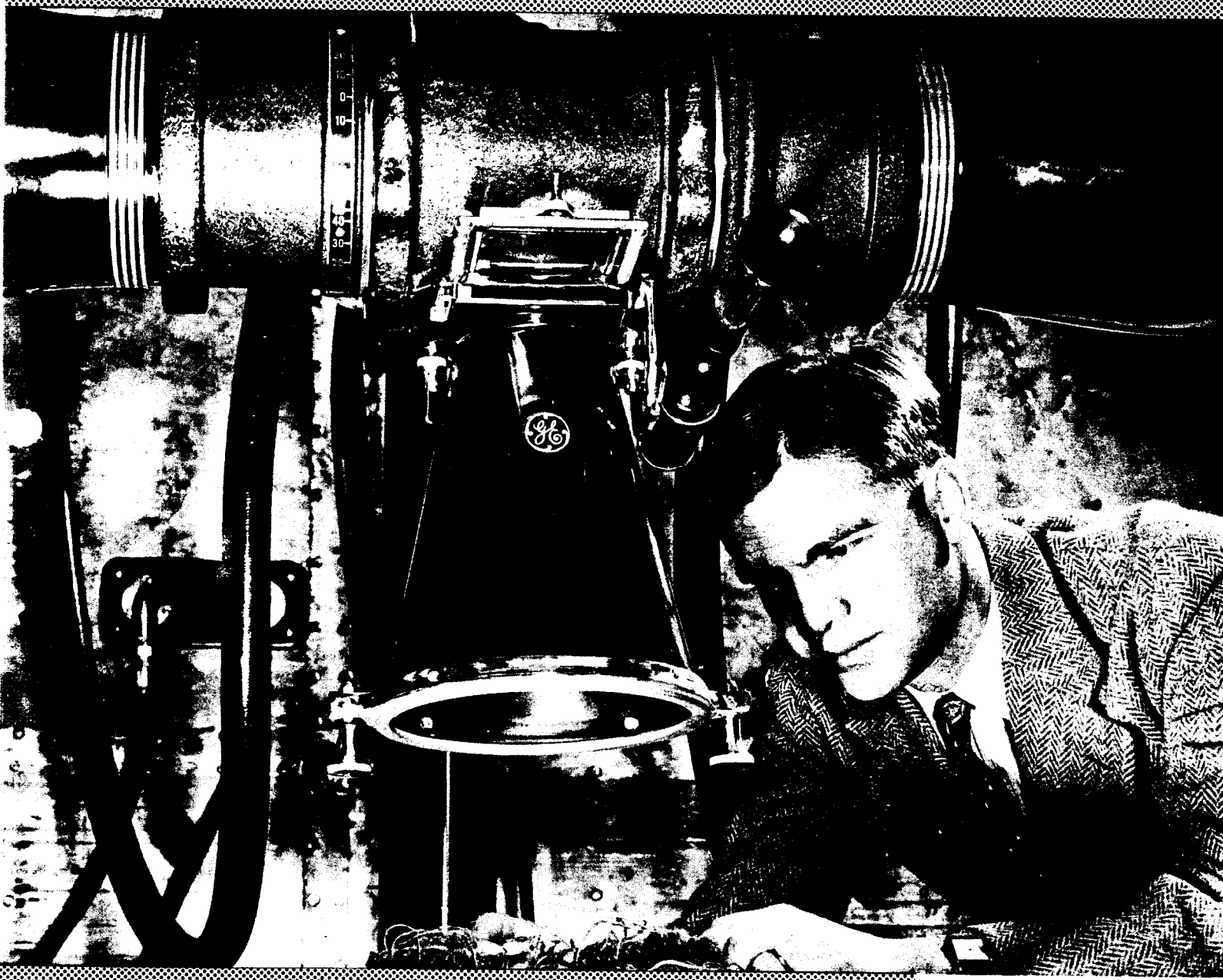
ISOTOPICS



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ISOTOPICS

March-April, 1948

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Barry T. Mines, *Managing Editor*
Elizabeth S. Hill, *Assistant*

Illustrators
George Cox Henry Wright

Photographers
Robert Walton Robert Smith

COVER: Dr. Arnold H. Sparrow arranging Trillium bulbs for exposure to X-rays in connection with the study of the sensitivity of plant cells to radiation. This investigation may furnish knowledge of the reason for the differences in the sensitivity of cells to X-rays. (See Biology Department Profile, Pages 6 and 7.)

The Pile

(To the layman, scientific terms usually are enigmas. A doctor's diagnosis of a certain skin disease may be that it is dermatitis. The geologist might indicate slate by use of the words metamorphosed argillaceous mudstone. The physicist speaks of nuclear reactors, accelerators, cloud chambers, completely mystifying individuals who have had no previous knowledge of nuclear physics.

In an attempt to explain to our readers the purposes of Brookhaven's projects in language that will be understandable to anyone, this reporter will endeavor, with the aid of our scientists and with frequent references to such books as "Explaining the Atom" by Selig Hecht and "Mr. Tompkins Explores the Atom" by G. Gamow, to write a series of articles that explain some of the technical programs of the Laboratory and the meaning of the various terms used.

Readers who wish even more detailed information about nuclear physics should take advantage of excellent books written for the layman that are now available in the library.)

There is no mystery attached to the use of the word pile by physicists to designate a nuclear reactor. The word is used in its literal sense. A Pile is, actually, a pile of material scientifically arranged to produce the most efficient pattern.

The essential item in a pile, or nuclear reactor, is a fissionable nuclear fuel; in other words, a fuel that will continue to undergo fission without mechanical aid. Chain reaction starts when a neutron from a cosmic ray strikes the nucleus of an atom of fissionable material causing it to undergo fission: break into two fragments, releasing in the process several more neutrons which fly away from the disintegration center at tremendous velocities. At the same time a large amount of energy is released.

If the process is to repeat itself, one of the neutrons released must strike another atom of fissionable material, and the process should continue indefinitely. Neutrons, however, are very active and extremely easy to lose. They may escape from the pile completely and be lost. In order to reduce this loss the pile is made large, reflectors are put around the outside, and it is built in a shape calculated to prevent the neutrons from escaping.

Further losses of neutrons occur through their absorption in impurities in the pile. For example, uranium^{235} occurs in nature combined with approximately 139 times its weight of uranium ^{238} which absorbs neutrons but does not continue the fission process. While U^{235} can be separated from U^{238}, the cost is prohibitive. Fortunately such expense can be avoided, and the natural mixture can be used in the pile under certain conditions. If the pile is so constructed that the fast neutrons will leave

the uranium mixture rapidly before U^{238} can absorb them, the neutrons can be slowed down in another material called a moderator, and will finally drift back and be absorbed by U^{235}.

The velocity of the neutrons is reduced by collision with the atoms in the moderator, and the materials used in the moderator must of necessity be carefully selected so that they will perform the slowing-down function without absorbing too many neutrons in the process. Only two materials which do not seriously absorb neutrons have been found practicable for use as moderators, heavy water and graphite, and heavy water is an expensive material to use.

If a pile were allowed to continue its chain reaction without control, the heat generated through the release of the enormous amounts of energy would interfere seriously with its performance. The rate or degree of fission can be governed by inserting in the pile at determined intervals, control rods made of a non-fissionable material which strongly absorbs neutrons.

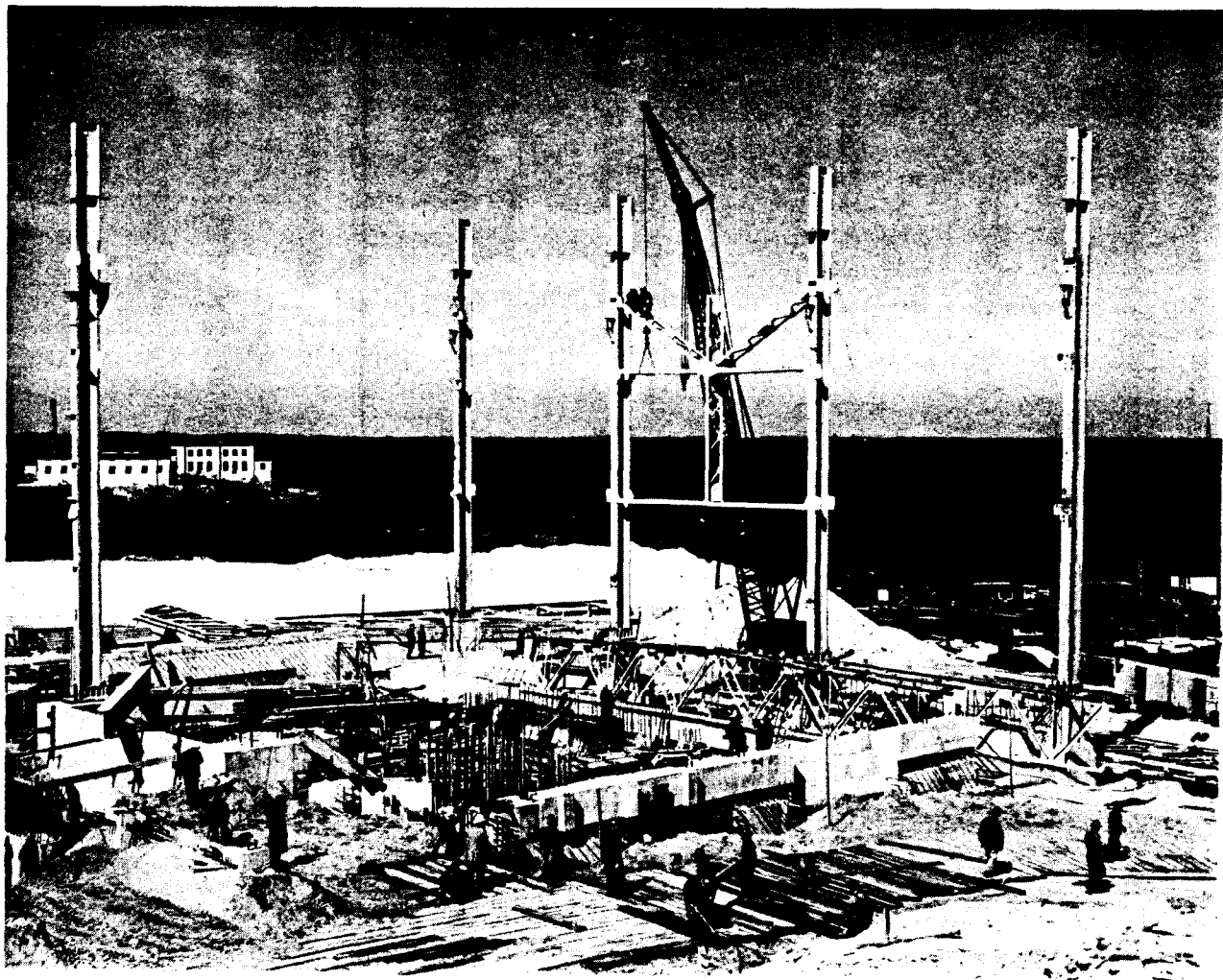
The temperature at which the pile operates is important, and therefore the pile must be cooled. As in the case of gasoline engines, water cooling and air cooling have both proved practical.

Pile No. 1 being constructed at Brookhaven will be an air-cooled, natural uranium, graphite-moderated, nuclear chain reactor, which means that it will operate with natural uranium as a fuel, that graphite will be used to reduce the velocity of the neutrons, and that an air stream will be used as a cooling agent.

Except for the details of cooling, the BNL reactor is similar in fundamental design to the first pile ever built (for experimental purposes in 1942 at the University of Chicago) and to the first high-power pile built at Oak Ridge in 1943. But the primary purpose in building this pile is unique. It will be a tool for basic scientific research shared alike by physicists, chemists, engineers, biologists, and physicians.

Designed essentially as a laboratory instrument, the new pile will be unusually flexible. Much of the space in and around the unit will be clear of operating gear and free for the use of experimenters. It will operate quietly in a building 80 feet high, 100 feet wide and 120 feet long. Air conditioned laboratories will be housed in wings extending from both sides of the pile building. General progress in the art of pile design leads the scientists to expect that the BNL reactor will be considerably more efficient as an instrument for research than existing reactors.

Mr. W. N. Thompson, Vice President of the H. K. Ferguson Company, states, "The unusually severe weather conditions have handicapped construction progress on the Pile during the winter months. With better weather in prospect, forces are now being expanded and new work areas are being opened up. The Pile is scheduled for substantial completion and initial trial operations by September 30, 1948."



PILE PROGRESS: Picture taken March 25th shows steel framing for Pile Building being erected.

STAFF PROFILE - SYDNEY THOMPSON

Mention history to Sydney Thompson, research chemist, and you must be prepared to enter into a spirited discussion as to whether events make great men, or great men make events. Sydney pursues the study of Historiography - the study and criticism of the sources and development of history as a branch of knowledge - as an avocation and avidly reads the works of famous historians.

Born in Ann Arbor, Michigan, in 1913, Sydney received his M.A. in 1936 from the University of Toronto. He taught chemistry at Sam Houston College in Texas, and held various research positions, including three years in the Manhattan Project. He became a member of the staff of the Laboratory on June 1, 1947, and is at present engaged in the study of the use of radioactive tracer elements in chemical processes.

Sydney, his wife Mary, and his two sons, David, 4, and Charles, 1, live in the apartment quadrangle.

His hobby is woodworking and designing educational toys, and he has designed and made some of the furniture and toys in his children's room. Sydney says that the large amount of snow which fell this winter has interfered with his hobby as he and his family and the children of neighboring scientists have had many enjoyable sleighing parties on the slopes near the apartment area.

Sydney is active in the National Association for the Advancement of the Colored People, the Urban League, and the Sydenham Hospital. He is interested in the progress of the peoples of Asia and Africa and their place in the modern world.

"LIFE" EXHIBIT ON DISPLAY HERE

All staff members are invited to visit Life Magazine's Atomic Energy Exhibit which is on display in the auditorium of the Research Staff Building, 32 Brookhaven Avenue. The exhibit was prepared in consultation with the U.S. Atomic Energy Commission which has urged nationwide education on the subject.

The numerous photographs emphasize the importance of the layman's understanding the social and political aspects of this great new source of power.

The exhibit illustrates the research that led to the war development of atomic energy, the possible post war uses and the problem of control. The text is, in part, quotations from the report on International Control of Atomic Energy prepared for the Secretary of State.

HOUSE HUNTING BLUES

You've had it, one time or another, that house-hunting headache.

There are many houses for sale, and some for rent. Apartments and rooms, too, are available. The only trouble the Housing Office faces is to match the need to the dwelling. People are so fussy. Imagine not wanting to pay two hundred hard-earned dollars a month to share a house with another couple. You could have the whole upstairs and the other couple could have the whole downstairs.

No? Well there is a charming house nearby that you might consider, $125.00 a month, nicely furnished and it can be occupied until June. Unfortunately, the price does go up for the four summer months to $800.00.

Mr. Doe is not in a position to buy? How about an apartment? There are a few. There is one that is really rather quaint and only $65.00 per month. Two rooms. "What, three children? And you say you are not eligible for a G.I. Building Loan? Well, Mr. Doe, your only substitute for the present would be an 'On-Site' Brookhaven Apartment." These are generally rented to incoming personnel for four months, to enable them to catch their breath and study the countryside, while they hunt for a permanent home.

During two discouraging months, Mr. and Mrs. Doe and their family traveled from Babylon to Southhampton, from Port Jefferson to Patchogue and much of the country in between, looking for a house to rent that would fill their needs and for their pocketbook.

Finally, believe it or not, despite the discouragement and strain on the budget, the Housing Office found THE house.

There are many other similar cases. Although the Housing Office is stumped occasionally, given time and your patience, they may manage to find an aspirin for your housing headache; and they will enjoy doing it.

HEALTH PHYSICS

As the Laboratory's scientific program progresses we will all be hearing more and more about Health Physics.

The Health Physicists will have many jobs to do. Even now, one is seen occasionally poking around the warehouses and laboratories with a meter in hand and a suspicious expression on his face. Buildings T-144 and T-145 are to be remodeled soon, as headquarters for the whole safety program, which includes Health Physics for radiation safety, and Safety Engineering for the prevention of other types of accidents.

The unit operated by Dr. Frederick P. Cowan, acting health physics officer, will be profiled in a subsequent edition of Isotopics and in the meantime we are printing below an abstract of an article by Dr. Karl Z. Morgan, health physics head at Clinton Laboratory, to outline the development and purposes of the movement.

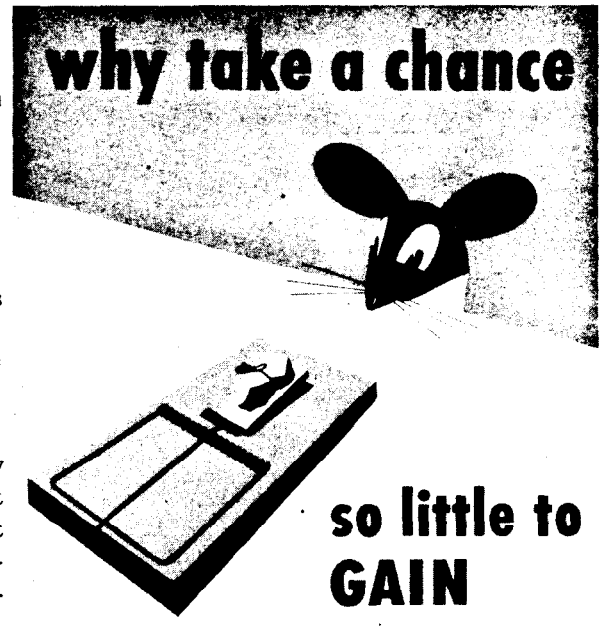
"Radiation Safety: A New Industrial Problem"
by
Dr. Karl Z. Morgan
(from Scientific American, January 1948)

Almost from the beginning of the atomic age it was recognized that developments could lead either to the unraveling of many problems on which man had labored for centuries, or, if unprecedented protective measures were not taken against radiations, to suffering and death. When the first atomic pile was set into operation on December 2, 1942, it was necessary to pause and consider whether it was wise to proceed with this important but dangerous development. It was estimated that if plans were carried out for the construction of the experimental pile at Oak Ridge and of the large production pile at Hanford, thousands of times as much radioactive material would be handled by the plutonium project workers as had been handled since the Curies discovered radium in 1898.

In an effort to find a solution to this problem, a department for the protection of the health of the plutonium project workers was established at the University of Chicago in the summer of 1942. The radiation protection programs of Health Physics Departments at the University of Chicago, Oak Ridge's Clinton Laboratories, and Hanford are essentially the same, except for the problems dependent upon the scale of operations. In all of the plants, elaborate precautions are taken whenever radioactive isotopes must be handled. During periods of possible radiation exposure, a Health Physics Department supervisor maintains a constant watch on the radiation level with a hand instrument known affectionately as "Cutie Pie". Isotopes to be shipped to hospitals or laboratories are packed in specially designed lead pots. After each sample has been sealed in the shipping container it is then carefully examined for radiation leaks with a portable Geiger counter.

Each person entering a restricted area on the plutonium project picks up a film meter and two ion chambers from his assigned rack. Two ion chambers are carried to minimize accidental errors of instrumentation. These three meters are carried by the worker during his normal duties and at the end of the shift are returned to the same rack. They are examined immediately by Health Physics Department technicians. If both pocket chambers indicate a significant fraction of a day's tolerance exposure, the film meter is read and an investigation is made the following morning to make certain that no one has been exposed to excessive radiation. All persons working in restricted areas wear protective clothing which must be washed regularly. A decontamination laundry uses conventional detergents to remove dirt, and a citric acid solution to remove radioactive isotopes.

All contaminated solid waste material from atomic energy plants is buried in guarded areas. Most of the liquid radioactive waste is stored in large tanks, although a small fraction is discharged into holding ponds and streams. Conditions in these ponds and streams are very closely controlled. All these radiation safety precautions are expensive and require a great deal of effort and concern to everyone working on these plutonium projects. They have, however, paid great dividends. In fact, no one is believed to have averaged a radiation exposure that exceeds 10 percent of the established tolerance level. This is a remarkable statement in view of the fact that these people are working with a large amount of radioactive material.



STAFF PROFILE - MINA KURZ

Few women, or men either, will admit that dimples are a handicap, yet Mina Kurz was informed that the judges of the contest, sponsored by the Sayville American Legion to select the 1947 Suffolk County Army Day Queen, placed her second because her dimples were too deep. The photographer who entered Mina's picture in the contest was the official photographer for the Sayville High School yearbook and he was so impressed by her graduation photograph that he enlarged it and forwarded it to the contest headquarters on the last night in which entries were accepted.

As evidence of the fact that the judges erred, the photograph at the top of this column is submitted. While Mina looks like Little Red Riding Hood, as a matter of fact her raincoat is blue, the official rainy day costume of the Laboratory's messengers.

Mina was born in Brooklyn, New York, attended the Andrew Jackson High School in St. Albans and graduated from Sayville High School. She is interested in oil painting and attends the Patchogue High School evening art class where she is studying portrait painting.

In February, Mina was promoted from messenger to clerk and is responsible for keeping the bulletin boards up to date. Her cheerful goodnight on the last mail pickup of the day will be missed.

DRAMATIC CLUB WILL PRESENT "7 KEYS TO BALDPATE"

The Brookhaven Theatre Group will present George M. Cohan's dramatic play, "Seven Keys to Baldpate", in the theatre on Brookhaven Avenue on the evenings of May 4th and 5th, 1948.

The cast, which was selected after a tryout during which all club members were given a chance to demonstrate their histrionic ability, will comprise:

Misses, Wave Culver, *Biology*, Evelyn Jirak, *Inter Office Services*, Alice Gewehr, *Technical Services*, Mina Kurz, *Inter Office Services*, and Messrs. Edward Nestor, *Budget*, Martin Plotkin, *Accelerator Project*, Balfour Golden, *Cafeteria*, Nelson Blachman, *Accelerator Project*, Ralph Kassner, *Accelerator Project*, Andrew Underhill, *Budget*, Merrill Lustgarten, *Electronics*, Alfred Christoffersen, *Photography*, and Anthony Shaeffer, *H.K. Ferguson*.

George Vaughn of the H. K. Ferguson Company will direct and Wilbur Steele, *Cabinet Shop*, will act as stage manager.

Those who have seen this play in the past will enjoy seeing it again with the characters portrayed by members of the Laboratory staff. Others will also enjoy following the adventures of a writer who seeks solitude only to be faced with one tense situation after another right up to a surprise finish.

"PUT SOME OOMPH IN IT" George Vaughn, director, tells members of cast of "Seven Keys to Baldpate". On stage, left to right: Tony Shaeffer, Andy Underhill, Alice Anderson, a visitor, Ralph Kassner, Balfour Golden, Wave Culver, and Ed Nestor.

STAFF PROFILE - KELSYE GARCES

Kelsye Garces, personnel records room supervisor, was born deep in the heart of Texas - La Grange, to be exact. She attended Our Lady of the Lake College in San Antonio, Texas, and received a B. A. in Education and Business Administration from Southwest Texas State Teachers College in San Marcos, Texas. She followed the teaching profession in Fayetteville, and Lefors, Texas, but left the profession to start work as chief clerk with the Coltexo Oil Company.

Kelsye met her husband, John R. Garces, Jr., a resident of Patchogue, while he was in the army stationed at Pampa, Texas, and they were married in 1944 in Ft. Myers, Florida, where he had been transferred. Five months after they were married John was shipped abroad where he remained for a year, and Kelsye spent that period alternating between her husband's people and her own family. After John was discharged from the army, he and Kelsye settled in Patchogue, and Kelsye entered the employ of the Laboratory in January, 1947, as a clerk, and shortly afterward was promoted to supervisor. As record room supervisor she has charge of the personnel folders, the Kardex records which indicate the names and other information regarding each employee by department and the alphabetical records in which are listed every member of the Laboratory staff.

Her hobbies are tennis, swimming, and reading, and she also admits a fondness for movies, provided they are worthwhile.

GOLDEN GLOVES CHAMP

Arthur J. Garritano, clerk in the warehouse, won the sub-novice 112 pounds, Golden Gloves Championship of Nassau and Suffolk Counties at the elimination contests held at Roosevelt Air Field in February.

Arthur, a graduate of Patchogue High School, trained at the Patchogue Y.M.C.A. He became a member of the Laboratory staff in August, 1947. His sister, Miss Gill M. Garritano, is secretary to Mr. Thomas F. Sheridan, Head of the Technical Services Division.

HERE'S ONE FOR RIPLEY

Mr. Meyer M. Reiss, member of the local AEC office and Mr. Richard Heinen, of the Laboratory carpenter shops can not only boast about the fact that they're the proud fathers of new daughters but can also brag about the date and day of their arrival.

Mr. Reiss' daughter, Roseann Elizabeth and Mr. Heinen's daughter, Marie Catherine, both have the distinction of arriving in this land of peace and plenty on the 29th of February, and also on the fifth Sunday in February which will not occur again for twenty-eight years.

BNL RIFLE CLUB NAMES OFFICERS

Mr. Arnold W. Runge, *Drafting*, was elected president of the Brookhaven Rifle and Pistol Association at a meeting held on March 8, 1948.

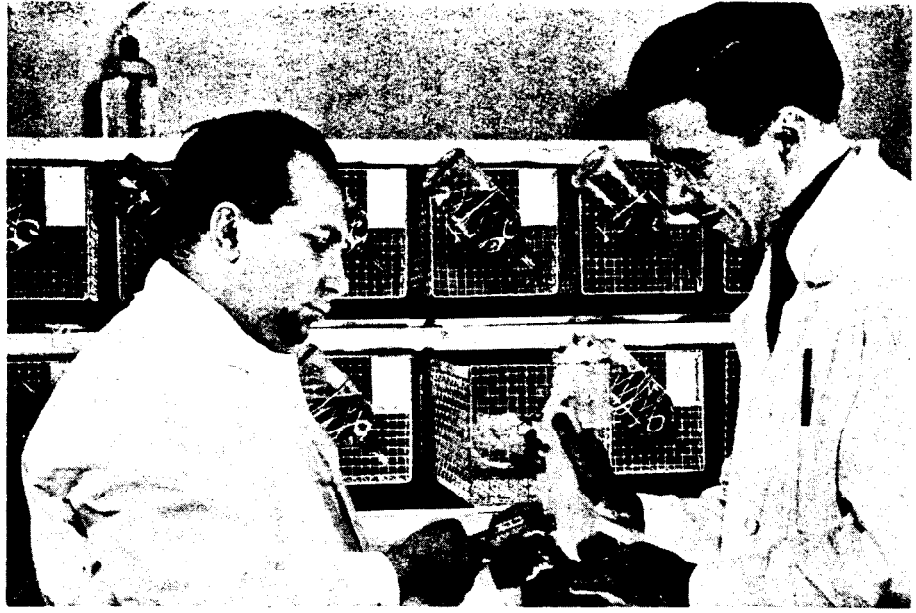
Other officers elected were: Alfred J. Brunini, *A.M. Department*, vice president, Equen B. Meader, *Housing*, executive officer, Edward J. Downs, *Photo Disintegration*, secretary, Mrs. Harriet A. Hayes, *Machine Shops*, treasurer, and Archibald M. Maccauley, *Laboratory Police*, chief instructor.

More than one hundred Laboratory staff members have indicated their intention to join the club and many have already paid their annual dues. The club dues will include membership in the National Rifle Association and a subscription to 'The Rifleman.'

Arrangements are being made to secure ammunition allotments, and tentative plans are to hold the first shoot in mid April.

Staff members who have not already joined may obtain complete information from Mrs. Hayes, Ext. 147.

Dr. Martin Gibbs extracting sugar from plant material, a step in the process to determine how plants manufacture their leaf pigments.



Dr. Abraham Edelmann (left) and Mr. Edward P. Sparapani injecting an anaesthetic into a rat in preparation for further studies in their investigation of the effects of whole body radiation.

Biology Depa

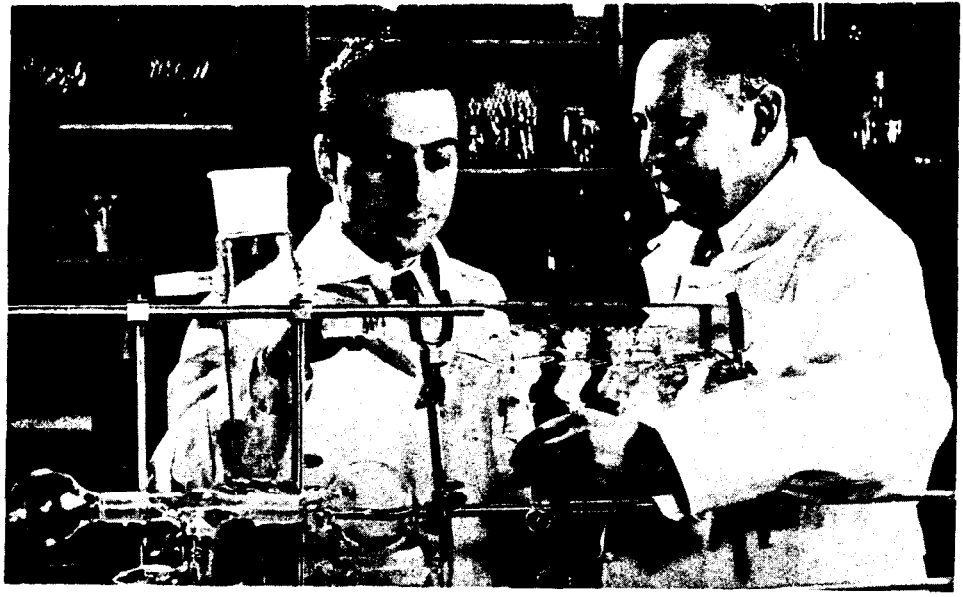
Entering the Biology Department laboratories in Buildings T-127 and 128, the non-technical observer may be puzzled by rows of test tubes, glass bottles of all shapes and sizes and many pieces of special equipment with such odd names as lyophlizing apparatus, or Soxhlet extractor. But if he tours the buildings under the guidance of Dr. Leslie F. Nims, chairman of the Biology Department, or of one of the scientists from the biology staff, he will soon realize that these are the tools for many interesting studies already under way in the converted barracks that are serving as temporary laboratories.

To understand the reason for some of the investigations it is necessary to remember that without radiation from the sun, life on earth would be impossible. This radiation, to which man is exposed every day of his life, makes plant life possible. Plant life, in turn, supports animal life.

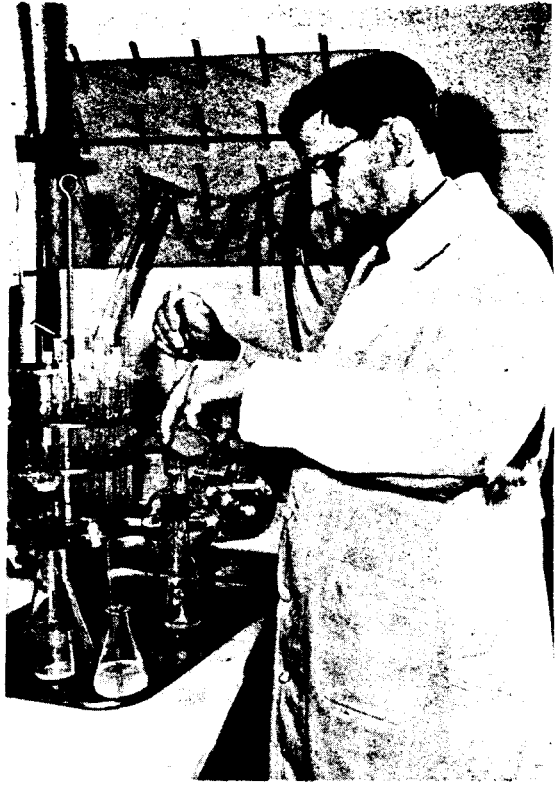
The Biology Department at Brookhaven, now almost a year old, is particularly interested in trying to find out how plants manufacture substances through the absorption of radiation from the sun, carbon dioxide from the air, and water and minerals from the ground. The Department is also interested in tracing the course of various substances through the human body and how they are transformed into muscle, bone and nerves. The radioisotopes that are now so abundantly available from the Atomic Energy Commission can serve as wonderful new research tools in such work.

When the Brookhaven pile is operating, much of the work of our staff biologists will, of course, involve using the concentrated radiations and the radioisotopes it will produce. The big electronuclear machines will provide additional types of radiation and of isotopes for the life scientists. Until then Dr. Nims and his associates are organizing small research teams, getting equipment togeth-

Dr. Robert Steele and Miss Lina Ottolenghi removing germ cells from plant bulbs in a moist chamber. This is in connection with their investigation to discover whether any of the chemical constituents of the plant cells are responsible for their wide variation in sensitivity to X-rays.



Dr. Leslie F. Nims, chairman of the Biology Department, (right) and Dr. Benjamin A. Rubin, group leader, examining an apparatus designed to preserve proteins in their native state.



Dr. Jacob Sacks preparing samples in the course of a tracer experiment with radioactive phosphorus.

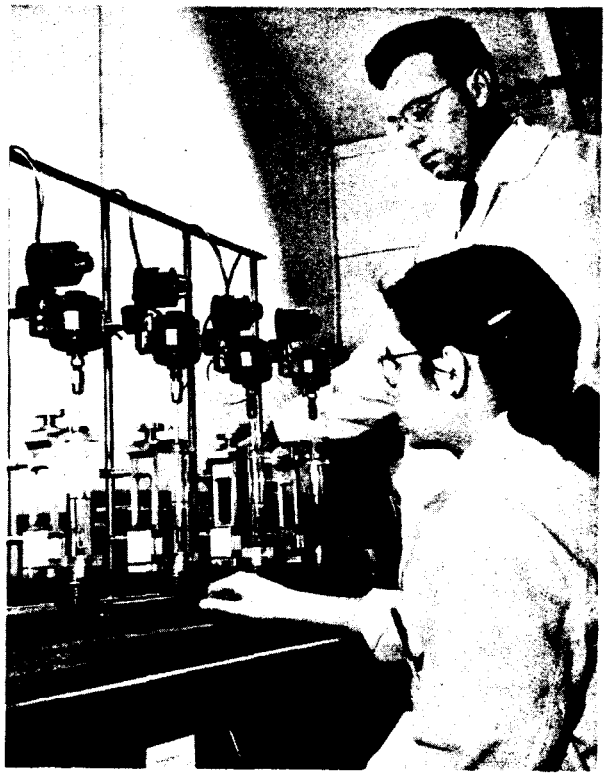
ment Profile

er and starting experimental work that may help to answer some of the most fundamental questions about living organisms.

Dr. Jacob Sacks, who is also a medical man, is studying processes in the liver connected with the utilization of fats and sugars, primarily to examine the effect of radiation on these particular functions of the liver. Dr. J. Raymond Klein is studying the effect of radiation on the physiology of radiation-damaged liver. Dr. Abraham Edelmann is investigating the effect of whole body radiation upon the functions of the endocrine organs; the pituitary, the adrenal glands, the gonads and the liver. Better methods for the treatment of radiation sickness and increased understanding of the organs themselves may result from such studies.

Why are certain cells more sensitive to radiation than others? Are their chemical constituents responsible? What is the chemical form of iron when it passes through the wall of the intestine into the blood stream? How do plants manufacture their leaf pigments? The answers to these and to many other questions are being sought by the Biology Department. The results of the investigations may lead to the establishment of better methods for the treatment of cancer and anemia, methods of increasing the crop yields or to the development of new types of plants that could be used for food sources.

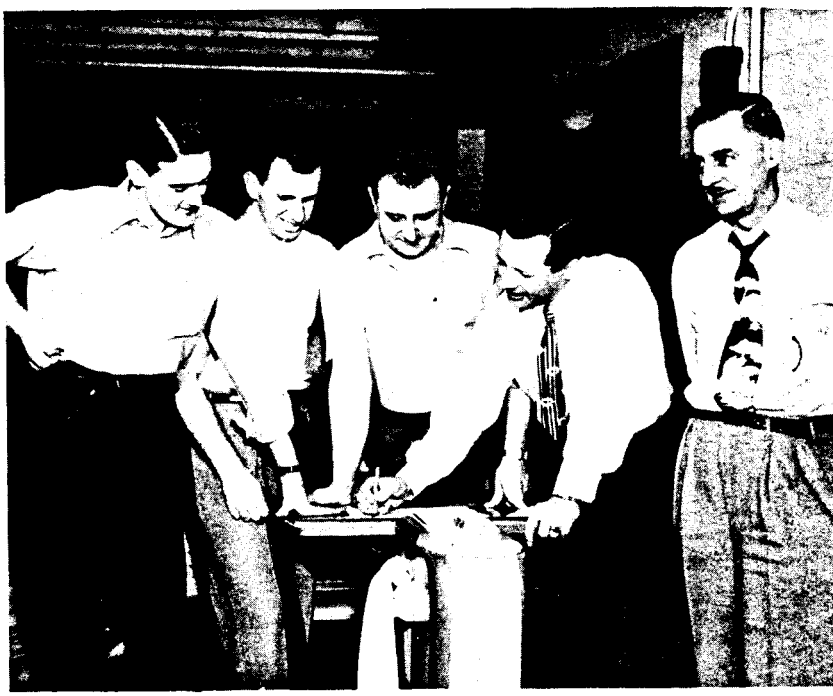
Space does not permit us to describe in any detail the many other important experiments now in progress in the Biology Department. It is possible that the benefits to mankind to be derived from the results of investigations in progress and from those that can be undertaken when Brookhaven has its research pile and its atom-smashers will more than balance the large amounts being invested in nuclear energy research.



Dr. Leon M. Sharpe and Miss Anna M. Torrey completing the final steps in the preparation of radioactive iron, using electroplating apparatus assembled in the Laboratory shops, in their investigation to determine the chemical form of iron when it passes through the wall of the intestine.

Bowling

1947-1948 BOWLING CHAMPS: A.E.C. team winners of first place in the Wednesday League and first place in the play-off. From left to right are C. Ruvola, H. L. Bates, C. G. Yax, J. H. Lancaster, G. Tiller and R. W. Widing.



RUNNERS UP: (Right) Purchasing team, winners of first place in the Tuesday League and second place in the play-off. From left to right are: D. J. Ryan, S. J. Kamen, G. Eldred, R. Brouwer and F. E. James.

THIRD PLACE: Men's Dormitory team, winners of first place in the Thursday League and third place in the play-off. From left to right are E. G. Heinze, C. Boulin, L. D. Heyman, J. S. Scott and C. A. Heyburn.

A.E.C., ADMINISTRATION #2, TEAMS WIN TOP HONORS

The AEC Bowling Team became the first champions of the BNL Bowling League by defeating the Purchasing Team, 4 points to 1 in the deciding match held on Wednesday evening, March 31st.

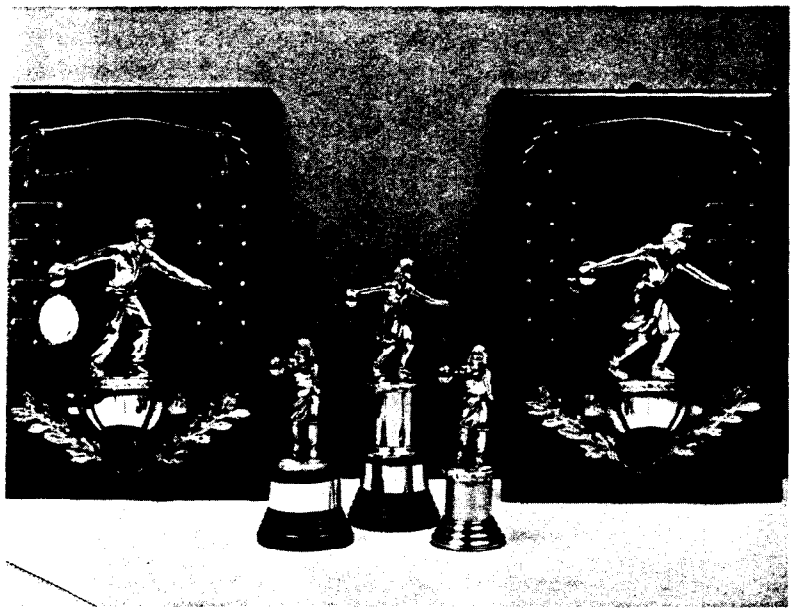
An enthusiastic gallery watched the Purchasing team take an early lead in the first game only to lose by six pins when Charley Yax of the AEC team made four strikes in the last two frames for a score of 203.

In the second game, Purchasing braced and managed to finish with a total score 40 pins more than AEC.

In the final and deciding game members of the Purchasing team struggled for marks but

finals

1947-1948 WOMEN CHAMPS: Administration #2 women's bowling team, winners of BNL Women's Tournament. From left to right are Estelle Baker, Florence E. Batvinis, Lucille A. Trudeau, Katherine Boysen and Ruth J. Marshall.



BOWLING LEAGUE PRIZES: Pictured at left are trophies that have been awarded to the winners of the men and women's 1947-1948 Bowling Tournament. To left and right are plaques that were awarded to the first place winners. These plaques must be won three times in succession for permanent possession. Smaller trophies in center were awarded to the women for individual scores and to each member of the winning team. Similar prizes were awarded to the men.

apparently they were on the mandatory list as AEC corralled most of the strikes and spares recorded and scored a total of 817 pins to win the game by 125 pins and the match by 91.

With this victory AEC secures one leg on the trophy which must be won three times in succession for permanent possession.

A close race for first place in the Women's Bowling League was decided on Wednesday evening March 24th when Administration (#2) team defeated the Physics team by a score of four to one. Communications team swamped Purchasing to the tune of five to nothing the same evening but had to be satisfied with the position of runner up only one point behind the winners.

Biology placed third and the A.E.C. team finished in fourth position.

RUNNERS UP: Communications team, second place winners in Women's League. From left to right are Olga Vario, Shirley Carde, Sarah Webb, Marian Bowditch and Rita McBride.

Margaret C. Chiuchiolo, Accelerator Project team, winner of a trophy for a high average of 142.

FINAL STANDING WOMEN'S LEAGUE

TEAM	WON	LOST
Administration #2	66	19
Communications	65	20
Biology	52	33
A.E.C.	44	41
Accelerator	40	45
Personnel	39½	45½
Physics	32	53
Info. & Pub.	31	54
Purchasing	28½	56½
Administration #1	27	58

FINAL STANDINGS MEN'S LEAGUES

Tuesday:

TEAM	WON	LOST
Purchasing	58	17
Bldg. & Grnds.	51	24
Fire Dept.	24	41
Meteorology	32½	42½
Electronics	26½	48½
Police Dept.	23	52

Katherine Boysen, Administration #2 women's bowling team, who rolled 203 to win first place for high game score and was second with an individual average of 141.

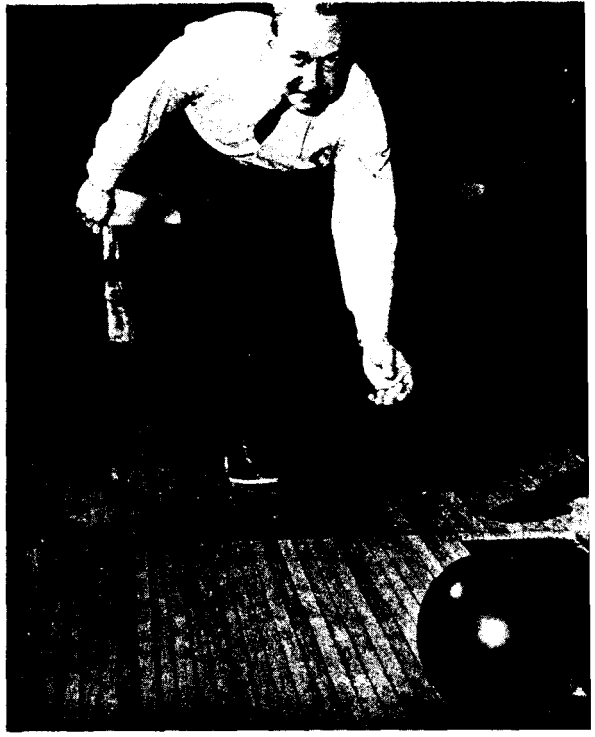
Wednesday:

TEAM	WON	LOST
A.E.C.	50	25
Photography	44	31
Machine Shop	42	33
Biology	34	41
Pile Eng.	28½	46½
Personnel	26½	48½

MEN'S LEAGUES (continued)

Thursday:

TEAM	WON	LOST
Mens Dorm. #1	53	22
Director's Office	47	28
Utilities	45	30
Paint Shop	40	35
Mens Dorm #2	26	49
Physics	14	61



Robert V. Dvorak, Electronics team, winner of high game score with a record of 234 pins, and also holder of highest average of 176.

Stephen M. Takats, Fireman's team, runner up for high average with a season's score of 160.

Robert P. Brown, Photography team, whose score of 600 pins took first place for three game series.

SEASON AVERAGES FOR TOP TEN

MEN'S LEAGUE

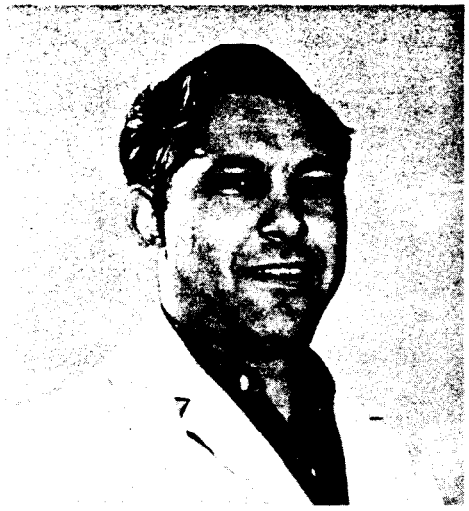
	Games	Pins	Avg.
Dvorak	42	7411	176
Takats	42	6752	160
Scesny	33	5274	159
Brown	51	8108	159
Lynn	41	6468	158
Yax	34	5283	155
Jason	47	7196	153
Bergin	39	5921	151
Heyburn	48	7276	151
Heyman	42	6297	149

WOMEN'S LEAGUE

	Games	Pins	Avg.
Chiuchiolo	48	6821	142
Boysen	45	6360	141
Batvinis	42	5166	123
Harris	27	3320	123
Guerrasio	48	5752	120
Penny	32	3785	118
Laguri	24	2838	118
McBride	42	4942	118
Marshall	45	5225	116
DeMeusy	21	2394	114

for MARCH-APRIL, 1948

STAFF PROFILE



Frank J. Garafola

As Frank J. Garafola, assistant foreman in charge of special materials, is mainly interested in fishing as a hobby, he is fortunate in living next door to Father Tatora, Pastor of Our Lady of Mt. Carmel Church in Patchogue, who owns more than ten boats which are available for the use of the members of the congregation.

Frank, his wife, and their two children, Judith, 6, and Francis, 3, spend a great many summer days fishing for trout on West Lake.

Born in Patchogue, Frank attended Patchogue High School. For a while after leaving school he covered a milk route. After a short period of work as a mechanic in the Plymouth Mills in Patchogue, he secured a position as bench mechanic in the Grumman Aircraft Engineering Corporation. He was employed at the Laboratory on May 14, 1947, as a machine operator, and was promoted in December to assistant foreman in charge of machining special materials.

In addition to fishing, his hobbies are soft ball, basketball, swimming and, in fact, all active sports. In spite of all the time that Frank spends pursuing his hobbies, he still finds time to cultivate a large truck garden and grows enough vegetables to keep his family fully supplied through the summer and part of the winter months.

(letters not to the editor)

Dear Gertrude;

I met an old guy here the other day who says he's working on Operation Isotripe, running the house magazine. I says you mean walking the magazine don't you, if it was running it would come out sooner. He said "when you say that, draw , sister" I told him I was no good at art work but that seemed to end the conversation.

The security man here is a nice fellow. He introduced me to a guy who works fro the F.B.I. Now dont menton this to a soul, but the F.B.I. feller says he is looking for a man named Ray Cosmic who no one has ever seen, but who pals around with a feller named Mason. It don't sound good to me, cause ther aint anybody that nobody has seen.

I played dumb and didn't tell the feller that my Dad is a detective in N.Y.City, but I'm going to tip Dad off and won't that F.B.I. guy feel foolish when Pop turns up with Cosmic and Mason,

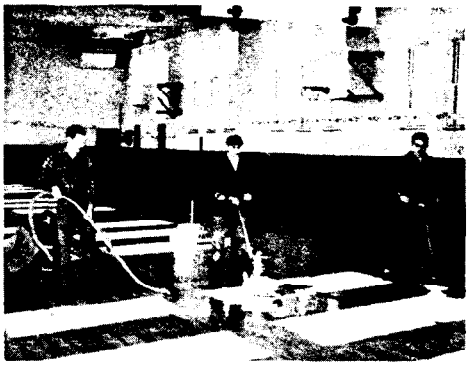
Read in the paper that the physicists (pretty good spelling Huh?)are changing the names of some particles. Gee, just when I was learning the old ones. Will keep you posted so you don't go around calling the atoms out of name.

'slong
Maisie.

HOW TO GROW A LAWN

With spring in the air, home owners naturally turn to thoughts of flower and vegetable gardens and last, but not least, of what to do about the lawn.

For after-hours relaxation, Mr. Edgar J. Hunter, Supervisor of Roads, Grounds and Heavy Machinery in the A.M. Department has written detailed instructions on the planting and care of a lawn and copies may be obtained through application to the Isotopics Editorial Office, Building T-110, 55 Pascal Place.



Dear Sir:

In reference to attached photo and writeup I would like to correct a few points. (1) The men in the photo are not actually doing the job. (2) The job is always done by the 4 to 12 shift in this gym. (3) And when the job is being done it's really work and the men strip down to their hide above the belt. Oh brother, those guys in the picture even have their hair slicked down. I know they aren't scrubbing. Let's give credit where credit is due.

(Signed)
Isomops and push brooms

(While we do not make a practice of publishing unsigned letters, we are accepting the above contribution in the facetious spirit in which it was written. Regarding the illustration in question, we are forced to break down and admit that it was a posed photograph, as the staff photographers are not ordinarily on duty at night when the floors are being cleaned. Editor.

WHAT PRICE PROTON-SYNCHROTONS OR SPECTROMETERS?

We stand in awe of Dr. Robert C. Miller, a California ichthyologist who ordered a shipment of fish from the Pacific. The fish were called humuhumunukunukaupuaa.

When the shipment arrived he peeked in the crate. "Dear me," he said, "they got the order mixed up -- these are humuhumukiukole!"

This is the second of a series of articles on atomic energy, written by R. J. Blakely, which were printed on the editorial page of The Des Moines Sunday Register.

* * *

A number of facts led scientists to suspect that the atom is *not* a simple, solid ball. One is that atoms join together to form molecules.

Scientists call the devices which caused atoms to join together *bonds*, or *valences* (from the Latin word meaning "to have power"). There are regularities in the number and strength of the bonds of various atoms. All chemical reactions are the transformation of atoms from one molecular arrangement to another. Some bonds are tighter than others. The tighter the bond is the more stable the compound is.

When atoms change from a tighter to a looser arrangement, energy from outside is required in the form of heat or electricity. When atoms change from a looser to a tighter arrangement, they give off energy in the form of heat, electricity, etc.

What are these bonds? The answer came from electricity.

* * *

For centuries man has known that when amber is rubbed with cloth, it becomes electrically charged and can pick up bits of straw or paper. The Greek word for amber is "elecktron". If a substance is repelled by amber, it is considered negatively charged. If it is attracted by amber it is considered positively charged. Static electricity (like that which shocks you when you touch metal, after rubbing your feet on a rug) and flowing electricity are the same.

When a current of electricity is sent through a tube which has been made almost a vacuum and when certain materials are put in the path of the current, small bursts of light can be seen. These bursts are caused by small particles hitting the material. Scientists weighed these small particles. They are only 1/1840th the weight of the lightest atom (hydrogen). They are called *electrons*. Their moving is electricity.

* * *

Where are the electrons when they are not moving in a current? They are in the atom, and some of them are near the surface. These can be pulled off. When an atom loses some of its surface electrons, it is positively charged; when it acquires some extra electrons, it is negatively charged.

Substances which are charged can move in an electric current. Such substances are said to be *ionized*, and the individual charged atom is called an *ion* (from the Greek word meaning "wanderer"). These electrons are the devices which permit atoms to join together.

When atoms join together to form molecules, they share electrons. An atom which is capable of sharing one pair of electrons with another atom (each contributing one electron) is called a one-bond or monovalent atom. An atom which is capable of sharing two pairs of electrons is called a two-bond or bivalent atom. And so on.

* * *

Thus all chemical arrangements and actions are caused by electrons on the surface of atoms. All elements in the same column of the Periodic Table have the same number of bonds. This explains their similarities.

Thus electricity was understood to be atomic. And more was known about the structure of the atom. Since atoms ordinarily are not charged, and since electrons are negative, it was reasoned that there must be something inside the atom which is positive to neutralize the electron.

* * *

In an electrical current the electrons flow from the negative pole (cathode) to the positive (anode). The next discovery was that something comes off the positive pole, too. It is not electrons, because it penetrates material deeply.

This something is a ray much shorter than the light ray. It was called the *X-ray* because at first nothing was known about it. Where did it come from? Scientists reasoned that it must come from atoms when they are hit by electrons.

* * *

The next step in understanding the atom was the discovery that certain elements - uranium, thorium, and radium - steadily give out powerful penetrating rays. These elements are called *radioactive*. Where do these rays come from? Scientists concluded that they, too, must come from inside the atom. Thus more was known about the atom, and more questions were raised.

* * *

Experiments with radioactivity led to a classification of the "rays". They were discovered to be of three types: (1) the *alpha particle* (which is positively charged and has an atomic weight of 4), (2) the *beta particle* (which is an electron, a negative unit of electricity), and (3) the *gamma ray* (which is similar to the X-ray). The alpha particle weighs four times as much as the hydrogen atom and travels very fast. The beta particle, though light, also travels fast. The gamma ray is very penetrating because it is so short and powerful. Thus the radiation of radioactive substances releases enormous amounts of energy. The energy is thousands of times greater than the energy released in chemical reactions, resulting from the rearrangement of atoms, so scientists recognize it immediately as of a different order. From the beginning of the Twentieth Century it has been called *atomic energy*.