in a confined space. A workable metal hydride system must be capable of storing significant amounts of hydrogen, and then releasing it when heat is applied from the vehicle's exhaust. This requires that the alloy release hydrogen at temperatures of 175-200°C. Many of the presently known metal hydride systems are capable of either storing high percentages of hydrogen at temperatures in excess of 300°C, or of operating at lower temperatures with unacceptably lower storage capacity.

The Air Products' work will be aimed at developing novel alloys capable of fulfilling both requirements. The family of magnesium alloys appears to offer the greatest promise and will be the subject of an intense and systematic study.

Air Products research for the 14-month contract is being performed by the Long Range Development Department of the Industrial Gas Division. The company built the first commercial-scale liquid hydrogen plant in 1955 to supply the Apollo rocket program. In December of 1977, Air Products dedicated its newest liquid hydrogen plant which will be used to supply the needs of the Space Shuttle program.

Academic Employment For Scientists Rises

Despite inflation, reduced endowments, and budget constraints, universities and colleges continue to hire increasing numbers of scientists and engineers, according to a report released by the National Science Foundation. Employment of full-time scientists and engineers rose three percent between January 1976 and January 1977, continuing the average growth of three percent since 1969.

The report noted that there appeared to be a shift in the activities of this group from basic research toward applied research.

Although the employment of women as academic scientists and engineers grew at a rate approximately double that of men between 1976 and 1977, the overall proportion of women in these fields has changed little since 1974 - up from 15 percent to 16 percent.

Cricket Club

All members of the Brookhaven International Cricket Club and others interested in playing cricket, are invited to come to a general meeting on Tuesday, April 4, Room D, Berkner Hall at 12 noon.

Thou Shall Not Pollute

Energy is a two-way street. Currently, the emphasis is on the search for new sources of energy with which to maintain and further develop this highly industrialized society. But the quality of life is eroding and "warning lights" are flashing. There are bills to be paid in the matter of human endurance and some of these bills are already being collected in the form of heart disease and cancer.

Pollution affects every level of society. Looking at energy problems from the human point of view and seeking data which will be relevant to the formation of national energy and health policies, is the focus of a complex study being undertaken at Brookhaven and supported by DOE's Division of Technology Overview.

The study is complex because it deals with human beings; how they adapt to and are affected by this fast-paced society. Under the leadership of Salvador R. Bozzo, M.D., a group in the Biomedical and Environmental Assessment Division of the National Center for Analysis of Energy Systems, has been studying the interrelationships among net migration, family income, estimated air pollution emissions and mortality. Working with Bozzo on the project are Kenneth M. Novak, Community Health Associate, and Fernando Galdos, Computer Science Analyst.

Using the Medical Data Base developed at Brookhaven, the entire population of the United States was cross-tabulated by in-

come and emission levels of air pollutants. Population characteristics and patterns were examined for each age, race, and sex group containing a minimum of 10,000 persons. The Brookhaven study is unique because it is the first to examine the relationship of these factors by age, race and sex.

In general, income was found to be negatively associated, and pollution positively associated with mortality as age increases. The findings of the researchers seem to indicate that where a person lived could have an influence on when, and of what, he will die.

Disturbing to the Brookhaven group is an unexplained increase in the number of men dying between the ages of 50-65 and there is little indication that the situation will improve. From 1958 - 1972, the mortality rate for men in these ages was 2.3 times higher than for women. Why? As possible causes, the group plans to explore more fully the areas of occupation and other environmental factors.

Quality of life is, of course, hard to define and has many components. For purposes of this study, median family income was the factor used. A better quality of life has a protective effect up to about the age of 35, say the researchers. After that, the protective effect, in relation to mortality, disappears.

Greater incomes do not necessarily lead to living in low pollution areas. As a matter

of fact, the Brookhaven investigators say that while they could find poor people living in clean (rural) environments, it was difficult to find the rich living in these relatively clean areas. The rich tend to be found in or near financial and industrial centers, such as Manhattan, which are high in pollution.

Migration is another piece in the puzzle and the picture that emerges is well known. Infants and children go where their families go. From the ages of 15 to 25, young people move all over the country, generally going where the jobs are. As they produce families, they move to the suburbs. In time, the suburbs become areas of high population density and industrialization. As people grow older, if they can afford it, they move to less concentrated areas. The old on limited incomes and the poor are forced to remain in the decaying areas.

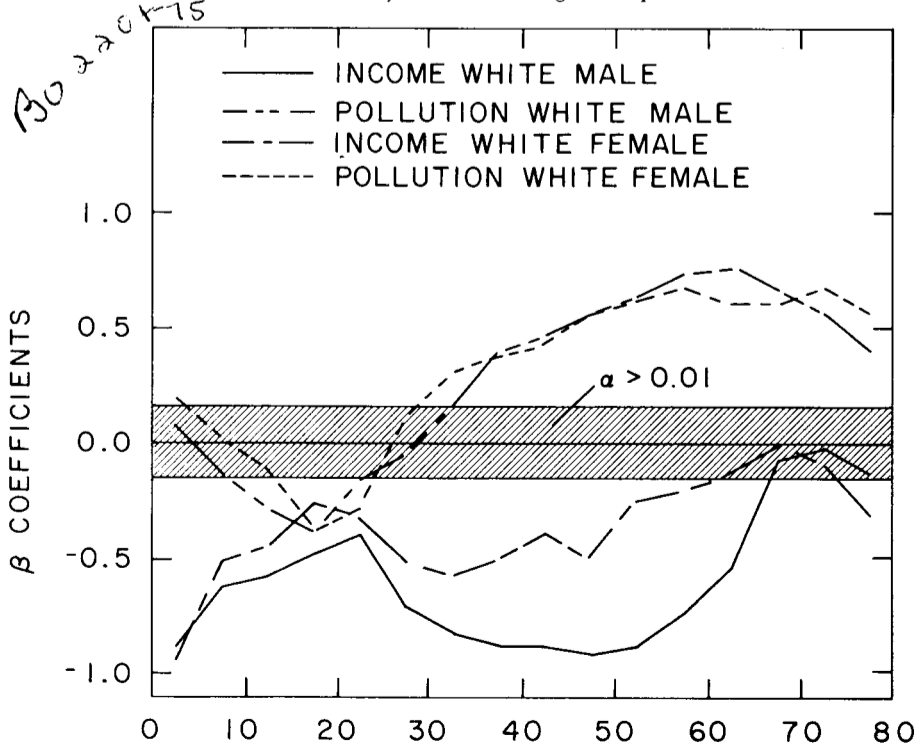
Dr. Bozzo's group is trying to understand the dynamics of population change and migration, in relation to income and exposure time to pollutants. It used to be that mortality and fertility had the greatest effect on population composition and size - now migration is number one.

The problem for the future, says Dr. Bozzo, is to control the density of human populations so that they get the maximum quality of life with the smallest environmental impact.

These cycles are of great concern to the people in some states of the Union which are not yet in the throes of urbanization. The April 1978 issue of *The Atlantic* is devoted to the problems of the Rocky Mountain states which contain large quantities of coal, uranium and shale oil, and the consequent dilemma faced by the people who live there. They look with alarm at Los Angeles and New York. In the article, Ross O'Toole, a Professor of Western History of the University of Montana, whose family has lived in Montana since 1859, states the problem:

"Americans are seeking as they have never sought before what Montana has in greater abundance than almost any state in the Union - open space, clear, cool waters, a big, clean sky. Once, distance, space, and remoteness were our economic curse. Now they are our economic blessing. What awesome irony and tragedy it would be if we were to turn our curse into a blessing only to turn it again into a curse."

From their own research, and drawing on the resources of the multi-disciplinary National Center for Analysis of Energy Systems, Dr. Bozzo's group is investigating what has already happened, and why, so that the future will reflect not only economic needs, but human needs. As he says, "the moralists of the last century are the environmentalists of this century."



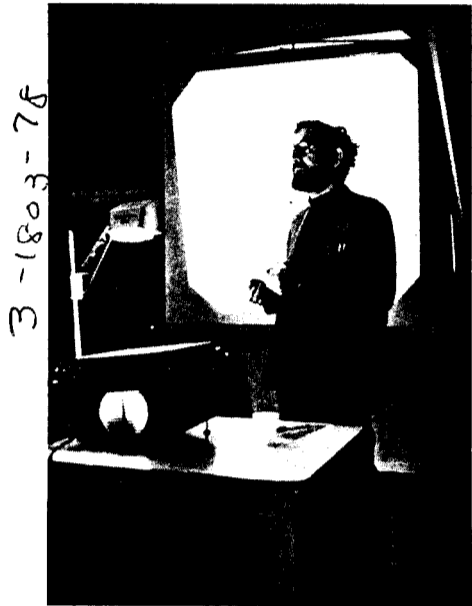
The combined effects of income and pollution on total mortality showing the increasing effect of pollution (upper curves) and the decreasing effect of income (lower curves), with age. Note the different income effect, by age, on males and females. Points on the chart are plotted at the mid-point of each five year age interval.

Journalism Students Visit Lab

3-1804-78



Some students from the Columbia University Graduate School of Journalism, who are taking the science writing course, visited Brookhaven earlier this week to learn about the Laboratory's research programs and to spend a morning in selected departments gathering material for a story. Above, John Walsh talked about the oceanographic program, and, at right, Ron Peierls gave the students a briefing on particle physics. Also Jack Fontana and Ralph Yang lectured on energy and materials resources, and Bill Marcuse on systems analysis for energy research and development.



3-1803-78

Retiring

3-1146-78



— photo by Rosen

George H. Schuette, who has been a Refrigeration and Air Conditioning Engineer in Plant Engineering since January 13, 1969, will retire today. He is planning to move shortly to his home in Lockwood, New York.

BERA Board Officers

The election of the BERA Board officers for the coming year was held at a meeting of the members last week. Elected were Gail Williams, President; Robert A. Brown, Vice-President; and Carol Beckner, Correspondence Secretary.

Ann Flood was reappointed for another year as Recording Secretary, which is a non-voting Board position.

Other members of the Board are Helen Keeley, Gerald Levine and Marge Stoeckel.

Drivers Note

If you rent cars for official or personal use and don't recognize this



you are missing out. Check with the Travel Office for more information.

Brookhaven Sponsors SEEK Program

4-90-78



Last week, 18 freshmen from the City College of New York became acquainted with the principal Laboratory facilities and took short courses in various subjects taught by members of the Brookhaven staff. They were participating in the SEEK Mini-Semester program established by City College to provide them with an overview of engineering and technical pursuits at a major institution. In cooperation with City College, Brookhaven's Office of Affirmative Action prepared the week-long program which was designed to encourage the students to continue their studies and enter the engineering profession. This is the second year that Brookhaven has been host to the SEEK students.

Amoco Cadiz Pollution

Last week the worst oil spill in history occurred off the coast of France. Today millions of gallons of dark sludge have invaded the fishing ports and beaches of Brittany, some of the finest coastland in the world.

Contributions to aid in the clean up of the Brittany coastline and in particular to assist efforts to reduce the suffering and destruction of marine and coastal wildlife are being collected by Gale Munson, Building 120.

The French Embassy in New York has informed Mrs. Munson that checks made to the order of "Monsieur le Marie de Brest" will be placed into a fund entitled, "Solidarité Contre la Pollution Amoco Cadiz" and will be used in the clean up effort.

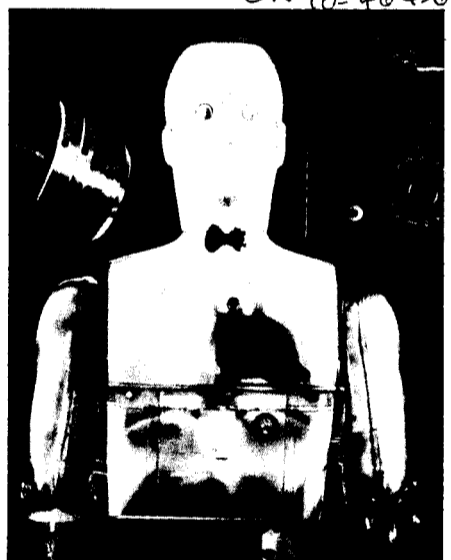
The BNL French Club/Alliance Française have indicated their support for this collection and will be asking their membership for a contribution to be made in the name of the Club. All contributions of any size will be appreciated. If you would like to contribute, please send your check to Gale Munson, Building 120, before April 12.

The Perfect Employee

He is an indefatigable worker and doesn't even take a coffee break. Salary, fringe benefits and recreation programs don't mean a thing to him. He always does what is required and never sasses back. Occasionally he comes apart at the seams, but this does not require extensive visits to the psychiatrist, just a little glue.

He is a phantom, a flexible, plastic gent manufactured to Airforce specifications of the standard American male, who has been regularly employed in the Medical Department for the last twenty years. More accurately, four phantoms have been used over the last 20 years at the whole body counting facility. Even plastic men wear out. Currently, he cost about \$5500.

His body is filled with a tissue equivalent fluid so that it has the same density as the



The Phantom

human body. As required, the various internal organs of the plastic phantom are filled with known amounts of radioisotopes. Measurements of radioactivity levels in the phantom provide data for calibration and comparison of data obtained from research patients who have been administered isotopes, in the diagnosis and therapy of diseases under study by medical scientists.

He changes color according to what's put in him. He can also be dressed up and suitably adorned during lighter moments at the Medical Department. In short, he is not only very good at his work, but is fun to have around.

Stony Brook Events

Recital: Guitarist Victor DeBella will perform at 8:30 p.m., April 8, Lecture Center 105.

Child Study: Children who are being seriously teased or who have severe temper tantrums are eligible for a study being conducted by Dr. Fredric M. Levine, Department of Psychology. Interested parents should call HR 3-6622.

Children's Theatre: Musical version of "Tom Sawyer" will be presented at 2 p.m., April 1 and April 8, Stony Brook Union Auditorium. All tickets \$2. Reservations 585-1868, 585-5867.

Recital: Cellist Bernard Greenhouse and pianist Martin Canin will perform at Sunwood Estate, Old Field, at 5 p.m., April 2. Tickets \$5.

BROOKHAVEN BULLETIN

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Hospitality Committee

A morning coffee will be held in the Brookhaven Center on Tuesday, April 11, from 9:30 to 11:30 a.m.

Alla Grassi will give a demonstration on stained glass.

All wives of Laboratory employees are welcome. Please come and bring the children. It is suggested that you bring along a toy or two for your child to play with.

Arrivals & Departures

Arrivals

- Rhonda Dagradi Applied Math.
- Daniel A. Hawkins Central Shops
- Vincent L. Saladino Accelerator
- Sharon L. Smith Energy & Env.

Departures

- Trevor J. Aggus Physics
- Dolores J. Seay Personnel
- George H. Schuette Plant Engrg.
- Shozo Takagi Chemistry
- R. Viswanathan Physics

IRS Film Showing

A film entitled "Why Me, Tom Krolik?" will be shown at Berkner Hall on Wednesday, April 5. There will be three continuous half hour showings starting at 12 noon. All interested employees are invited to attend.

The film informs taxpayers of their rights and responsibilities, especially as they relate to audits and appeals. It tells the story of Tom Krolik, a fictional taxpayer, from the moment he receives an IRS tax audit notice to the final resolution of his case.

Also discussed are delinquent taxes, taxpayer service, and the processing and confidentiality of tax returns.

Speakers Bureau

March

March 3 - Norman Holden (DNE), Shoreham-Wading River School District, Science at BNL.

March 4 - Ron Peierls (Phys.), The Chemistry Teachers' Club of N.Y., Brief Introduction into Quarks: Do little fleas have lesser fleas?

March 6 - William Wilhelm (Accel.), Energy Expo at Smith Haven Mall, Solar Energy.

March 8 - R.C. Anderson (DO), Energy Expo at Smith Haven Mall, Energy: In Your Home, In Your Business, In Your Future.

March 9 - Lewis Jacobson (PE), Energy Expo at Smith Haven Mall, Energy Conservation in your home and automobile.

March 15 - Smithtown High School East National Honor Society: William Casey (S&EP), Nuclear Energy; Cliff Frederickson (DEE), Computers; Al Lewandowski (DEE), Solar Energy.

March 21 - Richard Skelton (Med.), Mather Hospital, The care & handling of radiation accident victims by paramedical personnel.

Bowling

Pink League

Pat Oster had the big game for the night of 204 and a series of 503. Other high bowlers were Kay Sherry 184/164, Helen Keeley 181/174 (509 series), Marge Stoeckel 172/160, Marie Grahn 170, Carol Beckner 169/165, Colleen Holland 166/161, Lindora Boyd 165, Marie Brenner 161.

The Lickety Splits bowled the highest team series of the year thus far with a rousing 2456 and maintained their 8 point lead. Over average bowlers were Helen Keeley 89 and Pat Oster 74.

Red League

Honors this week go to Bob Jones for a 651 scratch, 711 gross series. Bob was 129 pins over average. His 265 game (285) gross is high for the year in both categories. Also bowling well in the Sandbaggers 11-0 win over the Blue Jays was E. Meier with a 246 game 583 scratch 655 gross, and A. Dick 539/635 series. The Sandbaggers knocked down 3137 pins for the night. The Freon Loaders also had a great night, knocking down 3135 pins in their 11-0 win over the Old Timers. J. Pringle had a great night, a 227 game (his first 200) 512/650 series. F. Powers had a 202/546/654 series. J. Kelczewski had a 202 (his first also) 541/649 and F. Stahman (again) had a 225 game.

The Bubble Boys downed the Pinball Wizards 11-0. J. Saul had a terrific night with a 206/543/675 series. Jim was 111 pins over average for the night. The 76'ers took the Anachems team 11-0. In this match, R. Wilson had a 205 and R. Larsen a 201. The Designers took 11 from the Trouble Shooters with E. Sperry rolling a 206. In the final match, the Cosmos were skunked by the Sparks 11-0.

Purple & White League

The Sea Gulls are in first place by one point, Plutonium's in second and tied for third and only two points behind first are the Diamonds, Woodchucks, and the Pen Mac's.

Ted Erickson had high series for the men with a 566 and Caryl Mac Dougall a 564 for the ladies. Other good games were Ted Erickson 206, Dick Murgatroyd 201, Bob Brown 199, Caryl Mac Dougall 202, Kay Conklin 181, Sharon Smith 180, Mary Jane Gillette 179, Carolyn Eterno 174, Mickey Haller 172.

Green League

The Sparks continued their winning ways as they took eleven from the Cosmos. For the winners, J. Cockrane had a 225 and B. Sick a 233. The Old Timers II stayed within striking range as they took eleven from the Dyno-Mites. For the Old Timers II, B. Galen had 200/200/202 for a 604 scratch series. The Bubble Boys took eleven from the Pinball Wizards. The Sandbaggers bombed the Blue Jays for eleven bowling a 3137 gross series. The Got-A-Hit-Ums took eight from the Pick-Ups with N. Parrinello having a 217. The Trouble Shooters lost eleven to the Designers.

L.I. Industrial Tournament

Reports from the Tournament have been sketchy mainly because there hasn't been much to report. Rich Larson's 224/626 on the last night was one of the better efforts as BNL finished back in the pack. Pan American took top honors with Sperry being awarded the Incentive Trophy. Our thanks to Bob Jones, Rich Larsen, Ken Riker, Rich Eggert and Charlie Bohnenblusch for representing BNL.

Golf

There will be an organizational meeting in the Recreation Hall, April 7, at 5 p.m. Old and new members are welcome. If you can't make the meeting but would like information about the league or you need a partner, call one of the newly elected officers: Vinnie Racaniello, 4613; Bob Vignato, 4592, or Marshall Bull, 2366. Deadline for membership will be Friday, April 15.

Boating Safety Course

A free six-lesson boating safety course will be given by Flotilla 18-6 of the US Coast Guard Auxiliary. The first lesson will be at 8:00 p.m., Wednesday, April 5, at William Floyd High School. For more information call Alan Bieber at Ext. 2924 or at 821-0761 evenings.

Service Awards



Robert B. Aronson, Deputy Chairman of the Medical Department (left) presented service awards recently to Alfred Delph (10 years), Theodore Johnson (25 years) and Stanton Cohn (20 years).

Volleyball

Employees League

On March 22, Phoenix took Biology: 21-15, 21-9, 21-18. The Bumps cooled the Cool Tools: 21-18, 21-9, 21-4. The Easy Aces forfeited three games to the Atom Spikers.

Standings

Spikers	14	1	.933
Bumps	12	3	.800
Cool Tools	9	6	.600
Phoenix	8	7	.533
Atom Spikers	8	10	.444
Biology	3	12	.200
Easy Aces	0	15	.000

Mixed League

Division A

On March 27, Lookin' Good over Le-Mufs: 15-4, 15-13, 15-7. No Names popped the Popovers: 15-12, 15-2, 12-15. The Nads edged the Assorted DO-E-Nuts: 15-7, 19-17, 16-14.

Standings

Lookin' Good	7	2
No Names	6	3
Popovers	6	3
Nads	5	4
Assorted DO-E-Nuts	2	7
Le Mufs	1	8

Division B

The Leftovers covered Cowturkey: 15-10, 15-3, 15-8. Oceanography beat Nuts & Bolts: 15-8, 11-15, 15-3. Riffraff forfeited three to the Diamonds.

Standings

Diamonds	9	0
Oceanography	8	1
Nuts & Bolts	6	3
Leftovers	3	6
Riffraff	1	8
Cowturkey	0	9

Cancer Detection

A comprehensive physical examination is offered to Nassau and Suffolk county residents at the Nassau County Cancer Detection Center. The fee is \$65 and appointments are necessary. The detection center is located at 1535 Old Country Road in Plainview and is open from 8:30 a.m. to 2 p.m. Tuesdays and Wednesdays, from 8:30 a.m. to 10:00 a.m. on Thursdays, and one Saturday a month. For information call 420-5262 during these hours.

3-874-78

Bicycle Club

As in the previous two years the first event of the season is the Beginner's Tour from BNL (Berkner Parking Lot) to Wildwood State Park and return, about 12 miles each way. This will take place Sunday, April 9, leaving at 10:30 a.m., return about 2:30 p.m. Bring a lunch, as the facilities at the Park are not yet open. This is a slow-paced ride on public roads suitable for older children with good cycling capabilities. A geared bicycle is desirable.

Coming up May 20 is TOES - a 100 mile 2-day tour of Eastern Suffolk with outside clubs. Advance registration is required. For details, come to the club meeting Monday, April 3 at 12 noon in Room A, Berkner. Discussion of the schedule and nomination of officers are the principal topics. If unable to attend, call Gerry Morgan, Ext. 4141.

Mountain Club

There will be a meeting on Thursday, April 6th at 7:30 p.m. in the North Room of the Center. The spring agenda will be discussed. Anyone interested in hiking, backpacking, rock climbing, caving, canoeing, etc. is invited to attend. Ray Tessmer's movie on white water canoeing, part of it filmed on the Chatoota (Deliverance) River, will be shown after the meeting.

Gardening Problems

The Cooperative Extension Association of Suffolk County has a diagnostic laboratory of home gardening. They will help to diagnose your gardening problems, both over the telephone (727-7850) and during visiting hours. To avoid conflict between the two, phone calls are answered from 8:30 a.m. to 1 p.m. Monday through Friday. Visitors are encouraged to come to their offices at 246 Griffing Avenue, Riverhead, between the hours of 1:00 to 4:00 p.m. on weekdays.

Women's Softball

As a result of interest generated following last year's Women's All-Star softball games, a team is being formed for entrance into the Brookhaven Town Women's Softball League. An organizational meeting will be held Monday, April 10, at noon in Berkner Room D. All women interested in playing should attend. The organizers are also looking for a good and willing coach(es) to help develop the team to full potential. Additional details are available from Karen Schach, Ext. 3623.

Selected Reading

- New Sci. 77, February 16, 1978
The republic of science. J. Ziman. 422-3
Fading spoon bender. M. Blanc. 431
- Science 199, February 17, 1978
A disaster in the environmental movement. S.K. Fairfax. 743-8
Polling the professors: Survey draws protest. G. B. Kolata. 751-5
- Science 199, February 24, 1978
Effects of federal residential energy conservation programs. E. Hirst and J. Carney. 845-51
New York puts together its own state energy policy and plan. L. J. Carter. 864-8
- New Sci. 77, March 2, 1978
Whose eyes on secret data? D. Campbell. 593-5
New directions in carbon-14 dating. R. Hedges. 599-601
- Science 199, March 10, 1978
Solar biomass energy: An overview of U.S. potential. C.C. Burwell. 1041-8
FermiLab director resigns: Cites subminimal funding. W.D. Metz. 1052-3
Bird lovers and bureaucrats at loggerheads over peregrine falcon. N. Wade. 1053-5
- Sci. Am. 238, March 1978
Pieter Bruegel the Elder as a guide to 16th-century technology. H.A. Klein. 134-40
- Phys. Today 31, March 1978
Patents: Another way to publish. C.M. Dann. 23-8
Lindenbaum sees economic gains from high-energy physics. 101-3
- Science 199, March 3, 1978
Breeder reactors: Fast flux fuel rods subject of silkwood charges. D. Shapely. 956-8
- Science 199, March 17, 1978
Historian of science states case for catching up on basic research. J. Walsh. 1188-90
- Sci. Gov. Rep. 8, March 1, 1978
OTA head spouts 100-proof environmentalism. 6-7

Cafeteria Menu

Week Ending April 7, 1978

Monday, April 3	
Corn chowder	(cup) .30 (bowl) .40
Beef chop suey on rice	1.20
Scrambled eggs, sausages, and fr. fries	1.10
Hot Deli - Pastrami	(on bread) 1.15 (on roll) 1.25
Tuesday, April 4	
Beef noodle soup	(cup) .30 (bowl) .40
Knockwurst and sauerkraut	1.10
Sauerbraten and potato pancake	1.40
Hot Deli - Veal pattie & peppers hero	1.25
Wednesday, April 5	
Cream of potato soup	(cup) .30 (bowl) .40
Braised meatballs à la mode w/buttered noodles	1.20
Special	
Davy Jones Fish Fry w/cup of soup, plain jello, small soda, coffee or tea 1.87 + tax	
Hot Deli - Corned beef	(on bread) 1.25 (on roll) 1.35
Thursday, April 6	
Chicken vegetable soup	(cup) .30 (bowl) .40
Cheese ravioli w/1 veg.	1.10
Roast chicken w/stuffing and 1 veg.	1.20
Hot Deli - Italian sausages and peppers hero	1.25
Friday, April 7	
Fish chowder	(cup) .40 (bowl) .50
Spaghetti w/clam sauce	1.10
Breaded pork chop and 1 veg.	1.40
Hot Deli - Smoked tongue	(on bread) 1.15 (on roll) 1.25

[Sir] Cyril Hinshelwood (1897-1967)
The creative scientist is in fact usually more concerned with the relations of things to one another than with the precise verbal analysis of what these things are. He seeks a representation of the world which continually grows by an extension or transformation of what is there already. Thus what many scientists are really after is the adventure of discovery itself.

Stephen Toulmin (1922-)
No doubt, a scientist isn't necessarily penalized for being a complex, versatile, eccentric individual with lots of extra-scientific interests. But it certainly doesn't help him a bit.

