

# the NIH Record

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HEALTH, EDUCATION, AND WELFARE

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NATIONAL INSTITUTES OF HEALTH  
PUBLIC HEALTH SERVICE

## President Johnson Names February As Heart Month

President Lyndon B. Johnson's official proclamation of February as "American Heart Month," together with recent developments in heart research, have intensified the drive to make 1965 a year for concerted effort against the Nation's number one killer—heart disease.

In his proclamation the President noted that "in the year 1965 heart disease—ailments of the heart and blood vessels—is expected to take a toll of more than one million lives, and year by year continues to be responsible for over half of all the deaths in the United States."

He said that "essential and forward-looking programs are in the main the result of a national partnership of the American Heart Association and its Federal allies, es-



Dr. Knutti

## Russian Virologists Tour Viral Research Labs

Two Russian virologists—Drs. Marina K. Voroshilova and Lidia L. Fadeyeva—recently were conducted on a tour of several of the major viral research laboratories in this country by the National Institute of Allergy and Infectious Diseases to acquaint them with the status of experimental studies in virology. The tour was arranged under provisions of the U.S.A.-U.S.S.R. agreement on scientific exchanges.

Included in the itinerary were visits to the Wistar Institute and Merck, Sharp, and Dohme in Philadelphia; the Division of Biologics Standards; NIAID's Laboratories of Infectious Diseases, Biology of Viruses, and Tropical Virology; Pitman-Moore Co. in Indianapolis; Yale's School of Public Health in New Haven; the New York City Department of Health and the New York University School of Medicine in New York City.

## Bruce N. Ames Receives Science Academy Award

Dr. Bruce N. Ames of the National Institute of Arthritis and Metabolic Diseases was one of six Washington area scientists, engineers and teachers who recently received awards for scientific achievement from the Washington Academy of Sciences.

Dr. Ames, Chief of the Section on Microbial Genetics in NIAID's Laboratory of Molecular Biology, was chosen for the Biological Sciences award in recognition of his outstanding contributions to molecular genetics.

The award was presented January 21 at the academy's annual dinner meeting, held in the John Wesley Powell Auditorium at the Cosmos Club. Dr. Ames was introduced by Dr. Marshall W. Nirenberg of the National Heart Institute.

Dr. Ames' previous honors include the Eli Lilly Award in Biological Chemistry.

## 2 NIAID Scientists Partially Decipher Structure of Strongest Known Venom

The unique chemical structure of the strongest of all known venoms has been partially deciphered by two scientists of the National Institute of Arthritis and Metabolic Diseases. The venom is extracted from the kokoi frog, found in the jungles of Colombia.

Drs. John W. Daly and Bernhard Witkop of NIAID's Laboratory of Chemistry reported that this venom is chemically related to the steroid hormones and appears to be structurally similar to the hormones secreted by the adrenal gland.



These are the two species of Kokoi frogs—*Phylllobates bicolor*—used in the study by Drs. John W. Daly and Bernhard Witkop, NIAID, in which they partially deciphered the chemical structure of the venom extracted from the frogs' skin. The slide, in centimeters, indicates their size.

## President Asks \$2.2 Billion for PHS in FY 1966; NIH Share Is \$1.15 Billion

The Fiscal Year 1966 Federal budget submitted to Congress January 25 by President Johnson includes a \$1.15 billion request for the National Institutes of Health. This exceeds by \$73.6 million the amount appropriated to NIH for the current fiscal year.

### 3 Members Named to NIAID Advisory Council

The appointment of three members of the National Advisory Allergy and Infectious Diseases Council has been announced by Dr. Luther L. Terry, Surgeon General of the Public Health Service.

They are Alice W. Fordyce, Vice President and Secretary of the Albert and Mary Lasker Foundation; Dr. Saul Krugman, Professor and Chairman of the Department of Pediatrics, New York University-Bellevue Medical Center; and Dr. Francis C. Lowell, Chief of the Allergy Unit, Massachusetts General Hospital.

As this issue went to press the House Appropriations Subcommittee reported it had rescheduled PHS and NIH budget hearings as follows:

PHS hearings to begin yesterday (Feb. 8) with opening statement by Dr. Luther L. Terry, the Surgeon General.

NIH hearings to begin next Monday (Feb. 15) with opening statement by Dr. James A. Shannon, Director of NIH.

ministration for the Department of Health, Education, and Welfare. The DHEW total includes almost \$2 billion proposed for separate transmittal for new educational and other programs.

The recommended budget for PHS includes \$6 million for scientific activities overseas (from the Special Foreign Currency Appropriation), most of which will be allocated to NIH.

The \$1.15 billion NIH budget request is apportioned as follows:

(See BUDGET, Page 3)

## NIH Orchestra Presents Concert Friday, Feb. 12

The NIH Orchestra, sponsored by the Recreation and Welfare Association, will present the first concert of the current season on Friday, February 12, at 8:30 p.m. in the Clinical Center auditorium.

Mark Ellsworth, director of the orchestra since its beginning six years ago, will again conduct.

The program will include works by Handel, Brahms and J. Strauss. The featured work will be Mozart's Symphony No. 40, in G minor.

All NIH employees, members of their families and guests are cordially invited to attend. Admission is free.

### Curative Use Sought

Apart from this possible relationship, there is always the hope that such a powerful venom may eventually prove useful as a curative agent since many venoms have such a "double" function.

In addition, the mode of action of such strong toxins often provides new insight into basic pharmacological and physiological phenomena and implements methods for the testing and evaluation of drugs.

The two scientists are now trying to determine exactly how a number of carbon, hydrogen, nitrogen, and oxygen atoms are joined to-

(See VENOM, Page 3)

# the NIH Record

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## NEWS from PERSONNEL

### EMPLOYEE TRAINING

The use of non-Government facilities, such as universities, for training civilian staff members under the provision of the Government Employees Training Act has been the subject of recent inquiries to PMB.

Most of these inquiries are concerned with eligibility, information supervisors must consider when deciding on nominations, and limits on the amount of non-Government training authorized.

Employees with at least one year of current continuous Civil Service employment are eligible for non-Government training provided: 1) the training is related to their work, 2) funds are available, 3) the gains derived by NIH justify the cost, and 4) the training is approved by authorized officials.

### Other Limitations Listed

Training in non-Government facilities cannot be approved if it is solely for the purpose of obtaining an academic degree, if it is designed to acquire skills that were necessary for the employee to qualify for his job, or if the training is designed primarily to qualify the employee for promotion.

In developing and considering nominations for training in non-Government facilities, reviewing officials must assess the employee's potential for: 1) useful contributions to the NIH mission, 2) his ability to use what he learns to help others develop their jobs, and 3) whether the gain from the training justifies the time away from the job and the cost to the Government.

As a general rule an employee may receive up to one year of train-



Those who have "fought the wind tunnel" in entering the Clinical Center will appreciate the graceful ease with which these girls are entering and leaving. Linda Berkowitz (L) and Ann Andrews, R. N., both of the CC Admissions and Follow-up Department, show how the new revolving door at the northwest entrance abolishes the gusty draft caused by positive air pressure within the CC. A similar door has been installed at the main entrance.—Photo by Jerry Hecht.

ing in each 10-year period. Certain exceptions are permitted for scientists and engineers.

The authority to train employees in non-Government facilities cannot be used simply to reward employees for "long and faithful service." The Government Employees Training Act was passed to provide the Federal establishment with a long-needed authority to up-grade the quality of the Federal Civil Service by providing meaningful opportunities for all employees to develop and grow.

## List of Latest Arrivals Of Visiting Scientists

12/17 — Dr. Yoshihiro Sato, Japan, Research in the Laboratory of Chemistry, Section on Steroids. Sponsor: Dr. Yoshio Sato, NIAMD, Bldg. 4, Rm. 108.

12/31—Dr. Hector Montes de Oca, Argentina, Research in the Laboratory of Virology and Rickettsiology. Sponsor: Dr. Alexis Shelokov, DBS, Bldg. 29, Rm. 316.

1/4—Dr. Roger Matte, Canada, Research in the Anesthesiology Department. Sponsor: Dr. Clarence L. Hebert, CC, Bldg. 10, Rm. 10N224.

1/5—Dr. Elsa Ida Borriss, Germany, Research in the Laboratory of Clinical Science, Section on Biochemistry. Sponsor: Dr. Marian W. Kies, NIMH, Bldg. 10, Rm. 2D55.

1/5—Dr. Donald S. Young, United Kingdom, Research in the Clinical Pathology Department, Chemistry Service. Sponsor: Dr. Ernest Cotlove, CC, Bldg. 10, Rm. 4N315.

1/6—Dr. Ilmari Jaakonmaki, Finland, Research in the Laboratory of Metabolism, Section on Chemistry. Sponsor: Dr. Henry M. Fales, NHI, Bldg. 10, Rm. 7N306.

1/21—Dr. Michael W. Johnson, England, Research in the Laboratory of Viral Oncology, Macromolecular Biology Section. Sponsor: Dr. Peter T. Mora, NCI, Bldg. 10, Rm. 3B16.

1/25—Dr. Alma L. Luzzati, Italy, Research in the Laboratory of Immunology. Sponsor: Dr. Maurice Landy, NIAID, Bldg. 10, Rm. 11B13.

## Employees at Westwood Donate to Blood Bank

Some 65 NIH employees in the Westwood Building responded as blood donors on January 28 when the Clinical Center Blood Bank staff visited there.

A total of 50 units of blood was contributed by the group to meet the needs of CC patients, including heart surgery performed the following day.

Employees in the group who did not qualify as donors by reason of age, medical history, or temporary health condition such as slight fever or a recent medication, will receive NIH Blood Insurance protection.



Harvey Bullock Jr., NCI, prepares to hand blood donor form to CC Blood Bank receptionist, Peggy Alexander, prior to giving blood January 28 at the Westwood Building. Behind Miss Alexander is Marguerite H. Rowen, R.N., of the Blood Bank staff.

## Deadline Is February 15 for Changes in Health Benefits

Employees interested in enrolling in the Health Benefits program or in changing enrollment as announced in the last issue of the *Record* may contact registration assistants in I/D Personnel Offices before the February 15 deadline. Names of registration assistants are posted on all NIH Bulletin Boards.

## Appointment Announced

Dr. Mason W. Gross, President of Rutgers University, New Brunswick, N. J., has been appointed a member of the National Advisory Research Resources Committee of the Division of Research Facilities and Resources.

Employees and supervisors alike are encouraged to make full use of this authority and, in doing so, to make certain that the Government's investment is fully justified by the increased contribution that the trained employee can make to the NIH mission.

## Film on Booster Shots To Be Shown by EHS

"The Call of Duty," a dramatic color film portraying the importance of maintaining a regular schedule of repeat immunization against contagious diseases, will be presented by the Employee Health Service next week.

The introduction to the 29-minute color film will be given by Dr. Charles White, Associate Medical Officer, EHS.

The film schedule is as follows: Clinical Center auditorium, Monday, February 15 at 11:30 a.m. and 1:00 p.m.; North Bethesda Office Center #2, conference room 113, Thursday, February 18 at 1:30 p.m.; North Bethesda Office Center #1, conference room 202, Thursday at 2:30 p.m.; and Westwood Building, conference room A, Friday, Feb. 19 at 1, 1:45, and 2:30 p.m.

## Dr. Skipper Appointed

Dr. Howard E. Skipper, Vice-President and Director of the Kettering-Meyer Laboratories of Southern Research Institute, Birmingham, Ala., has been appointed to the National Advisory Cancer Council for a 4-year term ending September 30, 1968.



## BUDGET

(Continued from Page 1)

operating funds, \$1,040 million; direct construction, \$1.5 million; grants for construction of health research facilities, \$56 million; and grants for construction of community mental health centers, \$50 million. General research support grants of \$45.2 million will be available from operating appropriations.

The amount requested for operating funds for FY 1966 represents an increase of \$74 million over the 1965 appropriation.

Amounts designated by activity are as follows:

Grants	(Millions)
Research	\$587.8
Fellowships	54.6
Training	193.4
State control programs	6.7
Subtotal	\$842.5

Direct Operations	
Research	\$82.0
Collaborative Studies	77.5
Int'l Research	1.2
Computer Res. & Tech.	1.5
Biologics Standards	6.4
Training Activities	2.1
Prof. & Tech. Assistance	4.6
Review & Approval	17.0
Program Direction	5.3

Subtotal	\$197.6
Direct Construction	\$1.5
Health Research Facilities construction grants	56.0
Community Mental Health Centers construction grants	50.0

TOTAL	\$1,147.6
Funds requested for direct operations are allocated as follows:	

Appropriations	(Millions)
Gen. Res. & Services	\$58.7
NIGMS	122.3
DBS	6.4
NICHD	53.5
NCI	150.0
NIMH	209.0
NHI	131.6
NIDR	22.2
NIAMD	119.2
NIAD	75.0
NINDB	92.1

TOTAL \$1,040.0  
Funds for the Division of Research Facilities and Resources (\$51.2 million) and the Office of International Research (\$6 million), as well as funds for Computer Research and Technology (\$1.5 million) are included in the amount requested for General Research and Services.

Each year Americans spend more than \$373 billion on personal goods and services. — 1965 Information Please Almanac.

## Villagers of Walajapet, India, Construct Orphanage Hall as Memorial to Kennedy

*This honor accorded the late President Kennedy was witnessed by an official of the National Institute of Arthritis and Metabolic Diseases. It points up the goodwill generated by U. S. research projects in developing countries.*

One of the more poignant tributes to President Kennedy and U. S. aid reported during the past year is the construction by the people of Walajapet, India, of John F. Kennedy Hall, part of a facility for orphans there.

The villagers were formerly known as "Untouchables." This caste was renamed "Harijan" by Gandhi, meaning "Children of God." Their Gandhi Mission Orphanage



Portrait of President Kennedy, wreathed in flower garlands strung on silver wire, traditional with India, is shown in the new orphanage hall following unveiling ceremony.



These two children, shown with their food bowls, are among participants in the feeding trials conducted at the orphanage. They are in an age group which is most susceptible to the protein-deficiency disease, kwashiorkor.

## Adolphe Menjou Movie Next in R&W Series

The next offering in the silent films classics series, sponsored by the Recreation and Welfare Association of NIH, will be The Marriage Circle, directed by Ernst Lubitsch and starring Florence Vidor with Adolphe Menjou.

The 1924 film will be shown on Saturday and Sunday, February 13 and 14 at 8 p.m. in the Clinical Center auditorium. Admission is free. NIH employees and guests are invited to attend.

was established to care for scores of children orphaned by a major famine in 1952. Maintained since then by the scant means of the region, it now benefits by a program of supervised institutional feeding that is part of a research project on the protein-deficiency disease, kwashiorkor, supported by the National Institute of Arthritis and Metabolic Diseases with P. L. 480 funds. The research project is carried out by the Christian Missionary College in nearby Vellore.

### Villagers Plan Dormitory

About a year ago the people of Walajapet (population 1,000), decided the orphanage needed an additional building—a dormitory with general purpose rooms—and proceeded to plan its construction.

It was agreed that each of the village families, as customary in projects of this kind, would assign as many members as possible to participate in the construction.

Because wood is virtually unknown in this part of India, the building had to be built entirely of brick and a native type of concrete. The brick was made from local clay deposits, the concrete from a mixture of burnt limestone and sand.

The brick walls, when completed, were coated with a stucco made also from limestone and sand. This, in turn, was painted with a white-wash concocted from the burnt

(See ORPHANAGE, Page 4)

## NIMH Booklet Describes 19 Research Projects

A new publication—"Research Project Summaries"—describing selected research studies in the area of mental health has been issued by the Public Health Service.

The pamphlet, which contains descriptions of 19 projects sponsored through the research grants program of the National Institute of Mental Health, was prepared by the Program Analysis Section of NIMH's Research Grants Branch.

Single copies of "Research Project Summaries," PHS Publication No. 1208, may be obtained without charge from the Public Information Section, National Institute of Mental Health, Bethesda, Md. 20014.

Copies in bulk may be purchased from the Superintendent of Documents, U. S. Government Printing Office, Washington, D.C. 20402, for 40 cents each.

## Dr. Ashworth Appointed DBS Laboratory Chief

Dr. John N. Ashworth, who has served as Assistant Chief of the Division of Biologics Standards' Laboratory of Blood and Blood Products since 1959, has been appointed Chief of the laboratory.



Dr. Ashworth

In this position he will be responsible for the Division's control activities pertaining to biological products derived from human blood, and research carried out in support of these activities.

Before coming to NIH in 1959, he was the Assistant Director of the American Red Cross' Blood Program for seven years.

Prior to his post with the Red Cross, he was Head of the Human Blood Products Processing Department of E. R. Squibb & Sons. His special interest has been the study of the physical chemistry of blood proteins.

Born in Springfield, Mass., Dr. Ashworth attended Brown University in Rhode Island where he received his Sc.B. in 1942. He received the Ph.D. from the University of Wisconsin in 1948.

He is a member of Sigma Xi, the American Chemical Society, and the New York Academy of Sciences.

## NIH Researchers Edit, Contribute to Book on Membrane Transport

The new book, The Cellular Functions of Membrane Transport, published by Prentice-Hall, with support from the National Institute of General Medical Sciences (See Record, Jan. 12) is edited by Dr. Joseph F. Hoffmann, Head of the Section on Membrane Physiology in the National Heart Institute's Laboratory of Kidney and Electrolyte Metabolism.

Contributors to the book include six NIH members: Drs. Ichiji Tasaki and Toshifumi Takenaka, National Institute of Mental Health; Dr. Karl Frank, National Institute of Neurological Diseases and Blindness; Drs. Jack Orloff and Joseph S. Handler, NHI; and Dr. David P. Rall, National Cancer Institute.

Dr. Gordon M. Tomkins of the National Institute of Arthritis and Metabolic Diseases and Dr. Walter H. Freygang, NIMH, also were chairmen of various sessions at the symposium.

The scientific papers presented in the book were those given by the participants at the 1963 Symposium of the Society of General Physiologists.

## ORPHANAGE

(Continued from Page 3)

limestone.

The entire job was done by hand labor, with the use of equipment and tools such as wheelbarrows and trowels.

With the building nearing completion, the villagers began the planning of appropriate dedication ceremonies.

From the USIS office in Madras they obtained, gratis, a photographic portrait of President Kennedy and spent their money to have it framed.

As the dedication plans took shape they hung the picture and inscribed on the floor beneath it sand messages typical of Indian hospitality.

Local dignitaries were requested to speak at the time of the dedication, scheduled for October 19.

### U. S. Representative Needed

But an important element was missing—there was no official representative of the U.S.A. available to participate in the ceremonies.

At this point the villagers learned that Dr. Benjamin T. Burton, NIAMD Associate Director for Program Analysis and Scientific Communication, would be arriving soon on an inspection tour of Institute projects. His mission at Walajapet was to check on the feedings trials at the orphanage. He was considered an ideal U. S. official representative.

On Dedication Day the Walajapet dignitaries lauded the late President Kennedy for fostering "universal humanitarian tenets" and "ideals which transcended national boundaries." Another expressed appreciation for the "beneficent role of the feeding trials for orphans."

In his turn, Dr. Burton—aided by a young interpreter "who added

## NIDR Scientists Discuss Research at Health Day Ceremony in Cleveland

Three National Institute of Dental Research investigators were featured speakers at the 25th Annual Children's Dental Health Day in Cleveland on February 1.

Drs. Robert J. Fitzgerald, Paul H. Keyes, and Rachel H. Larson, of the Laboratory of Microbiology discussed causes and control of dental caries.

Children's Dental Health Day was initiated by the Cleveland Dental Society.

Dr. Fitzgerald presented experimental evidence from studies with laboratory animals to show that caries has all the attributes of a transmissible disease.

Dr. Keyes discussed the uses of various formulations which have been used to control acute rampant dental caries in animals. He has used fluoride and antibiotic preparations applied typically in the form of gels, pastes, powders and solutions.

Dr. Larson spoke about the results of animal studies in which the interrelationship of dietary and host factors have been shown to affect the development of dental caries.

certain flourishes"—emphasized "the universality of humanitarian aims" and "the reciprocal deep respect in the United States for Gandhi's lifelong dedication to the betterment of the lot of the underdog."

He cited "the benefits likely to accrue to other developing countries from the results of studies such as those at the orphanage," and the desire of Americans "to help others help themselves."

"The most fitting example of such self-help," he concluded, "is this orphanage at Walajapet."

## Two New Publications By PHS Provide Data On Grant Programs

Two new publications recently issued by the Public Health Service provide a listing of formula and special project grants for health services during Fiscal Year 1964 and statistical tables summarizing Fiscal Year 1963 grant programs.

The first publication lists \$90.7 million in formula and special project grants during Fiscal 1964 for health services, as compared with \$76.3 million a year ago.

### 50 States Participate

In 1964 formula grants were made under eight programs to the 50 States, the District of Columbia, Puerto Rico, Virgin Islands, and Guam to help support the general health programs of the States and, in specific programs, for control of tuberculosis, radiological health, cancer, heart disease, chronic diseases, mental health and water pollution. On the formula basis, appropriations totaled \$58.3 million.

Project grants to provide for health services, studies, experiments and demonstrations are available to State or local public agencies or nonprofit organizations on a basis of applications that describe the need.

Copies of the new booklet, PHS Publication No. 1233, entitled Public Health Service Grants and Awards, Fiscal Year 1964 Funds, Part IV, Health Services Formula and Project Grants, may be purchased from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20401, at 30 cents per copy.

The second publication, which completes a 5-part series for 1963 data, is offered as a convenient reference source.

Section I provides graphic and tabular highlights of the major programs sponsored by PHS and deals with trends and comparative data concerning both applications and awards.

### Contains Summary Tables

Section II contains summary tables dealing with detailed breakdowns by types of awards, sponsoring programs in NIH and the Bureau of State Services (Community Health-Environmental Health), States, and recipient institutions. The publication provides an itemized accounting for more than \$966 million in grant and award funds.

The title is: Part V, Public Health Service Grants and Awards Summary Table for the Extramural Programs, Fiscal Year 1963; PHS Publication No. 1079.

Copies may be bought from the Superintendent of Documents, U.S.



Dr. Michael E. DeBakey (center), Chairman of the President's Commission on Heart Disease, Cancer and Stroke, discusses the commission's report to the President with James H. Harrison (left), Public Printer of the Government Printing Office, and Dr. Edward W. Dempsey, Special Assistant for Health and Medical Affairs to the DHEW Secretary. The report became available January 14 and is on sale through the Superintendent of Documents, Government Printing Office, Washington, D. C. at \$1.25 per copy.

## Survey Reveals Courses In Psychiatry Attracting Many Family Physicians

Courses in psychiatry are now attracting many family physicians, according to a study of the General Practitioner Training Program by the National Institute of Mental Health. The survey reveals that more than 4,400 physicians enrolled in postgraduate training in psychiatry in the first four years the training was offered.

With some physicians signing up for more than one course, enrollments total about 2,000 a year, according to the study which appeared in a recent issue of the Journal of Medical Education.

### Programs in 21 States

Conducted in 21 States, the psychiatric training programs have their largest enrollments among physicians in California, New York, Utah, Michigan, and Pennsylvania. More than half of the participating physicians are in general practice, with 20 percent in pediatrics and internal medicine.

Spokesmen at NIMH pointed out that Congress initiated the program after a study by the Joint Commission on Mental Illness and Health showed that next to the clergyman, physicians other than psychiatrists are most often consulted by persons with emotional problems.

The study was reported by Roger L. Robertson, M.A., and Beatrice M. Shriver, Ph.D., Training and Manpower Resources Branch.

Government Printing Office, Washington, D.C. 20401, at \$2.25 per copy.

Single free copies of both publications are available on request from the Public Health Service, Washington, D.C. 20201.



Villagers from the region around Walajapet visited the Gandhi Mission Orphanage to witness dedication ceremonies of the new John F. Kennedy Hall, in background. Seated on the ground are present members of the orphanage, boys left, girls center. Former members are seated on chairs at right. The latter are among the original group of children for whom the orphanage was established in 1952.—Photos from color slides by Dr. Burton.



## HEART MONTH

(Continued from Page 1)

pecially the National Heart Institute and the Heart Disease Control Program of the Public Health Service."

The President further proclaimed that "it is both urgent and indispensable that all of our people become aware of the vast problem of heart disease and of what is being done and can be done about it, and that every citizen join the endeavor as a member of the health forces of the Nation to help speed the conquest of heart disease."

The President's first official proclamation of February 1964 as "American Heart Month" sounded the starting gun for one of the most productive years in the battle against the crippling cardiovascular diseases.

The country's leading authorities in the field of heart and blood vessel research took major steps last year to combat the cardiovascular diseases, which afflict over 10 million persons and cause over half of all deaths every year.

### Labs Are Battlefields

Laboratories became battlefields as scientists attempted to solve the many mysteries of heart disease.

Dr. Ralph E. Knutti, Director of the National Heart Institute, pointed out that "great strides have been taken in 1964 against high blood pressure, congenital heart disease and rheumatic fever. In other areas, such as hardening of the arteries and coronary heart diseases, there is still much to be accomplished."

Most congenital and acquired heart defects can now be repaired by surgery, Dr. Knutti said. He noted that artificial heart valves and pacemakers have been installed successfully in many patients, and surgeons have better anesthetics and heart-lung machines which take over the circulatory duties of the heart and lungs during an operation.

### Artificial Heart Sought

Medical investigators may come up with an implantable artificial heart before they discover a cure for heart disease. Some experts are now saying that an artificial heart will be developed within the next decade. It could be that 1965 will be the biggest year for planning in this area.

During 1964 significant progress was made in the fight against heart disease. Early in the year, the Report on Smoking and Health of the Advisory Committee to the Surgeon General of the U.S. Public Health Service cited evidence associating cigarette smoking with coronary heart disease.

In November 1964, 700 of the country's leading experts in heart research recommended a sweeping



Heart surgery performed inside a hyperbaric chamber has been successfully used to correct congenital defects causing "blue babies." The chamber's high-pressure oxygen atmosphere steps up oxygenation of the patient's body tissues, providing temporary improvement of the child's condition to enhance his chances of surviving the operation.

perspective of priorities to be confronted in the next decade. Meeting at the Second National Conference on Cardiovascular Diseases in Washington, D.C., these physicians made important recommendations in the fields of research, community services, and education.

Dr. Irvine H. Page, Director of the Cleveland Clinic, in delivering the research summary at the conference, noted that "There is no doubt that the most startling change in medicine during the past decade has been the upswing of interest in cardiovascular diseases and the demise of fatalistic acceptance."

### Commission Requests \$3 Billion

In December 1964, the final report of the President's Commission on Heart Disease, Cancer and Stroke was submitted to President Johnson. The commission requested almost \$3 billion to fight the Nation's three leading killers.

The commission urged a national network of centers for patient care, research and teaching. It also called for better application of medical knowledge in communities by getting the most recent develop-



One type of artificial heart currently undergoing long-term trials in animals is this air-driven, sac-type heart developed by National Heart Institute grantees at the Cleveland Clinic.—Photo by Jerry Hecht.

ments and techniques of prevention and treatment to grassroots levels so that people can obtain the best possible care.

### 'Cancer of the Stomach' Is Sixth in Series of 10

"Cancer of the Stomach," a pamphlet prepared by the National Cancer Institute to give the public a clearer understanding of the disease, was issued recently by the Public Health Service.

The 8-page pamphlet, sixth in a revised series of 10 dealing with cancer of different body sites, discusses the incidence of stomach cancer—its symptoms, diagnosis, and treatment—and current research.

Unlike many other forms, stomach cancer has occurred less frequently in the United States in the

last several decades. It causes only about six percent of all cancer deaths, compared with 20 percent 20 years ago. Nevertheless, an estimated 19,000 Americans die from it each year.

Single copies of "Cancer of the Stomach," PHS Publication No. 1237, are available without charge from the Public Health Service, Washington, D.C. 20201. The pamphlet may be purchased in quantity from the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402, at 5 cents a copy or at \$3.25 per 100 copies.

## NIAID Awards Contract For Typing Center to Catalogue Rhinoviruses

The National Institute of Child Health and Human Development has awarded two large training grants, amounting to \$121,736 for the first year of a 5-year program, to the University of Chicago to support graduate training of research investigators in the areas of adult development and aging.

At present, the University of Chicago has the only major training center in this country in the social and behavioral sciences of gerontology.

The NICHD grants will support an expanded multidisciplinary, interdepartmental program involving the Departments of Psychology, Sociology, Psychiatry, Hospital Administration, and Social Service Administration.

The bulk of the funds will be used by the university to train research investigators in fields where there is an acute shortage of trained personnel.

### Program Continued

The remainder will be used to supplement an ongoing program, started seven years ago, to train graduate students enrolled under the university's Committee on Human Development. These students pursue research training programs leading to the Ph.D. degree.

Ten graduate student trainees now enrolled with the committee are specializing in social and psychological problems of middle age and old age. The grants will make possible admission of six new students to this program each year for the next five years.

The new students may elect to work in the fields of education, hospital administration, psychology, social service, or sociology. In addition, trained psychiatrists will be accepted for postdoctoral research in geriatric psychiatry.

Dr. Bernice L. Neugarten, Professor of Human Development, will administer the program, assisted by an interdepartmental committee.

## Dr. Fred Alt Transfers To Oceanographic Office

Dr. Fred Alt, formerly Chief of the Instrument Engineering and Development Branch of the Division of Research Services, recently transferred to the U. S. Naval Oceanographic Office.

Dr. Alt is now Director of the Testing Division of the U. S. Naval Oceanographic Instrumentation Center. The Division is responsible for the testing, evaluation, and standardization of instruments used in oceanography and marine science research.

## NIMH Sleep Study Indicates Dreaming May Be Unique, Basic Biological State

By Mildred Lehman

Exploring the realm of sleep, National Institute of Mental Health scientists are uncovering physical evidence that the body's periods of dreaming represent a unique and basic biological state.

Far from being a calm stretch of quiescence, normal sleep is studded with activity that can be measured. "Sleep with rapid eye movement," or "rapid sleep," is marked by a distinctive constellation of physical events, according to Dr. Frederick Snyder, Chief of the Section on Psychophysiology of Sleep, Adult Psychiatry Branch, NIMH.

These include low-voltage, fast activity on the electroencephalograph, irregular cardiorespiratory function, bursts of rapid eye movement, and muscle twitching.

### Rapid Sleep Recurs

It is believed that dreaming occurs in rapid sleep, which occupies about 20 percent of the human adult's sleeping time. Rapid sleep recurs regularly during sustained sleeping, at 90-minute intervals, generally in four episodes, lasting from a few minutes to an hour.

Studies indicate that the dreaming stage of sleep may be a different body condition from waking and sleeping. If dreaming is a fundamental biological state, the possible implications for medicine and psychiatry have hardly begun to be tapped.

However, electrophysiological measurements of individual neurons and neuronal populations in the brain suggest that at least some forms of dreaming, hallucination, psychosis, and epilepsy have some relation to rapid sleep.

Using a refined microelectrode technique, Dr. Edward V. Evarts, Chief of the Section on Physiology, NIMH Laboratory of Clinical Science, has succeeded in mapping neuronal behavior through phases of waking and sleeping in unanesthetized, unrestrained monkeys and cats.

### Electrode Used in Tests

He has been able to tap individual pyramidal tract neurons by sinking an electrode 1 to 1.5 mm. into the animal's brain. Penetrating to within 30 or 40 microns of the neuron, the electrode is sensitive to tiny currents which flow when the cell discharges.

Dr. Evarts has shown that phases of sleep involve reorganizations of neuronal discharge in the brain. In rapid sleep, some neurons may be far more active and much less inhibited than in waking.

Besides rapid sleep, Dr. Evarts has identified placid sleep, active waking with gross movements, and placid waking without movement.

Each phase shows a characteristic pattern of neuronal discharge. These patterns suggest an inhibition-excitation dialectic which takes place at different rates in different

parts of the brain.

The inhibition and disinhibition process uncovered by Dr. Evarts suggests interesting clues to understanding the dreaming state and hallucinations.

In his laboratory, Dr. Snyder has explored the possibility that primitive parts of the brain are responsible for rapid sleep. In observing the primitive opossum, he found the same constellation of physical events in rapid sleep that is found in humans.

While the biological function of rapid sleep is yet to be ascertained, Dr. Snyder cited a number of important leads as to its clinical implications. The most intriguing and most speculative, he said, is that related to psychosis.

### Depressed Patients Studied

Dr. Snyder is studying the sleeping patterns of severely depressed patients as well as those of animals and normal human adults. During acute phases of illness, mentally disturbed patients have anomalous rapid sleep patterns, as indicated by rapid transitions between waking and dreaming and unusually high percentages of rapid sleep.

The sleep patterns of epileptics and heart disease patients are also being studied at NIMH, in collaboration with Dr. David Horwitz of the National Heart Institute, and Dr. Kristof Abraham of the NINDB. The research promises new perspective on the nature of brain disturbance in epilepsy, and the frequent occurrence of hemorrhages and coronary occlusion during sleep.

## Detection Device Sought For Metabolic Errors

The feasibility of developing an automatic analyzer for mass screening of newborn babies and young infants for certain inborn errors of metabolism was among topics discussed at a one-day workshop held recently at NIH.

The workshop was co-sponsored by the National Institute of Neurological Diseases and Blindness and the Joseph P. Kennedy Jr. Foundation. Approximately 40 participants — representing medical research centers, government, and industry—took part in the workshop on "Inborn Errors of Metabolism."

### Subjects Discussed

Under discussion were the inborn errors themselves, their metabolic products (metabolites) in body fluids, and various detecting techniques such as paper chromatography, column chromatography, fluorometry, and bacterial inhibition assay (the Guthrie test).

The participants suggested that an apparatus be developed to detect six inborn errors of metabolism simultaneously from a single blood or urine specimen.

These six errors were selected because they are among the more frequently encountered, they are detectable in the newborn period, and normal values have been established for their metabolites.

### Metabolic Errors Listed

The six errors are: histidinemia, homocystinuria, phenylketonuria (PKU), maple syrup urine disease, hyperglycinemia, and galactosemia.

A consensus of the participants was that both blood and urine should be studied and that the best periods for testing for inborn errors and metabolism would be during the first four days of life and three to four weeks after birth.

## Grant Aids Development Of Microscope With a 2 Angstrom Resolution

The electron microscope, which has made possible many exciting recent advances in basic research, may soon become an even more effective research tool under a grant announced recently by Luther L. Terry, Surgeon General of the Public Health Service.

A \$155,900 grant to Cornell University for the first year of a 4-year project, to be administered and financed jointly by the National Institute of General Medical Sciences and the National Science Foundation, will be used to develop an electron microscope with a magnification so great that parts of a cell billionths of an inch in size would be visible.

### Dr. Siegel Directs Project

The program director of the project, Dr. Benjamin M. Siegel, Professor of Engineering Physics, came to Cornell in 1949 to establish the Laboratory of Electron Microscopy and he has had a long and fruitful career in this field.

The project at Cornell is designed to develop and construct an electron microscope capable of operating at the ultimate level of theoretical resolution.

When the instrument is perfected, it should make possible direct observation of atoms within enzymes, proteins, viruses, and other molecules of biological importance. Scientists could identify the sequence of components of the DNA molecule, which is the very basis of life and heredity.

It is the aim of the Cornell group to construct a microscope with a resolution of 2 Angstroms, which could focus on particles only eight-billionths of an inch in size.

### Need Cited

The best existing commercial electron microscopes have a resolution of only 4 to 6 Angstroms. The advance would be potentially of great significance to the whole field of biomedical research.

There is a great need for improvement in electron microscopic instrumentation. Electron microscopy is one of the most reliable methods of research into the fine structure of cells, and it is already reaching the limits of its capabilities.

Dr. Terry has stated that, "During the past two decades, the United States has played a leading role in this field. This project represents a major effort to maintain our position and contribute new knowledge to a field where many other countries are making challenging advances."



Representatives from research centers, government and industry met recently here to discuss the feasibility of developing an automatic analyzer to screen newborns and infants for several inborn errors of metabolism. Participants included (left to right): Dr. Edgar A. Bering Jr., NINDB; Dr. Hugo W. Moser, Fernald State School, Waltham, Mass.; Dr. Mary L. Efron, Massachusetts General Hospital, Boston; Dr. John H. Menkes, Johns Hopkins University, Baltimore; Dr. Robert Guthrie, Children's Hospital, Buffalo; and Dr. Donald J. Kurtz, NINDB. The meeting was sponsored by the Joseph P. Kennedy Jr. Foundation and NINDB.—Photo by Herbert Alston.



## Jonathan Cole Reviews Antidepressant Drugs, Suggests Limited Use

Antidepressant drugs, the subject of a current debate by many doctors, were reviewed by Dr. Jonathan Cole, Chief of the NIMH Psychopharmacology Service Center, in a recent issue of the *Journal of the American Medical Association*.

In the article, Dr. Cole discussed the "current concern" about these potent agents. Because of possible side effects and questions of efficacy of some of the dozen or so drugs now on the market, many experts believe they should be used with caution.

Because of their potency and possible side effects, Dr. Cole feels that neither group of antidepressant drugs should be the initial treatment for mild depressions. He suggests instead that treatment be limited to a sedative or tranquilizer, with antidepressant drugs used only if symptoms persist.

### 2 Drugs Most Effective

In a review of 72 studies of the drugs, Dr. Cole concluded that imipramine and a chemically similar drug, amitriptyline, are the most effective of the antidepressants.

Several studies show, however, that they are only moderately effective, and occasionally no better than placebo treatment and supportive care.

The imipramine types produce some side effects including dryness of the mouth and excessive perspiration, but many of these are "annoying rather than serious," he wrote.

The evidence for the efficacy of the other major group of antidepressants, the monoamine oxidase inhibitors, is less convincing, Dr. Cole noted. Some depressed patients will respond specifically to them after other drugs have failed, but he emphasized that the issue with the inhibitors is whether their therapeutic efficacy is sufficient to offset the potential risk.

### Response Difficult to Predict

Dr. Cole emphasized that with both the imipramine-like drugs and the inhibitors, it is extremely difficult to predict which patients will respond successfully.

He added that there is little evidence to support the efficacy of a third group of so-called antidepressants, including such stimulants as the amphetamines, in the treatment of depression.

Dr. Cole concluded that there is some encouraging preliminary evidence that the antidepressants may serve as valuable preventive drugs.

"It may well be in the long run that their importance will rest as

## Dr. Campbell Lectures At Immunology Seminar

Dr. Charlotte Campbell, Associate Professor at the Harvard School of Public Health, guest lecturer at the January 27 Immunology Seminar held in the Clinical Center, stressed the marked differences among histoplasma strains and the concomitant variations in the antigenic structures of these organisms.

In her presentation, titled "Studies on Histoplasma Capsulatum Antigens," she cautioned that standardization of histoplasma antigens will require standardization at every step in the process of the development of the graded antigen.

### Participates in Staff Meeting

On the following day, Dr. Campbell also participated in a Combined Clinical Staff Meeting devoted to chemotherapy of the systemic mycoses.

There she discussed the therapeutic effect of orally administered Amphotericin B on various experimentally induced mycotic infections of mice.

Treatment with this drug through oral administration had proved so successful in the experimental situation, she felt further efforts to administer the drug orally in humans should be pursued. At present the drug, while quite acceptable to mice, is bitter to the human tongue and is poorly tolerated.

### Formerly With Walter Reed

As former Chief Mycologist at Walter Reed Army Institute of Research, Dr. Campbell is well known and highly esteemed in the area. Her seminars, sponsored by the Division of Biologics Standards, were of particular interest to the Medical Mycology Section of the Laboratory of Infectious Diseases, National Institute of Allergy and Infectious Diseases, where projects related to Dr. Campbell's have been under way for many years under the direction of Dr. Chester W. Emmons.

much or more in their ability to avert relapses than in their efficacy as initial therapy," he wrote. "In contrast to electro-convulsive therapy, these drugs provide a convenient means for continued treatment."

In one controlled study, a 6-month followup showed that patients maintained on imipramine had a much lower relapse rate than those taking a placebo. About 20 percent of the patients taking the drug relapsed, in contrast to 80 percent on the placebo.

The NIH European Office was established in Paris, France, in December 1961.

## May 14 Deadline Set for Applicants for Clinical, Research, Staff Associateships

This year physicians and dentists may apply for Clinical, Research, and Staff Associateships at NIH no later than May 14—unlike previous years when deadlines were set for September.

Successful applicants will enter duty as Commissioned Officers of the Public Health Service on July 1, 1967. Until that time their Selective Service obligations may be put off under the Commissioned Officer Residency Deferment Program (CORD).

The three similar, though operationally different, kinds of associateships offer training concomitant with the provision of clinical and/or research services.

Each associate is assigned to a preceptor under whose direction he participates in a research program.

This represents the largest and most important part of his training experience; and the levels of research responsibility and lati-

tude given to him depend upon his training and experience as well as his interests and initiative.

Separate didactic exercises complement Clinical and Research Associateships, and associates in all three categories are welcome to attend any of the exercises which can accommodate them if their schedules permit.

### Career Opportunities Noted

In effect, these positions include broad opportunities for career development in most of the medical specialties and basic science disciplines.

Appointments as associates are for two years except in the National Institute of Allergy and Infectious Diseases where Clinical Associates are appointed for three years; and in certain program areas appointments may be extended for an additional year. Service as a PHS Officer satisfies military obligation.

Unless he seeks transfer to another area of the PHS an associate may expect to be inactivated as an Officer at the completion of his NIH appointment.

In addition to requirements for commission in the Public Health Service and for participation in the CORD Program, applicants shall—at the time they enter duty in 1967—have completed internship and, in most cases, a year or more of assistant residency.

### Applications Available Mar. 1

The amount of training required beyond internship is determined by the specific program areas to which applicants may seek appointment.

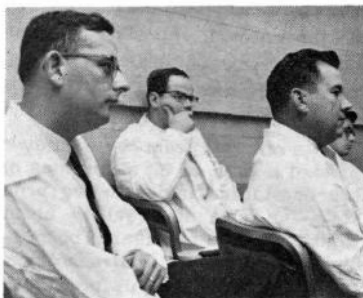
Aspirants must apply directly to the National Institutes of Health in order to be considered. Application forms and informational materials—including notes on the program areas to which applicants may seek appointment—will be obtainable March 1 through May 7 from the Clinical and Professional Education Branch, National Institutes of Health, Bethesda, Md. 20014.

## Rev. Henle Appointed to Dental Advisory Council

The Rev. Robert J. Henle, S.J., Vice-President in charge of Academic Administration, Saint Louis University, Saint Louis, Mo., has been appointed by Surgeon General Luther L. Terry of the Public Health Service to a 4-year term on the National Advisory Dental Research Council.



About one-half to two-thirds of the Clinical Associate's time is devoted to laboratory research, with the remainder devoted to clinical care of research patients. Here Clinical Associate Gerald Sandler, M.D., assisted by June McCalla, R.N., prepares an "IV" for patient Laura Hurt, who doesn't seem to mind the procedure. —Photo by Lee Bragg.



Associates participate in a wide variety of seminars, lectures, conferences, informal discussions and rounds—such as the one shown here. Pictured left to right are: Dr. Paul J. Schmidt, CC Blood Bank Chief; Dr. Douglas Morningstar, CC Clinical Pathology; Dr. William R. Kirkham, CC Clinical Pathology; and Dr. Paul Holland, CC Blood Bank, behind Dr. Kirkham. —Photo by Sam Silverman.

## 4 NHI Nurses Honored For Dedicated Service

Gold heart-shaped pins were presented recently to the four National Heart Institute nurses with the longest service at a surprise ceremony honoring the entire NHI Clinical Center nursing staff. The pins, each set with a small ruby and engraved with the initials "NHI," were a gift from NHI staff physicians.

The recipients were Nina Ramacioti, Assistant Chief of the Heart Nursing Service; Annie Dawkins, Assistant Head Nurse, Nursing Unit 8E; Isabelle Ambrose, Head of the NHI Patients' Observation Room; and Jean Brotslow, Head Nurse, Nursing Unit 7E. All have been at the Heart Institute since 1953.

### Fredrickson Praises Staff

At the ceremony, Dr. Donald S. Fredrickson, NHI Clinical Director, told the assembled nursing staff, "There is a real danger that in trying to make history so fast we may seem to forget those who are never authors of papers, nor earn even a footnote, and yet without whose help there would be nothing at all accomplished."

"For this reason we have staged this ceremony to honor among us that group of our staff whose record of faithfulness and excellence is unmatched by any of the rest, and which receives such muted recognition."

Dr. Fredrickson told the nurses that the physicians of the Institute had long wished to show their gratitude in some way "for all that you have done for us, for more than a decade—not only from duty, but from comradeship."

"We felt that perhaps this could be done best," he added, "by bringing special honor to these four nurses who have continuously served the Institute from the first year the clinical studies program opened its doors."

## VENOM

(Continued from Page 1)

gether to form the molecule.

Once the molecular structure is determined, properties of the substance can be compared with known compounds, such as the adrenal hormones, following which it may be synthesized and its potential usefulness in medicine evaluated.

The venom from the skin of the kokoi frog has been used as an arrow poison for centuries by the Cholo Indians of Colombia. Its deadly action is caused by a multiplicity of events, including an irreversible block of transmission of nerve impulses to the muscles. Death occurs within minutes.

In December 1963 and January 1964, NIAMD sponsored an expedition headed by Dr. Daly and Mrs.



Dr. Donald S. Fredrickson, NHI Clinical Director, congratulates the four nurses who have served the Institute the longest time. They are, from left: Isabelle Ambrose, Jean Brotslow, Dr. Fredrickson, Annie Dawkins, and Nina Ramacioti. The nurses were given gold heart-shaped pins, each one set with a ruby and engraved with the initials "NHI," at a special ceremony honoring the entire Institute nursing staff.—Photo by Jerry Hecht.

## CC Booklet Tells How to Be Healthy Patients

People With a Purpose, a new NIH Clinical Center publication, explains what is involved in being a healthy research patient at the CC and what its rewards are.

The new booklet tells its story by citing specific examples of the research projects in which Normal Volunteer Patients are now, or were recently, taking part.

It underscores the many safeguards that surround a volunteer's participation in research, the constant concern for his well-being, the fact that he is fully informed about the projects in which he participates, and his absolute prerogative to decline participation in, or to terminate, his participation in any specific study.

In just five years' time the annual number of Normal Volunteer Patients studied at the CC has increased about 60 percent. Hopefully, this new publication will serve to encourage more and more

people to help meet this constantly increasing need.

The CC is now recruiting volunteers through civic organizations in Appalachia where people are temporarily out of work and have time that they can give to this kind of humanitarian effort.

Religious groups also sponsor a good number of volunteers, and some colleges sponsor students who not only participate as research patients but also are afforded opportunities to gain experience that will

## Robert Fisher Receives Wagner Award in N. Y.

Dr. Robert L. Fisher, formerly a Clinical Associate in the Section on Neuroradiology, National Institute of Neurological Diseases and Blindness, has received the Lewis Clark Wagner Award at the Hospital for Special Surgery, New York, for the outstanding Resident's Paper of the Year.

The award was given for his study, "Contrast Radiography of the Spinal Cord," carried out at NIH in collaboration with Dr. Giovanni Di Chiro, Head of the Section on Neuroradiology, Medical Neurology Branch, NINDB. A report of their work appeared in the August 1964 issue of the Archives of Neurology.

complement their formal curricula of studies.

As the booklet points out, "Medical research is rapidly expanding, multiplying many times over the number of research projects, both long- and short-term, which need the services of normal control patients. Yet, the supply of people who are capable and willing to render this kind of service to their fellowmen does not always meet the need. Some research studies must wait; some conquests over disease must be delayed."

Copies of People With a Purpose—PHS Publication No. 1271—are available on request from the CC Information Office (NIH, Bethesda, Md. 20014).



After six weeks of training at the NIH Clinical Center, 18 volunteers recently graduated into the Gray Service of the Montgomery County Chapter of the American Red Cross; and, in their service to Clinical Center patients, are now lending valuable support to the work of the hospital's medical staff. The new volunteers shown here with the Chairman and Vice-Chairman of the Service's NIH unit, are from left, front row: Mrs. Thomas H. Bell, Mrs. Russell H. Clavoe, Mrs. Elenore Creamer, Mrs. Arve H. Dahl, Mrs. V. G. Popof (Vice-Chairman), Mrs. William McFarland (Chairman), Mrs. George Dietrich, Mrs. James Ebbess, Mrs. William Edmondson, and Mrs. Harold Englander. Back row: Miss Diane Young, Mrs. James Smith, Mrs. Raymond Pouget, Mrs. Turner S. McLaurin, Edward Osborn, Mrs. Harry F. Metcalfe, Mrs. Dean Lewis, Mrs. Robert Lattanze, Mrs. G. Howard Gowen. Not present for the picture was Miss Anita Kay Reicher.—Photo by Ed Hubbard.

trometer to crack the molecule of the venom into charged fragments.

By measuring the "masses" of these molecular fragments, this instrument reveals what atoms, elements, and isotopes are present and, in addition, can determine in

what quantities they exist relative to each other.

A report of what is known thus far of batrachotoxin's chemical nature appears in a current issue of the Journal of the American Chemical Society.

Marte Latham, a professional collector of rare animals, who captured 2,400 kokoi frogs in the rain forests of Western Colombia.

Skin extracts from these animals yielded a total of 30 milligrams of the crystalline major active principle—an amount equal to about 1/80 of a cube of sugar. The principle was named Batrachotoxin, from the Greek word for frog—batrachos.

Batrachotoxin has been found to have a very strong effect on the heart, which is interesting since the chemically related strophanthus glycosides are heart stimulants and are used as arrow poisons in Africa.

Drs. P. Bommer and K. Biemann of the Massachusetts Institute of Technology utilized a mass spec-