Over 300 species of viruses, bacteria, plants and animals were investigated for their DNA content per cell. The results show that the larger the organism, the more DNA content within a cell, the more sensitive the cell to damage by ionizing radiation. The research was done by a team headed by Dr. Arnold Sparrow of the Biology Department. The results were presented on Wednesday, June 9, before a symposium on “Evolution of Genetic Systems,” held at Brookhaven and attended by over 150 biologists and geneticists. This was the Laboratory’s 23rd annual biology symposium, which has become known for its in-depth review of a single topic each year. Dr. Sparrow’s paper, “Survey of DNA Content and Evolutionary Trends,” was co-authored by Drs. H.J. Price and M.J. Lipman. Of the seventeen papers presented at the symposium, two were from the host Brookhaven National Laboratory and the rest from 14 different universities, including Cambridge, England, and the University College, Wales, England.

Under the symposium theme of “Evolution of Genetic Systems,” sessions were held on the topics of: 1. from the Molecular Level; 2. Molecules to Gene Level; 3. Gene Group to Chromosome Level; 4. Evolutionary Changes in Kind and Amount of DNA; and 5. Relationship between DNA and Chromosome Liver. The evening lecture was delivered by Dr. R.K. Wente of the University of Illinois who spoke on Evolution of Cellular Information, Transfer Mechanisms and Macromolecular Complexes. Dr. Wente’s research has been organized under the chairmanship of Dr. H.H. Smith, who was assisted by Drs. H.J. Price and M.J. Lipman.

Sparrow’s report, which included a survey of other scientific work on the topic, was based on his research conducted at Brookhaven stated that there are broad trends toward increasing cellular DNA content with increasing evolutionary complexity. For example, plants that have lost their DNA than viruses and bacteria, to the extent that the amount of DNA in flowering plants has 100 million times the amount of DNA of the smallest viruses. Dr. Sparrow emphasized that “general trends” because overly exactly, some of the flowering plants such as lilies and tulips, and the amphibians and salamanders and lungfishes have more DNA than man. Although the evolution of more advance organisms generally resulted in an increased DNA content, the evolution from the advanced to the complex organisms often resulted in a reduction of DNA. The reason for this is thought to be a duplication of genes. In plants duplicated many times along the chromosome within a cell, therefore making it likely that much of the differences in DNA content in higher organisms is due to the difference in the extent of gene repetition rather than differences in the number of unique genes.

It is speculated that redundancy may commonly exist in genes coding for proteins and that increases in DNA content may represent, in part, the results of selection for duplications of genes whose products previously limited evolutionary adaptability. Evolutionary decreases in DNA values may represent a trend toward normal or over-reiterated DNA sequences which have lost their adaptive value. The decrease suggests that the amount of DNA per cell and per chromosome have been influenced in both directions by strong selective pressures.

In the other host paper, Dr. Joseph Venners reported on experiments in gene function, where an RNA messenger chain had a successive step and the chain was used to add two adjacent genes producing different protein. Thus was reproduced a single bi-functional enzyme of the usual single-function proteins.

**Energy Seminar**

The Thursday evening Energy Seminar will hold two additional sessions:

- June 17 - Thermal Pollution – Vance L. Pianko
- June 24 – Future Energy Sources? – C.R. vince

The group meets at 8 p.m. in the North Room of the Brookhaven Center. If an alternate meeting place is necessary, the location will be posted at the Center. Any interested is welcome to attend.

**Fast Cheapper Celebrates Five Years Of Operation**

This week 5 years of experimental operation was completed by the fast neutron chopper at the FFHR. Designed to produce neutron pulses for nuclear physics experiments, the 700 lb. rotor has logged a total of 1200 operating hours in 5 1/2 years of operation, and spun through a distance of almost 12 million miles.

The chopper is the basic element in a complex measuring system designed to measure the gamma-ray decay of resonant nuclear states formed by neutron capture. These decays provide a picture of the structure of nuclei and the mechanism by which the incoming neutron excites the target nucleus. Much of the information obtained by the device is relevant to the Nuclear Energy program, although the primary objective is fundamental research. One of the most successful and productive instruments of its kind, the chopper has been in use in over 1000 separate experimental runs, on measurements of over 50 different isotopes.

**BNL’s Twentieth Annual Summer Student Program Starts Monday Morning**

Seventy-eight students from 48 different colleges and universities throughout the United States will spend 12 weeks at BNL from June 12 to July 11, 1970. The students will spend eleven weeks of their summer vacation at Brookhaven National Laboratory. The program was initiated in 1952 for the purpose of providing practical research experience in the laboratory. Each student is under the guidance of a laboratory staff member. A total of 40 students will participate in the program, morets its inception.

The program is geared to provide maximum benefit to students. They are encouraged to attend seminars in any of the Laboratory’s eight departments and to interact with as many of BNL’s scientific disciplines as possible during the summer. Summer is also the busiest time at the Laboratory for visiting faculty members from all societies, from industry and universities. As a special summer feature, Laboratory staff members are preparing a series of weekly laboratory seminars on subjects which will be largely selected by the students. This year’s visiting faculty and BNL staff members will be encouraged to attend and participate in the seminars.

This year’s participants include 29 students majoring in physics, 16 in chemistry, eight in mathematics, six in biology, three in medicine, four in biochemistry, two each in chemical and electrical engineering, and one each in physics, computer science, nuclear engineering, and communications. Of these, 19 will be in the Physical Science Department, 15 in the Department of Applied Science, 13 in the Biology Department, 11 in the Chemistry Department, seven in the Accelerator Department, six in the Applied Mathematics Department, and the Medical Department, three in the Instrumentation and Health Physics Department and one in Administration.

The students were selected on the basis of their academic performance plus several letters of reference. Approximately 300 students applied for the 78 positions available. Of those selected, 32 are graduating seniors and the rest are in their junior year. Three schools, with four students each, are tied for having the most students. They are Jackson State, Jackson, Miss.; Carnegie-Mellon University, Pittsburgh, Pa.; and the University of Illinois, Urbana-Champaign, in the Accelerator Department, six in the Applied Mathematics Department, five in the Medical Department, three in the Instrumentation and Health Physics Department and one in Administration.

A two-well-of-two short films produced by the Laboratory, "Summer at Brookhaven" and "Life in the Lab," were shown Friday, June 11 at 12:30 p.m. In Berkner Hall.

Aspects of Symmetry is a delightful view of all the modes of symmetry in a practical context. It shows how dancers, engineers, computer architects, and the like, use symmetry in their work. The film features a computer program that uses a whirlwind mental and visual tour of the macrocosm and the microcosm. The action of the film is so rapid that you will want to hold on to your seat. A nineteen minute color wh.
Art Curators Visit Brookhaven

Dr. E. R. Sayre (center) points out details of painting to group of art curators and conservators from the New York Metropolitan Museum of Art. Dr. Sayre and Dr. Garvan Harbottle, (holding painting) explained Brookhaven's research in the arts and archaeology to the visitors.

Selected Reading

Am. Scientist 36, May-June 1971
The role of fundamental research in an advanced society
W. D. McIlroy, 294-2
Advances and challenges in science in 1970. C.P. Hasbun, 209-307
Minerva 9, April 1971
A dilemma of American science and higher educational policy: The support of individuals and fields versus the support of universities
J. T. Wilcox, 171-76
On some positive aspects of the economics of the brain drain. G. Pachauri, 211-12

Arrivals & Departures

Arrivals
James E. Whittfield
Medical
Departures
Lawrence T. Arnold
Accelerator
Guy Delamore
Accelerator
Lawrence J. Wein
Accelerator
Stewart Senator

Radio Club Meeting
The regular monthly meeting of the Radio Club will be held on Thursday, June 10, 6 p.m. at the Recreation Building.

Weekly Calendar

Tuesday, June 15
Particle Physics Seminar
10:00 a.m., Seminar Room, 20 Penn. St.
SLAC Plan for a Spectrometer
Dr. Lens, SLAC
Biomedical Engineering Seminar
1:00 p.m., Chem. Sem., 55 Lewis Rd.
Absorption Edge Transmission Scanning
H. L. Atkins, Medical Dept., Brookhaven National Laboratory
Solid State Seminar
1:30 p.m., Sem., Sem. Rd., 20 Penn St.
Intractions between Electrons and Absorbed Gases
Prof. John Hudson – R. P. I.
Physics Colloquium
3:30 p.m., Seminar Room, 20 Penn St.
Partially Results of an All Sky X-ray Survey
Herbert: Gursky, American Science & Engineering, Inc.
Thursday, June 17
Solid State Seminar
1:30 p.m., Seminar Room, 20 Penn St.
Ultrasonic Attenuation in Helium
K. Kehr, Cornell University

Tuesday, June 22
Instrumentation Seminar
2:00 p.m., Instr. Sem., Bldg. 355
Timing with Ge Detectors
A. H. Cox, Instrumentation & Health Phys Dept., Brookhaven National Laboratory
Wednesday, June 23
Chemistry Seminar
3:30 p.m., Chem. Seminar Room, 35 Lewis Rd.
1-Alkylthio-isocianides Reagents and Their Application to Metal-Molybdenum Chemistry
Marvin Rasch, University of Massachusetts

Announcement

Myron Stanglin will give a series of lectures on the Fundamentals of Superconductivity with emphasis on the phenomenological theory. The lectures will be presented on successive Wednesday mornings at 9:30 a.m. in the Snyder Lecture Hall of the Accelerator Department. The first of this series will be presented on June 30.

Dr. George A. Baker, Jr. (Applied Math) presented a talk entitled "The Pade Approximant in Theoretical Physics" at the Courant Institute on May 28.

Powell Richards, William Eckelman and Elliott Lebowitz (all DAS) will present papers and participate in the 18th Annual Society of Nuclear Medicine Meeting in Los Angeles, California June 26 to July 2. Mr. Richards is conducting an invited teaching session on the subject of medical radionuclide production and is an invited discussant for a paper entitled "Synthesis of Low-Molecular-Weight High-Tc-Labeled Compounds." Dr. Eckelman is also an invited discussant for a paper entitled "Electrolyte Aggregation by Ionic (Al/III)" in Generator Elate.

Dr. David Werley (Accl. Dept.) was an invited speaker at Princeton University on May 24, the title of his talk was "AGS Experimental Areas and Experimental Program."

Said F. Mushghalib of the National Neutron Cross Section Center (DAS) present a colloquium entitled "Search for Simple Mechanisms in Neutron Capture" at Rensselaer Polytechnic Institute, Troy, New York on May 17.

Dr. Barry Goodin (DAS) will present a paper at the 5th Annual Conference on Trace Substances in Environmental Health, Columbia, Missouri from June 29 to July 1.

Irwin Lewis (Applied Math) presented a paper entitled "TEST: An Engineering Oriented Compiler," at the Canadian DECUS Symposium in Fredericton, New Brunswick, Canada on June 9.

Peter Mattern gave a demonstration of thermoluminescence to the visiting group from the Metropolitan Museum.

Here and There

Clare Lambert

Dr. Charles Flood (right) shows a model of the Medical Research Reactor to art conservators.

Salary Increase

Schedule Clarified

On March 24, Laboratory Director Dr. Maurice Goldhaber addressed Brookhaven's senior staff members. His remarks were published in full in the April 8 issue of the Brookhaven Bulletin.

At the time Dr. Goldhaber announced that the effective date for salary increases for FY 1972 would be deferred for some employees and said that, since the wage and salary budget is about 80% of our total budget, these deferrals in salary increase will save about half a million dollars, and in this way will save some people.

The actual schedule for those people receiving salary increases in FY 1972 will be as follows:

The effective date for wage employees receiving increases will be July 5, 1971.

The effective date for those monthly employees in salary grades NE I to NE I inclusive and E I to E I inclusive who are receiving increases will be August 1, 1971.

Employers will be notified June 24 of increases effective July 3 and August 1.

The effective date for those employees classified as Antimatter Scientist, Associate Scientists, employees in grade NE 5 and grade E 4 to E 8 inclusive receiving increases will be November 1, 1971.

The effective date for all other monthly employees receiving increases will be January 1, 1972.

This policy is in a compromise necessitated by the need to minimize the number of employees losing their jobs and simultaneously provide our remaining employees with increases which at least partially offset the salary erosion caused by inflation.

Employers covered by bargaining unit contracts will receive wage adjustments in accordance with the terms of those contracts.

Softball Players Needed For Men’s League
Please contact Recreation Office, Ext. 391 or 2088, if interested.
Pool - Gym Procedures
Admission to the Swimming Pool and Gymnasium will be granted only to employees; members of employees' families (members of the same household); and, guests of the same.
An employee or a family member will be permitted to bring no more than five guests per family. If employees or employee family members must accompany and supervise guests of the same, they must be accompanied and supervise them in the Pool and Gym areas.
Persons may be denied the privilege of using the recreation facilities for improper conduct or use of the equipment.
Parents bringing children to use the Pool should follow these rules:
1. Children are to remain in the designated waiting area near the Pool entrance until the Pool opens at 9:30 a.m., and when present to be picked up by parents. The Gymnasium will not be available for this portion of the Pool.
Children of employees are not permitted in the Gym before 3 p.m. when not accompanied by an adult. The Gym will close each night at 9:30 p.m. and is closed on weekends.
Employee activity, organized or informal, has first priority in the Gym. Organizational activity, however, may be permitted when space is available and it does not interfere with scheduled activity.
The official schedule is posted in the Gym. This schedule is subject to revision, as required.
Admission through the gates of the Laboratory to use the Swimming Pool and Gymnasium is controlled by the Security Office. However, members of employees' families are permitted into the Laboratory to use the Pool and Gym if they:
Are accompanied by an employee, or
Are in possession of a Season Pass, or
Are in possession of a Temporary Identification Card issued by the Security Office.
Tennis Anyone?
With the approach of summer, it is anticipated that the tennis courts will be in greater demand. There will be times when all courts will be in use and players will be waiting on the sidelines for "their turn."
Since our courts are not scheduled and are not reserved except for tournament finals, they must be used on a first-come, first-served basis.
Since the majority of employees have limitations on their time for tennis, family members are requested to try to play tennis at times other than the noon hour and immediately after four. The cooperation of all concerned will be appreciated.
The tennis courts are not a safe playing ground for young children. Enthusiastic parents are requested to keep their children and tri-cyclers away from the courts.
Tennis does not earn the title of "Greatman's Game" without reason. All players and spectators are expected to exhibit sportsmanship and conduct themselves with decorum. Obviously, outbursts of temper have no place on the court.
In addition, the rights of players on adjacent courts must be considered. Please wait until action has terminated temporarily before crossing behind a player for any reason. Ask politely for the return of an errant ball.
Jills Ticket Reservations
The Recreation Office door will open from 9:30 a.m. to 4:30 p.m. Monday evening, June 14, to take ticket orders for the 1971 Jet season games at Shea Stadium. BERG has 20 seats for each of the seven home games located in Reserve Section No. 25, which are priced at $0.00 each. Tickets are available to as many interested employees as possible, the following sales procedures will be observed.
1. Tickets are intended for the employee and his immediate family. It is understood that a single employee might wish to purchase a ticket for his or her mother.
2. An employee is entitled to purchase two tickets for one game only. (This restriction may be lifted if warranted by need)
3. Ticket reservations must be made in person. No telephone orders will be accepted.
4. Payment must be made at the time of order. Check payable to BERG, please. Tickets will not be returned or acceptable for refunds or exchange at the Recreation Office. Refunds or exchanges should be made at the Ticket Office at Shea Stadium.

The Sun, The Moon, And The Stars
Herbert Ferber's sculpture, "Jubal," and right to loan from the Whitney Museum of American Art, was originally commissioned for a temple in Cleveland. It was intended to represent the idea of creation with the abstracted forms of sun, moon and stars supplying the iconography. Its innate strength is manifest in the case with which this remarkable sculpture illuminates a scientific environment as it would a religious one, and for the way in which it represents humans as well as cosmic reality. Ferber's work is one of the older generation and has an international reputation. He pioneered in developing the open sculptural form of Cubismo in this country.

The Art Of Berkner Hall
When the Berkner Hall Cafeteria complex was finished two years ago, many who applauded the architecture realized that it offered an excellent context for the exhibition of contemporary art. Furthermore, it was felt that the incorporation of appropri-
ate art would serve to warm and humanize the otherwise quite chaste architectural ambiance. The quality of the architecture dictated that the art should be of the highest quality also.
Thus, the BER Art Committee expanded its usual format of exhibitions to include the showing of works of art throughout the Berkner Hall building. It has been fortunate in being able to obtain appropriate works on loan from individual artists, museums and private collections. Although works are sometimes shown by artists with some connection with the Laboratory, this is done only when the works themselves are suitable to the surroundings and conform to the highest professional standards. A year ago a major contribution to this program was made by Governor Nelson A. Rockefeller when he loaned Brookhaven Henry Moore's "Winged Figure" for several months.

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