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# Record

U. S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

December 8, 1970  
Vol. XXII, No. 25

NATIONAL INSTITUTES OF HEALTH

## Health Benefit Changes Effective Next Month Will Improve Coverage

Increased benefits and premiums and a greater Government share of premium costs will accrue to most employees enrolled under the Federal Employees Health Benefits Program early in the new year.

The changes in benefits are primarily improvements to close the gaps in coverage and to raise benefit payments for escalating medical care costs.

Higher premiums go into effect along with the increased benefits. However, a recently enacted law will raise the Government's share of the premium costs to a permanent average of 40 percent.

### More Details Later

For some employees, the net effect will be small decreases in the premium deductions on their pay statements.

The changes will be covered in more detail in a Civil Service Commission pamphlet, *Information About Plan Changes Effective January 1971*, which will be distributed to all employees in late December.

Each employee covered under the program should carefully review

(See *BENEFIT CHANGES*, Page 2)

## Enzyme Defect in Cancer Cells Identified In Joint Study by NINDS-NCI Scientists

By Bari Attis

A team of NIH researchers has identified an enzyme which has greatly reduced activity, and in fact may be absent in cells which have been transformed by DNA viruses into cancer cells.

The discovery of this biochemical defect may explain how these cells become transformed and multiply uncontrollably, and may also provide some clues to restoring them to normal.

## Advisory Cancer Council Releases Scientific Basis For Cigarette Ad Ban

The scientific basis for the new Federal restriction on cigarette advertising, which goes into effect Jan. 2, is spelled out in *Progress Against Cancer 1970*, just released by the National Advisory Cancer Council.

In thus making its fourth annual report to the public on the state of the art in cancer research, the Council also urged increased educational efforts by both governmental and private agencies to warn the public against the health hazards of smoking.

It cited the more than 60,000 deaths a year in the United States from an "epidemic" of lung cancer attributed mainly to cigarette smoking.

The current publication devotes most of its 100 pages to chemical

(See *COUNCIL*, Page 5)

## Employees Alerted to Plans to Initiate Strict Enforcement of Parking Rules

By Jane Stafford

January is the month! The month that starts the New Year and also the month that starts—and hopefully finishes—NIH registration.

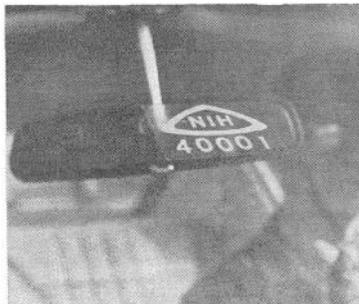
Registration for what? Why, for parking, of course. All employees will have had official notification in a memo from the NIH Director, Dr. Robert Q. Marston, announcing plans for strict legal enforcement of the rules and regulations governing conduct and traffic on the reservation.

Registration forms (NIH 1234) will be sent through timekeepers. After the forms have been properly filled out and returned as directed, numbered NIH parking permits will be issued.

The registration cards will be computer-processed with the help of the Division of Computer Research and Technology.

Serial numbers on parking per-

(See *PARKING*, Page 4)



All employees parking at NIH will be required to display permits on the windshield in the blind spot directly behind the rearview mirror.

Dr. Roscoe O. Brady of the National Institute of Neurological Diseases and Stroke and Dr. Peter T. Mora of the National Cancer Institute collaborated in leading a team of researchers in this study.

The team began by studying the Simian Virus 40 (SV40) and polyoma virus. Scientists have known for a long time that these two DNA viruses cause the formation of tumors when they are injected into rodents.

Also, when researchers treated cells in tissue culture with the two DNA viruses, they found that the normal cells lost a number of their original characteristics and acquired uncontrolled growth properties in culture after they were transformed by the viruses.

### Viruses 'Take Over' Cells

The viruses do this by "transforming" or taking over the genetic machinery of normal cells and influencing the chemistry of the cell membranes and the ability of these cells to produce tumors when injected into laboratory animals.

Drs. Mora and Brady noted that certain complex lipids (fat-like substances) called gangliosides, which are highly concentrated in cell walls, changed markedly after the cells were transformed by the two tumorigenic DNA viruses. The complex chemical substances changed to a much simpler, primitive chemical form.

Further study revealed an exact biochemical change in the virally transformed cells. Cells transformed by a DNA virus no longer manufacture a key enzyme called "amino-sugar transferase," an enzyme needed if gangliosides are to be produced.

This lack of ganglioside synthesis coincides with a profound alteration in the surface properties of the transformed cells.

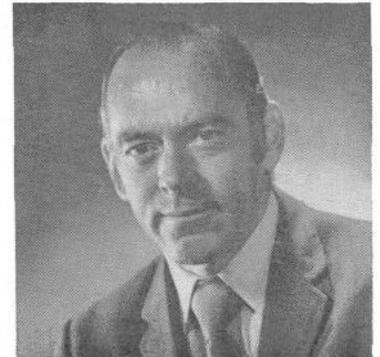
(See *ENZYME DEFECT*, Page 3)

## Dr. Brady Will Deliver Mider Lecture Dec. 16 On Recent Lipid Studies

Dr. Roscoe O. Brady, assistant chief of the Laboratory of Neurochemistry, National Institute of Neurological Diseases and Stroke, will deliver the G. Burroughs Mider Lecture on Wednesday, Dec. 16, at 8:15 p.m. in the Jack Masur Auditorium, Clinical Center.

In his lecture, "The Genetic Mismanagement of Complex Lipids," Dr. Brady will describe his recent work in hereditary disorders of lipid metabolism.

He will also discuss how his bio-



Dr. Brady is the third NIH scientist to be honored since inception of the G. Burroughs Mider Lecture.

chemical studies of lipids have led to an important discovery of altered lipid metabolism in virus-transformed tumorigenic cells.

Findings and their implications for potential therapeutic approaches in both these areas will be outlined.

Dr. Henry G. Wagner, NINDS director of Intramural Research, will serve as official host, and Dr. Robert Q. Marston, NIH Director,

(See *DR. BRADY*, Page 7)

## 'NIH Record' Takes Holiday; Next Issue Set for Jan. 6

Happy holiday wishes to all our readers.

As in previous years, only one issue of the *NIH Record* is published in December.

The next *Record* will be off the press Jan. 6.

# the NIH Record

Published biweekly at Bethesda, Md., by the Publications and Reports Branch, Office of Information, for the information of employees of the National Institutes of Health, Department of Health, Education, and Welfare, and circulated by request to interested writers and to investigators in the field of biomedical and related research. The content is reprintable without permission. Pictures are available on request.

The NIH Record reserves the right to make corrections, changes or deletions in submitted copy in conformity with the policies of the paper and the Department of Health, Education, and Welfare.

NIH Record Office ..... Bldg. 31, Rm. 2B-03. Phone: 49-62125  
 Editor ..... Frances W. Davis

### Staff Correspondents

ADA, Nelson Sparks; BHME/OD, Florence Foelak; CC, Elsie Fahrenthold; DAHM, Laura Mae Kress; DBS, Faye Peterson; DCRT, Joan Chase; DDH, Carolyn Niblett; DGC, James McLaughlin; DMI, Florence Foelak; DN, Evelyn Lazzari; DPHPE, Eleanor Wesolowski; DRG, Marian Oakleaf; DRR, Dave Dunlap; DRS, Robert Knickerbocker; FIC, Jan Logan; NCI, Pat Gorman; NEI, Julian Morris; NHLI, Bill Sanders; NIAID, Krin Larson; NIAMD, Katie Broberg; NICH, Lloyd Blevins; NIDR, Sue Hannon; NIEHS, Elizabeth Y. James; NIGMS, Wanda Wardell; NIMH, Daniel Rice; NINDS, Anne Tisiker; NLM, Peter Monk.

## NIH Television, Radio Program Schedule

### Television

#### NIH REPORTS

WRC, Channel 4  
 1 a.m. Wednesday

December 9

Dr. C. Gordon Zubrod, scientific director for Chemotherapy, NCI  
 Subject: Chemical Control of Cancer (Part 1) (R)

December 16

Part 2 of the above program (R)

December 23

Part 3 of the above program (R)

December 30

Dr. Murray Goldstein, associate director for Intramural Programs, NINDS  
 Subject: Stroke (R)

January 5

Dr. Gerald D. LaVeck, Director, NICHD  
 Subject: Infant Mortality (R)

### Radio

#### DISCUSSION: NIH

WGMS, AM-570—FM Stereo 103.5—Friday, about 9:15 p.m.

December 11

Dr. Louis W. Wachtel, NIDR  
 Subject: National Caries Program

December 18

Dr. R. W. Lamont-Havers, Associate Director for Extramural Research and Training, NIH  
 Subject: Research and Training Grants Activities of the NIH

Interview takes place during intermission of the Library of Congress concerts.

## Several Units of NIGMS Move to Building 31

The Office of the Director of the National Institute of General Medical Sciences, Dr. DeWitt Stetten, Jr., has moved to the fourth floor A wing of Bldg. 31.

Included in the move are the offices of the Institute's associate director, deputy associate director, special assistants to the Director, executive officer, and the Information Office.

Also moved were: the program directors for Biophysical Sciences and Engineering in Biology and Medicine and Office Services.

Remaining in the Westwood Bldg. are NIGMS's Program Analysis, Research Grants, Research Training, and Research Fellowships branches and the office of the director of the Pharmacology and Toxicology Program.

## Jessie M. Scott, Director of DN, To Appear on TV Show Jan. 6

Jessie M. Scott, Director of the Division of Nursing, BHME, will appear on "Claire," WMAL-TV on Jan. 6 between 10 and 11 a.m.

Miss Scott will talk about the nursing shortage and programs to improve education and practice.

## Registration of Voters For 2 Washington-Area Elections Is Under Way

Voter registration is currently under way for two upcoming Washington-area elections.

The District's primary election for its first non-voting delegate to the House of Representatives will be Jan. 12. The general election for the delegate will be March 23.

D.C. residents who are over 18 years or older and U.S. citizens are eligible unless convicted of a felony, adjudged mentally incompetent, or claim the right to vote elsewhere.

Persons who have voted since January 1968 in the District are already registered.

To find the nearest registration point in the District area, call the D.C. League of Women Voters, 232-2577.

### P.G. Election on Jan. 26

Prince Georges County will conduct a single election for its new county executive and six county council members Jan. 26.

County residents who are 18 or older, a U.S. citizen, and a Maryland resident for 6 months, may call the county election information office, 627-2811, to confirm eligibility and to locate the nearest registration point.

## BENEFIT CHANGES

(Continued from Page 1)

the pamphlet for changes in the plan in which he is enrolled.

Also, employees should keep the pamphlet (BRI-117) as part of their health benefits plan contract.

All premium changes become effective Jan. 10, 1971. The new deductions (shown below) will be made from paychecks received Feb. 2.

By CSC regulation, employees are not permitted to change their enrollments at this time. However, an "open season" must be held no later than November 1972.

During a general "open season" an employee who is eligible to participate in the health benefits programs may register to enroll and persons already enrolled may change plans, options, type of enrollment or any combination of these.

## Friends Honor BHME's H. Abernathy, Served 45 Years in Gov't

Harry C. Abernathy, who has 45 years of Federal service to his credit—was recently honored by 100 colleagues and friends at a retirement party.



Mr. Abernathy

A native of Loveland, Colo., Mr. Abernathy, has been assistant executive officer of the Bureau of Health Manpower Education since its inception on Jan. 1, 1967. He previously served in the same position with the former Bureau of State Services.

Mr. Abernathy's Civil Service is interwoven with his military career, which began in May 1925 when he enlisted in the U.S. Navy. Discharged in 1929, he joined the Naval Reserve.

### Held Posts in Prison System

Following a year in private industry, he accepted a position as administrative assistant at the U.S. Industrial Reformatory, Chillicothe, Ohio.

In May 1934 he transferred to the U.S. Penitentiary at Alcatraz Island, Calif. as administrative assistant.

He was reassigned to the PHS Hospital at San Francisco in 1937 where he served until called to active duty with the U.S. Navy in January 1942.

### Attends Harvard

Under naval auspices, he attended the Harvard Graduate School of Business Administration. On completion of the course, he was assigned to the Naval Hospital in Seattle, and later served with the Third Fleet in the Pacific and at Leyte Gulf in the Philippines.

Mr. Abernathy returned to the PHS in 1946 as chief of the Materiel Management Section, in the Division of Hospitals, later moving to the position of Supply Officer in the Division of Administrative Management, Bureau of Medical Services.

### Recalled to Active Duty

He was again recalled to active Navy duty in 1951 for 3½ years, part of which included service as a member of the Munitions Board in Washington, D.C.

Following his discharge, Mr. Abernathy assumed responsibilities as assistant executive officer, BSS, in November 1954. His service with the PHS has been uninterrupted since that time. He retired from the U.S. Navy Reserve in 1968 as a Captain.

Mr. Abernathy received the HEW Superior Service Award in April 1969.

## New Premium Rates for 4 Major Health Plans

	Aetna (Indemnity Benefit Plan)	Blue Cross- Blue Shield (Service Benefit Plan)	Group Health Ass'n Plan	AFGE Plan
<b>High Option</b>				
Self only	\$6.33	\$5.60	\$7.79	\$4.49
Self and Family	15.62	13.47	20.05	12.25
<b>Low Option</b>				
Self only	\$2.68	\$2.40	\$4.54	\$2.37
Self and Family	6.40	5.88	12.10	6.91

## ENZYME DEFECT

(Continued from Page 1)

Normal cells stop growing when they come in contact with each other; however, transformed cells like other cancer cells continue to grow up against each other and into multi-layers.

Also, the transformed cells display different antigenic properties than normal cells.

"This is the first specific biochemical change which was found to be associated with transformation by both tumorigenic DNA viruses," Dr. Brady said.

"We now need to find out how important these changes are in relation to human cancers, particularly those that may be of viral origin."

### RNA Viruses Under Study

The researchers are now studying RNA viruses that may be implicated in some human cancers to see if similar biochemical changes occur in RNA transformed cells.

"We need to know what shuts off the enzyme in the transformed cells and whether or not it can be turned back on," Dr. Brady added, "or whether we can add a chemical substance to these tissues which will restore them to normal."

Working with Dr. Brady and Dr. Mora in this study were Drs. Federico A. Cumar and Edwin H. Kolodny, NINDS, and Vivian W. McFarland, NCI.

Their findings were published in the *Proceedings of the National Academy of Sciences* in October 1970.

## Duplicate Bridge Starts Earlier Next Month

To add 15 minutes of playing time, the duplicate bridge game sponsored by the NIH R & W Association in the Bldg. 1 cafeteria every Wednesday night will start at 7:45 instead of 8 p.m. beginning Jan. 6.

All NIH bridge players and their bridge-playing friends, novice or expert, are welcome. Participants should attend as partners.

The cost is \$1 per evening.

Winners and runners-up receive official rating-point certificates from the American Contract Bridge League.

For further information, call Dick Ray, 881-1429, or Bob Brothers, 946-6553.

## Intaglio Prints Now on Display in Bldg. 31 Lobby Until Dec. 15

Intaglio prints by Phyliss Hoffman, wife of Dr. Harold Hoffman, NCI, will be on display in Bldg. 31, A Wing lobby until Dec. 15.

With the prints are brief explanations of various plates: copper, plexiglas, and acetate.

Mrs. Hoffman will answer queries of employees who may call her on 946-3629.

## Christmas Festivities for Patients at CC Bring Promise of Holiday Spirit, Cheer



CC patients join in with Christmas carolers whose visit every year at this season means so much to them.

Festivities for Clinical Center patients celebrating the 1970 holiday season promise to bring good cheer and bright spirits.

A Christmas shoppers' bingo on Dec. 11 is the first event in an extensive program planned by the CC Patient Activity Section.

Following, on Dec. 14, is a Christmas-Hanukah concert with music traditional to both holidays pre-

sented by the U.S. Naval Academy chorus and Cantor Raphael Edgar.

The program will be broadcast over the NIH station, and may be heard on bedside radios of patients unable to attend.

For those patients who have not completed their Christmas shopping, there will be a Christmas shoppers' spree via bus to Tysons Corner on Dec. 16, or a Christmas craft workshop on Dec. 17 for the "elves" who want to make something for Mom or Dad.

### Holly Hop for Adults

On the 17th there will be a Holly Hop. This "dance-in" is for the adults, but the big party of the year for the youngsters will be held on the 19th. As in past years, the Clifton Park Citizens Association is assisting Santa and his helpers.

Dec. 18 has been designated Trim-the-Tree Day, with the Patient Activity Section promising help when emergency decorations are needed.

Other activities scheduled include a Protestant carol service, children's Christmas story hour, and visits to CC nursing units on Christmas Eve by a caroling group from the community.

### Other Activities Listed

Also, during Christmas week a trip is planned to view the National Christmas Tree and community lighting displays.

To round out the festivities, on New Year's Eve, there will be an early evening party for young patients, and a later party for adults.

In addition, feature films, season bingos, and religious services have been scheduled for patients.

## Dr. Myers, NINDS Lab Chief, Lectures Abroad

Dr. Ronald Myers, chief of the NINDS Laboratory of Perinatal Physiology, is delivering the Purkinje Lecture in Bratislava, Czechoslovakia, this week at the invitation of the Slovak Academy of Sciences.

His lecture, "The Problem of Perinatal Brain Damage," describes his studies in Rhesus monkeys duplicating the physiological and pathological changes that occur in relation to perinatal damage in humans.

### Visits Laboratories

Before delivering the talk, Dr. Myers toured laboratories throughout the country for 8 days as a guest of the Slovak Academy of Sciences.

During the week prior to his trip to Czechoslovakia, Dr. Myers delivered a lecture at the University of Aarhus, Jutland, Denmark and, in West Germany, he was the invited speaker of the German Society for Perinatal Medicine where he spoke on "Experimental Models for Cerebral Palsy and Mental Retardation."

On his way back to this country, Dr. Myers will stop in London to deliver a lecture at King's College Hospital and Medical School.

### Rhesus Monkeys Used

Here at NIH, Dr. Myers and his colleagues are using Rhesus monkeys as models to learn more about cerebral palsy—a series of brain-centered ailments, all of which affect muscular control.

They are also studying pregnant monkeys, monitoring such parameters as fetal hemoglobin saturation, fetal blood pressures, and oxygen content of the blood as delivered to the tissues as indicators of fetal condition during labor.

Ultrastructure studies are also being carried out on the central nervous system of developmental stages of the Rhesus monkey from the 49th gestational day through birth.



Santa will be on hand for the CC Open House on the 21st to take orders given by the patients instead of the doctors and nurses, who are guests of their patients on this important occasion.

### 3-Day Holiday Weekends on Agenda for Fed'l Employees

Three-day holiday weekends for Federal employees will be more frequent in 1971 under provisions of the Uniform Monday Holiday Act, as of Jan. 1.

Certain holidays, previously observed on specific dates and falling on varying days of the week, will now be observed on designated Mondays.

Columbus Day is an added official holiday, and Veterans Day moves from November to October.

In calendar year 1971, except for the Thanksgiving holiday, the new holiday schedule will include all 3-day weekends:

New Year's Day — Jan. 1  
Washington's Birthday—3rd Monday in February

Memorial Day—last Monday in May

Independence Day—July 4 (July 5 off)

Labor Day—1st Monday in September.

Columbus Day—2nd Monday in October

Veterans Day—4th Monday in October

Thanksgiving Day — 4th Thursday in November

Christmas Day—Dec. 25 (Dec. 24 off)

Employees whose services are required on holidays will receive compensatory time off or holiday pay.

## PARKING

(Continued from Page 1)

mits will be assigned to each registered motor vehicle. They bear no relation to employee numbers.

For general parking, the permits will be blue; and for employees entitled to reserved parking, red. Reserved parking permits for personnel at the Westwood Building will be brown.

All vehicles other than those of visitors must bear these permits, which must be displayed on the windshield in the blind spot directly behind the vehicle's rearview mirror. Failure to display the permit is a violation of the regulations.

### Permit Has Many Uses

The permit alerts the guard that the vehicle is the property of an employee and legally parked. It also speeds up service in case lights are left on, the vehicle is involved in an accident, or if other problems arise.

Special parking areas are being reserved for visitors' parking, and will be identified by appropriate signs. Employees parking in these areas would be violating regulations.

After registration is completed, there will be a short period during which guards will issue warning notices to violators pointing out the nature of the violation. This warning period is designed to alert personnel and to help prepare them for the time when actual tickets are issued.

The actual tickets will carry with them the requirement for posting collateral or requesting a hearing before the U.S. Commissioner for adjudication.

Both warning notices and actual traffic tickets will be issued only by guards who have been appointed as U.S. Special Policemen. These men have had special training and

## Study Finds Urokinase-Heparin Regimen More Effective in Dissolving Blood Clots

The clot-dissolving agent urokinase plus anticoagulants outperformed anticoagulants alone in relieving pulmonary blood-vessel obstruction and improving bloodflow to the lungs in patients with pulmonary embolism, according to results of the recently completed Urokinase Pulmonary Embolism Clinical Trial.

The study, the first published controlled clinical study of the clot-dissolving capacity of any fibrinolytic agent, was carried out by the National Heart and Lung Institute through contracts awarded by its National Blood Resource Program.

It involved a total of 160 patients in 16 cooperating institutions.

The study results were reported in mid-November in Atlantic City at the American Heart Association Scientific Sessions by Drs. John Murray, of the University of Washington, and Sol Sherry, of Temple University.

Of the 160 patients, 82 received 12-hour urokinase infusions followed by intravenous heparin for at least 5 days.

The 78 controls received only intravenous heparin for a like period. Thereafter, both groups were maintained on oral anticoagulants.

There was a high rate of clinical improvement in both groups; but objective evidence of improvement, on the basis of X-ray visualization of the pulmonary blood vessels after 24 hours, was more pro-

testing, and they will be identified by special badges.

Employees will be notified of the start of actual ticketing by desk-to-desk memoranda.

A survey of vacant spaces in the parking lots on the reservation indicates that there is more than ample parking for all personnel who drive to work. Recently there has been an average of over five hundred vacant parking spaces each day.

nounced in the urokinase-treated group than in the controls. Judged on this basis:

- Distinct improvement was observed in 30 urokinase-treated patients, but in only five control patients.

- Urokinase-treated patients with larger clots at the beginning of therapy usually showed the most marked improvement, a tendency not observed in the control group.

The extent of clot dissolution and improvement in lung perfusion, as judged from radioisotopic lung scans, was greater in the urokinase-treated group than in the control group during the first 24 hours.

Thereafter, however, the between-group differences diminished steadily and, by the 5th day, had all but vanished.

### Bleeding More Common

Improvement in various indices of heart performance was substantially greater in the urokinase-treated group during the first 24 hours.

Bleeding complications during therapy were more common and were more often severe among urokinase-treated patients.

Mortality was about the same in both groups: six urokinase-treated patients and seven control patients succumbed. But a noteworthy finding was the relatively low mortality among patients with massive pulmonary embolism and shock: only two of 11 died.

Recurrent embolism within 2 weeks occurred with about equal frequency in both (urokinase: 15 percent—control: 19 percent), but resulted in only one death.

Followup lung scans over periods up to a year after the acute episode revealed lingering lung-perfusion deficiencies in most patients.

The study results indicate that the urokinase-heparin regimen resulted in speedier clot dissolution and better lung perfusion than did heparin alone, especially during the first 24 hours.

### Differences Seldom Dramatic

But the differences, while unequivocal, were seldom dramatic. In terms of clinical improvement, the urokinase-treated group did not differ strikingly from the control group.

The investigators feel that urokinase-heparin may eventually prove to be the therapy of choice for massive pulmonary embolism with shock.

But they concluded that further evaluation will be needed to establish the clinical value of fibrinolytic therapy in this and other thromboembolic disorders.

## Dr. Talbot Joins DRG's Grants Associates for One Year of Training

Dr. Bernard Talbot, a native of New York, N.Y., has joined the Grants Associates Program for a year of training in grants administration.



Dr. Talbot

He comes to the Division of Research Grants from Rome, Italy, where he recently completed a NATO postdoctoral fellowship at the University of Rome.

In 1958, Dr. Talbot graduated *magna cum laude* from Columbia University, and in 1962 he received his M.D. degree from Columbia University Medical School.

He received his Ph.D. degree in Biophysics-Molecular Biology from the Massachusetts Institute of Technology in 1967.

From 1963 to 1968, Dr. Talbot taught Optical Methods in Biophysics and Electron Microscopy at MIT.

No stranger to NIH programs, he was an NIH postdoctoral fellow from 1962 to 1965, a special fellow from 1965 to 1966, and a postdoctoral trainee in Biophysics at MIT from 1966 to 1969.

A member of Phi Beta Kappa, Dr. Talbot is a member of Sigma Xi, the American Association for the Advancement of Science, and the American Chemical Society.

## First Internat'l Congress Of Immunology Advance Program Now Available

The First International Congress of Immunology will be held in Washington, D.C., Aug. 1-6, 1971, under the sponsorship of the International Union of Immunological Societies.

It is being organized by the American Association of Immunologists.

The congress's format will include 80 conference-workshops of limited attendance instead of the usual 10-minute paper sessions.

These workshops will explore progress in specific problem areas. Workshop accomplishments will be evaluated and summarized at open sessions.

The congress is seeking to provide, for the first time, a comprehensive exposition of immunology. It will stress the multi-disciplinary science's basic principles as well as its varied subspecialties.

The advance program and registration forms are now available. For information, write to Secretariat, First International Congress of Immunology, 9650 Rockville Pike, Bethesda, Md. 20014.



Leprosy patients at the Eversley-Child Sanitarium in Cebu City, Philippines, participate in chemotherapeutic drug trials, part of the U.S.-Japan Medical Science Program. The studies—supported by a contract between NIAID and the Leonard Wood Memorial for the Eradication of Leprosy—are conducted at the hospital operated jointly by the Philippine government and Leonard Wood organization. George S. Yee (front row left), NIAID, project officer for the leprosy program, observes hospital physician Dr. T. Fajards, Jr. examine a patient. Dr. Gerald Walsh, of Leonard Wood Memorial, is on the right.

## Lois K. Kryger Receives Award for Achievement From Dental Assistants

Lois K. Kryger, Division of Dental Health, BHME, was presented the Achievement Award by the American Dental Assistants Association at its 47th Annual Session last month in Las Vegas.

A member of the association since 1946, Miss Kryger was honored for her "outstanding work for the ADAA and for Dental Assistants."

Miss Kryger's contributions include development of the technique used in instrument exchange between the dentist and dental assistant.

Also, she initiated the change in job classification of dental assistants in the Dictionary of Occupational Titles from the "Clerical and Sales" series to the "Medical" series.

Miss Kryger wrote five of the eight refresher course outlines for dental assistants which are distributed by the ADAA.



Miss Kryger has held several posts, including that of president, American Dental Assistants Association.

## Yerkes Center Scientists Discuss Nervous System Of Monkey in New Book

Two researchers—Drs. Sohan L. Manocha and Totada R. Shantha—at the Division of Research Resources' Yerkes Primate Research Center at Emory University, Atlanta, have published a new textbook, *Macaca Mulatta: Enzyme Histochemistry of the Nervous System*.

The book discusses the nervous system of the Rhesus monkey from the viewpoints of anatomy, cell structure, and histochemistry.

It also describes the fiber systems within the nervous system, their enzymes, and the significance of their locations.

Although similar studies have been performed on mammals, the book is the first to comprehensively examine the enzyme histochemistry of a primate's brain, according to a foreword by Dr. Geoffrey Bourne, Director of the Yerkes Center.

## NCI Scientist Reports Possible Method For Treating Acute Leukemia Patients

Evidence of a chemical difference between normal and leukemic human cells—and a possible method of utilizing this difference in treating acute leukemia patients—has been reported by Dr. Robert C. Gallo of the National Cancer Institute's Human Tumor Cell Biology Branch.

Dr. Gallo reported that, in testing white blood cells called lymphocytes from three patients with acute lymphocytic leukemia, he and his colleagues found that the cells of all three patients contained a catalyst or enzyme called RNA-dependent DNA polymerase.

By contrast, the enzyme was not detected in white blood cells obtained from 48 normal blood donors, which were pooled into three groups for testing purposes.

The enzyme from the leukemic cells has now been obtained in a relatively pure form (250-fold purification) after removal of most other components of the cells.

Significantly, in June of this year, the enzyme RNA-dependent DNA polymerase was reported to be present in several RNA viruses that cause cancer in laboratory animals.

Drs. Howard M. Temin and Satoshi Mizutani of the McArdle Laboratory for Cancer Research, University of Wisconsin, and Dr. David Baltimore of the Massachusetts Institute of Technology, reported its presence in two such viruses.

### Identified in 6 Viruses

Dr. Sol Spiegelman, supported by a contract from NCI's Special Virus Cancer Program at Columbia University College of Physicians and Surgeons, identified the enzyme in a total of six cancer-causing RNA viruses, but not in other viruses which do not cause cancer.

Because this enzyme seems always present in RNA tumor viruses of animals, its discovery in cells from leukemia patients is considered good supportive evidence that viruses are associated with cancers of man.

At the same time that Dr. Gallo and his colleagues, Drs. Sue Yang and Robert Ting of Bionetics Research Laboratories, a division of Litton Industries (also under NCI contract), were discovering the enzyme in leukemic human cells, St. Louis University virologist Dr. Maurice Green detected the enzyme in animal cells that were made cancerous by an RNA virus that could no longer be recovered from the cells.

Dr. Green, working within the Institute's Special Virus Cancer Program, then attempted to block the enzyme's activity in the cancer-transformed animal cells by means of an antibiotic called Rifampicin, known to inhibit a DNA virus called vaccinia virus.

When he found that some derivatives of Rifampicin were potent inhibitors of the enzyme, he advised the NCI research team of his find-



Dr. Gallo, reported on his research at a colloquium held at the Pasteur Institute in Paris.

ing.

Dr. Gallo and his colleagues set out to determine whether the Rifampicin derivatives would be effective against the human leukemic enzyme.

They found that although Rifampicin itself was able to block the enzyme activity only to a small degree, one of the related compounds (n-demethyl rifampicin) was able to inhibit it completely.

The compounds were made by Gruppo Lepetit Company of Milan, Italy, a subsidiary of the Dow Chemical Company.

### Caution Expressed

Dr. Seymour Perry, NCI Associate Scientific Director for Clinical Trials, emphasized that thus far inhibition of the enzyme has been demonstrated only in test tube experiments.

Now, derivatives of Rifampicin as well as other compounds must be evaluated for possible effectiveness against cancers in animals.

Subsequently, they must be demonstrated to be relatively safe before they could be evaluated in the treatment of leukemia and possibly other malignancies in man.

## COUNCIL

(Continued from Page 1)

causes of cancer. It is a report on the effects of many environmental factors, not only the "private pollution" of smoking but also the more public air pollution from industrial and commercial wastes, as causative agents in malignant disease.

*Progress Against Cancer 1970* can be purchased from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, for \$1.75 a copy.

## Conference Will Explore Multimedia Techniques For Health Education

The first national conference to explore the combined use of multimedia communications techniques in health science education will be held next summer.

"Media 70's—A National Conference on Multimedia in the Health Sciences," will be sponsored by the Bureau of Health Manpower Education and the National Library of Medicine.

Scheduled July 18-21, 1971, in Cincinnati, Ohio, the program will be designed to demonstrate how audio-visual concepts, closed-circuit television, computers, and programmed instruction systems can be combined to improve instruction in the health sciences.

The sessions will investigate ways to create a teaching and learning environment which will shorten length of formal instruction while allowing the student to utilize his full capacity to learn.

"Although the use of multimedia instructional aids in general education is an accepted fact," BHME Director, Dr. Kenneth Endicott, said, "it has had slow acceptance in the health sciences."

Dr. Endicott pointed out that the proposed conference will fulfill the need of faculty and staffs for exchange of information about availability and effectiveness of these instructional aids at other schools.

The meeting will also enable users to be in contact with manufacturers of the various equipment involved.

Approximately 800 faculty members, training directors, and specialists from medical, dental, nursing, pharmacy, and other health schools, hospitals, military and Veterans Administration facilities, and colleges and universities involved in programs leading to post-graduate health programs are expected to attend.



Laurie Cochran, NINDS, hands her donation for the "Davis Plan" to James B. Davis, OAS Director and originator of the plan. Instead of exchanging Christmas cards, employees donate money to the Patients' Welfare Fund to help CC patients and their families.

## New Technique Helps to Take Guesswork Out of Testing Corneas for Transplants

A new method now takes the guesswork out of evaluation of donor material for corneal transplants. This safe, practical technique is based on the finding that trypan blue dye stains only damaged corneal cells without harming healthy cells.

### The 'Artificial Placenta,' Produced by DRS, Wins 3 Major Film Awards



Arthur F. Moore, DRS, receives the CINE Golden Eagle award from Dr. William G. Carr, CINE President, for the motion picture, "Artificial Placenta."

The *Artificial Placenta*, a scientific film produced by the Medical Arts and Photography Branch, DRS, for the Laboratory of Technical Development, NHLI, has won three major awards in film competitions here and abroad.

Presented officially last month were the CINE (Council on International Nontheatrical Events) Golden Eagle award and scroll, the Society of Federal Artists and Designers best of show award, and a bronze medal and scroll from the VI International Festival of Scientific and Technical Films ("Nikola Tesla" competition in Belgrade).

Arthur F. Moore, chief of the Motion Picture Section, MAPB, and producer-director as well as one of the screenwriters for the film, accepted the awards for his section and for Dr. Robert L. Bowman who, as head of the Laboratory of Technical Development where the artificial placenta studies were performed, sponsored the film.

### The Experimental College (IBR, Registration Open

Registration for the Master of Arts degree program of the Experimental College, Institute for Behavioral Research, is open through Dec. 11.

Also, students may now register for the Certificate program, which opens Jan. 4, 1971.

The Institute for Behavioral Research is a non-profit research and educational organization.

One of its basic tenets is that students should be involved with current research in the field of human learning rather than that knowledge should be placed first and ex-

Dr. Frederick W. Stocker and a team of researchers at the Duke University Medical Center have established the safety of this stain for clinical use. They were supported in part by the National Institute of Neurological Diseases and Stroke.

Previously, besides examination with the biomicroscope, physicians tested donor corneas to determine whether they were healthy enough to transplant by using a para-nitro-blue tetrazolium stain.

#### Stain Affects Cornea

This stain, however, makes the cornea being tested unsuitable for grafting. Physicians had to assume that the second cornea from the same donor—the only one they could use—was in the same condition as the one tested.

This method reduced the number of corneas available for transplants. The second cornea was usually, but not always, as healthy as the first one tested.

With the new method, researchers use the dye test on the same cornea that will be used in the transplant and determine exactly how healthy that cornea is. The dye stains only the dead or damaged cells.

After the cornea has been stained, the physician examines it under a microscope. The damaged cells appear blue and the unstained healthy cells are only faintly visible.

Endothelial dystrophy, cornea guttata, can also readily be detected by this method.

#### Trypan Blue Dye Harmless

Extensive tests of the trypan blue dye with both rabbit and human corneas showed it had no harmful effects on healthy tissue.

In addition to other tests, the researchers stained healthy human corneas that were not going to be used in transplants within 2 to 3 days after the death of the donor and found that 90 percent of the cells were normal—an indication that the dye does not damage tissue when it is applied.

They also tested a commercial solution of the dye and found that it, too, did not harm healthy corneal tissues.

After careful laboratory testing, Dr. Stocker and his colleagues used the new stain successfully in a number of transplant cases.

They point out that this stain experience in research second.

For information and a catalog, write to: Registrar, EC:IBR, 2429 Linden Lane, Silver Spring, Md. 20910, or phone 585-3915.

## Simple Diagnostic Test Is Developed to Detect Toxic Digitalis Reaction

Researchers have developed a fast, simple diagnostic tool using saliva that can save lives by showing when a heart patient is suffering a toxic reaction to digitalis.

Occasionally a heart patient, who has been taking digitalis, has an irregular heart beat. The patient could then be suffering heart symptoms because more of the drug is needed.

However, the same signs also can indicate a toxic reaction to the drug itself, in which case therapy must be changed.

Dr. Stephen Wotman and a team of researchers at Columbia-Presbyterian Medical Center in New York City have developed a fast, simple method using whole saliva that can diagnose digitalis toxicity.

The study was supported by the National Institute of Dental Research as a part of its research program on salivary gland secretions.

#### Potassium Levels Rise

Dr. Wotman discovered that the level of potassium in whole saliva rises significantly in cases of digitalis toxicity and that simply measuring the potassium level in saliva can detect this.

In a study of 47 patients, he found that the potassium level actually rises in all patients taking digitalis but that the increase was significantly greater in patients with digitalis toxicity than in other patients on this drug.

The 47 study patients included 13 heart patients suspected of digitalis toxicity, 26 heart patients on digitalis with no apparent toxicity, and eight healthy subjects.

The researchers obtained the saliva to measure the level of potassium and other ions by first putting a strip of filter paper containing citric acid on the patient's tongue.

When this paper stimulated the flow of saliva they used a syringe with no needle to extract the fluid as it pooled behind the lower front

should not be used to evaluate all corneas. Those from young, healthy donors can be presumed to be healthy.

However, if the donor is over, say 50, this test will determine whether or not the cornea is still healthy. The researchers set an estimated 70 percent healthy cells as the minimum requirement of a donor cornea.

The researchers also suggest that the corneas be tested and stored in serum until the patient is prepared for surgery.

Individual units of a commercial solution of the dye were designed and will be available soon from Smith, Miller and Patch.

### NICHD's Pregnancy Study Still Seeks Participants

Women who are planning pregnancy are still being sought by NICHD's Reproduction Research Branch.

In order to study the hormonal changes in early pregnancy, the researchers must study women during the month in which they become pregnant and for the next 6 weeks.

The study requires frequent small blood samples during the first few weeks and less frequent samples thereafter. A fee will be paid for each blood sample.

Women interested in participating in the study should call Dr. M. B. Lipsett, Ext. 62136.

teeth.

The researchers then studied the saliva samples by atomic absorption spectrophotometry, although flame photometry tests which are available in most hospitals for blood analysis could be used as well.

The analysis showed that all of the heart patients taking digitalis had higher potassium levels than healthy people, but that the 13 patients with suspected toxicity had still higher levels.

When their therapy was changed, the 13 patients improved and their potassium levels dropped to the level of patients on digitalis without signs of toxicity.

Where possible, the researchers used a far more complicated blood test available at the medical center to confirm toxicity in these patients before their therapy was changed.

Dr. Wotman reported on these findings at the 43rd Scientific Session of the American Heart Association last month.

Associated with Dr. Wotman in this research were Drs. J. Thomas Biggers, Irwin D. Mandel, and Herbert J. Bartleson.



Dr. Shigeo Honjo, Primatology Director at Japan's National Institutes of Health, Tokyo, examines modern primate caging systems at the Washington Primate Research Center (Seattle), supported by the Division of Research Resources. Dr. Theodore C. Ruch, Center Director, explains the modern caging systems he developed to house primates. Dr. Honjo also visited NIH.

## 2 CC Employees Cited For Devoted Service



Gladys L. Garris (l) and Eugene Hampton receive awards for outstanding service from Edith A. Jones, CC Nutrition Department chief.

Gladys L. Garris and Eugene Hampton, both employed in the CC Nutrition Department, recently received cash awards of approximately \$150 each for their "outstanding support and conscientious service to the Clinical Center."

Mrs. Garris, who joined the CC soon after it opened in 1953, has recognized the need for adequate staffing in the Patient Dietetic Service. She has often cancelled personal plans to be on duty when needed.

Mr. Hampton has been the principal cook in the main kitchen of the CC's Food Production Service for the past 8 years. He prepares many unique items to meet the exacting requirements of a wide variety of research studies.

His devotion to CC patients has frequently entailed extra work to compensate for staff shortages.

## Dr. Charles A. Janeway Named to NIAID Council

Dr. Charles A. Janeway, physician-in-chief at Children's Hospital Medical Center in Boston, Mass., was recently appointed a member of the National Advisory Allergy and Infectious Diseases Council until Jan. 31, 1974.

Dr. Janeway received his M.D. degree from The Johns Hopkins University.

In his post at the center since 1946, Dr. Janeway served at the same time as the Thomas Morgan Rotch Professor of Pediatrics at Harvard University Medical School.

### Serves as Consultant

He is also consultant to several hospitals in the Boston area and to the U.S. delegation to WHO.

Dr. Janeway has contributed over 170 papers to medical journals on subjects such as infectious disease, immunity and hypersensitivity, nephrosis, and the physiology of the plasma proteins.

He is presently serving as President of the American Pediatric Society.

## NCI Initiates Study to Improve Research To Identify Carcinogens in Environment

A special study designed to improve the efficiency of research for the identification of carcinogens, or cancer-causing substances, in the human environment will be initiated

### DR. BRADY

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will introduce Dr. Brady.

Dr. Brady is most well known for his work on the family of hereditary diseases, the sphingolipidoses. The cause of each of these diseases is the lack of a specific enzyme which allows the buildup of a fatty material called spingolipid in the tissues.

He and his colleagues at NINDS are responsible for the identification of the exact enzyme missing in four hereditary diseases: Gaucher's, Niemann-Pick, Fabry's, and Tay-Sachs.

### Accurate Diagnoses Possible

By uncovering the missing enzyme in each of these neurologically-related disorders, Dr. Brady has made possible the accurate diagnosis of these diseases, even before birth.

Through enzyme assays based on Dr. Brady's work, prenatal tests can be performed to determine whether a fetus has any one of the diseases. In addition to allowing the diagnosis of patients with this disease *in utero*, and thus facilitating genetic counseling, Dr. Brady's work has also been a key factor in identifying carriers of the diseases.

Although no therapy has yet been found for this series of diseases, Dr. Brady will outline in his lecture the potentialities for treating these disorders and the directions which therapeutic procedures might be expected to take.

In addition to his work in these diseases, Dr. Brady and his colleagues at NIH have made some discoveries which may have an important impact on cancer research.

### Identify Missing Enzyme

They have identified a missing enzyme in cells which have been transformed by DNA viruses into cancer cells. This is the first biochemical change found associated with structural alterations of cells caused by DNA virus transformation.

This biochemical change may help explain how cells become cancerous and invasive and multiply abnormally. Dr. Brady will describe in his lecture how this work may provide clues to restoring the cells to normal.

The G. Burroughs Mider Lecture was established in 1968 by the scientific directors of NIH to honor Dr. Mider for his service. The award is made annually to a scientist who has contributed significantly to the biomedical research eminence of NIH.

under a contract between the National Cancer Institute and the Stanford Research Institute (SRI) of Menlo Park, Calif.

The one-year contract, drawn to run through calendar 1971, will support the NCI carcinogenesis research program, and is designed to establish priorities for screening in laboratory animals of the countless new compounds introduced into the environment each year, in addition to those already in existence.

A number of chemical compounds are now known, or suspected, to be causes of human cancer. Scientists at NCI and those supported by the Institute are working continually—primarily with animal tests—to identify additional carcinogens but a major challenge they face is where to look first.

According to Dr. Gio B. Gori, associate scientific director for program in the NCI Etiology Area and project officer for the contract, the SRI researchers will engage in a broad assessment of the environment.

### Thousands to Be Screened

Industrial chemicals, foodstuffs, air and water pollutants are among the hundreds of thousands of materials to be considered.

Initially, through a process of successive screening, compounds not produced in appreciable quantities will be eliminated from the search; then consideration will be given only to those coming into direct contact with man.

Further narrowing of choices will be effected by retaining only those used for long periods, at high-dosage levels, etc., the selection being principally dependent on the severity of exposure in man.

Some of the factors to be taken into consideration, said Dr. Gori, will be the production of chemical materials and their distribution, matching up these data with information on distribution of populations, climatic conditions, air, water and soil partitions, food chains, persistence and toxicity characteristics.

Sex differences, and other aspects in the young and the aged of the populations exposed will also be considered.

### Program Explained

Dr. Gori emphasized that this systems-analysis program is a feasibility study, set up first to define criteria for determining suspicion of chemicals with regard to cancer, and then to explore the feasibility of using these criteria in ranking the degree of suspicion attached to individual compounds.

Although the \$309,455 contract includes provisions for the use of

## Latest Participants in NIH Visiting Scientists Program Listed Here

11/12—Dr. Fumiyoshi Ishikawa, Japan, Section on Organic Chemistry. Sponsor: Dr. H. Todd Miles, NIAMD, Bldg. 2, Rm. 201.

11/13—Dr. Mohamed El Sayed Omar, Egypt. Section on Primate Malaria. Sponsor: Dr. Peter G. Contacos, NIAID, Chamblee, Ga.

11/17—Dr. David Joseph Pedder, United Kingdom, Laboratory of Chemistry. Sponsor: Dr. Henry M. Fales, NHLI, Bldg. 10, Rm. 7N306.

11/19—Dr. Hajime Ishida, Japan, Laboratory of Pharmacology. Sponsor: Dr. Khalil Ahmed, NCI, Baltimore Cancer Research Center.

## Dr. James Kennedy Dies; Was NIDR Branch Chief

Dr. James J. Kennedy, a Bethesda dentist, died Nov. 24.

Dr. Kennedy, formerly a dental surgeon at the National Institute of Dental Research, served for a period as chief of NIDR's Clinical Investigations Branch.

A native of Michigan, he graduated from the University of Michigan in 1943 and earned his D.D.S. from Northwestern University.

Before joining the NIDR staff, Dr. Kennedy was an assistant professor of Pedodontics at Northwestern University and held the rank of captain in the U.S. Army.



Mary Ross, CC Environmental Sanitation Department, receives gifts and best wishes at a ceremony marking her retirement after 29 years of Government service—the last 7 as an elevator operator in the Clinical Center. John A. Stanmore, ESC Day Service Unit supervisor, presents a card bearing signatures of her many friends and colleagues.

a computer, this will not be primarily a computer study, but rather an analysis of the logic steps required.

The SRI team of experts will be under the direction of Arthur McGee, principal investigator.



Dr. John R. Seol (l), NIAID scientific director, chats during coffee break, with Dr. Ray D. Owen, California Institute of Technology, and Dr. Roy L. Wafford, University of California, Los Angeles. The two Californians were among the 80 American and foreign investigators who met at NIH last month to consider the problems involved in using cellular antigens to help prevent rejection of transplanted organs. The conference was sponsored by the Transplantation and Immunology Branch, NIAID, to consider needs in this research field which might be met through the Institute's programs.

## New Study Supported by Dental Institute May Reveal How We Taste Sweetness

How do we know something is sweet? By what chemical steps does a substance in the mouth register the sensation of sweetness in the brain? Do animals have the same sense of taste as people, or are they taste-blind to certain flavors, much as some people are colorblind to certain waves of light?

Dr. Steven Price at the Medical College of Virginia, Richmond, will study these questions with grant support from the National Institute of Dental Research.

Dr. Price believes a sweet-sensitive protein he and his colleagues have found on the surface of cows' tongues is the first chemical receptor to combine with various sugars in a cow's food.

### Seeks Pattern

He now seeks to determine whether or not different species of animals share a common sweet-sensitive protein, and hopes to learn something of the evolutionary pattern of taste development.

Knowing how cows avoid noxious foods and are attracted to wholesome ones may help in determining how people accomplish the same thing.

Another possibility Dr. Price hopes to study later is whether the sweet-sensitive protein may also be found on the surface of the intestine, in the liver, or in the brain—wherever sugar molecules are captured, transported, and transformed to supply energy as it is needed in the body.

If this should be the case, the protein would have much greater significance than as a first step in conveying taste messages of sweetness.

Because it is accessible on surfaces of the tongue, it is easier to study first as an element of taste than of energy conversion.

## NIMH Book Reports on Biological Rhythms in Psychiatry, Medicine

"From the moment of conception until death rhythm is as much part of our structure as our bones and flesh."

These words introduce *Biological Rhythms in Psychiatry and Medicine*.

The new publication is a cumulative report of studies by scientists working with support from the National Institute of Mental Health as well as work done by NIMH and NIH investigators.

The scientists have worked with researchers in several disciplines—including biologists, entomologists, and mathematicians.

### Various Phenomena Studied

Aspects of mental and physical health that may be affected by such study range from X-ray treatment, surgery, and drug testings to psychotherapy and public health programs.

Researchers studied a variety of phenomena including seasonal changes, sleep and dreams, and effects of biological rhythms on arterial disease, cancer, allergy, metabolism, and mental illness.

Single copies of PHS Publication No. 2088 are available for \$1.75 from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

## Drug Combinant Widely Used for Birth Control Causes Defects in Mice

Scientists doing basic pharmacological studies a contract with the National Institute of General Medical Sciences have disclosed that norethynodrel, a drug combinant used widely for birth control purposes, causes a variety of fetal or birth defects when administered to pregnant mice.

### Scientists Cautious

The scientists cautioned, however, that no conclusion regarding human exposure and fetal development can be made on the basis of these findings.

The scientists also report that the administration of two specific metabolites of the drug, identical to those produced by its breakdown in the body, caused more defects in mice offspring than did the parent drug itself.

These findings were reported Nov. 27 in the science journal *Teratology* by a team of investigators led by Dr. Monroe E. Wall and Dr. Keith H. Palmer at the Research Triangle Institute in North Carolina.

Three different groups of pregnant mice totaling 300 animals were tested, some with the drug itself and others with pure forms of one or another of the metabolites.

Examinations of their litters one day short of the normal 19-day mouse gestation period revealed that up to 64 percent of the fetuses displayed severe developmental abnormalities.

### Birth Defects Noted

Among the birth defects observed were malformed brains and skulls, cleft palates, and a variety of distortions in the development of eyes, ears, and sex organs.

The intrauterine death of fetuses likewise was reported to be five-to-eight fold greater than normal for mice treated late in their pregnancies (11 to 13 days).

By contrast, there was little intrauterine death of fetuses when the drug or its metabolites were given in earlier stages of pregnancy (8 to 10 days).

Of the two metabolites studied, one, known chemically as the 3-beta hydroxymetabolite, was much more active in causing fetal abnormalities than the other, called the 3-alpha hydroxymetabolite.

### Chemical Structures Similar

It was further noted in the study that the chemical structures of the two drug metabolites given to the mice were the same as those found in the urine and blood of women following oral administration of norethynodrel.

Significant, too, is that the amounts of norethynodrel given

## Volunteers With Varying Sensitivity to Poison Ivy Needed for Study Here

If you are sensitive to poison ivy, you can help NIH scientists seeking an effective preventive measure against this warm weather scourge. Call Dr. Richard Johnson, NIAID, Ext. 64457, to volunteer your services.

Dr. Johnson, Dr. Harold Baer, chief of the Allergenic Products Section, Laboratory of Bacterial Products, Division of Biologics Standards, and Dr. Charles Kirkpatrick, head of the Clinical Allergy and Hypersensitivity Section, Laboratory of Clinical Investigation, National Institute of Allergy and Infectious Diseases, are studying the varying degrees of sensitivity to poison ivy.

### Extract Applied

The investigators want to test employees sensitive to poison ivy by applying extracts of the plant to the skin and observing hypersensitivity reactions. Two blood samples will be taken. A small payment will be made to volunteers at the completion of the study.

The way in which the itching rash of poison ivy spreads varies according to the individual's sensitivity.

One objective of the study is to determine which of several materials is the best diagnostic reagent for establishing the degree of sensitivity.



orally to mice in the study were relatively small, but represented on a dose-weight basis the approximate amount of the drug a woman would receive.

Associated in the study with Drs. Wall and Palmer were Joy T. Gidley and H. Dix Christensen, Jr.

Their investigations are being supported by NIGMS in a national program of research to learn the nature and causes of adverse drug reactions, occult drug toxicity, drug interactions and other risks associated with the use of prescription and over-the-counter drugs.