

Decade Forecast: 1/3 of Work Force Will Be Women

By Joseph Mahoney

Deputy Assistant Secretary of Labor, Seymour L. Wolfbein, at the invitation of the NIH Administrative Training Committee, discussed the manpower outlook for the 1960's at a seminar held February 25 in Stone House Conference room. The audience included NIH management and information trainees and key administrative personnel.

Dr. Wolfbein pointed out that workers under 25 will account for nearly half of the labor force growth during the coming decade. There will be a small increase among workers age 25-34, he said, and fewer between ages 35-44. Two out of 5 will be 45 years of age or older, he said, and the number of women workers will increase at nearly twice the rate for men, so that by 1970 women will comprise one-third of the labor market. There will also be a considerable increase in the number of persons able and willing to work on a part-time basis.

Dr. Wolfbein stated that in 1957, for the first time in U.S. history, the white collar force outnumbered the blue collar force. This trend, he said, will continue, with the

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5,000 Russian Science Papers Translated in PHS Program

Since establishment of the PHS Russian Scientific Translation Program more than two years ago, approximately 5,000 Russian scientific papers and 13,200 abstracts have been translated and made available to American scientists. The program is conducted at NIH.

Translation of Russian scientific material on this scale is in accordance with a directive of the U.S. Senate Committee on Appropriations, which states in part, "... The scope of this effort should supplement other translation efforts to the degree required to provide adequate coverage."

The NIH program is concentrated on biomedical literature translation and is coordinated with similar programs of the National Science Foundation (basic physical and biological sciences), Department of Commerce (applied sciences and technologies), and

Health Day April 7

Dr. M. G. Candau, WHO Director-General, has announced that World Health Day, on April 7, will be devoted this year to centering attention on the worldwide campaign by the 90 member-nations of WHO for complete elimination of malaria, which he says remains "a constant threat to more than 1,000 million human beings."

This campaign, now under way in 92 countries and territories, is termed by Dr. Candau "the greatest co-ordinated public health program ever undertaken in the world's history."

Dr. Coatney Studies Malaria Control on African Tour

At the request of the World Health Organization, Dr. G. Robert Coatney, Chief, NIAID Laboratory of Parasite Chemotherapy, has embarked on a tour of three African countries to evaluate WHO projects utilizing medicated salt in the worldwide effort to eradicate malaria.

Dr. Coatney's tour of duty will take him to Monrovia, Liberia; Accra, Ghana; and Amani, Tanganyika. He left the U.S. March 7 and will return in mid-April, following a report of his findings to WHO headquarters in Geneva, Switzerland.

The WHO projects are being conducted in areas where it is possible to control the supply of cooking

salt for experimental purposes. The salt, when combined with chloroquine or pyrimethamine, may give protection against malaria and prove effective in controlling the disease in areas where spraying for eradication of the malaria-bearing anopheles mosquito is impractical.

Atomic Energy Commission (nuclear sciences).

The procedure consists of selection, translation, re-publication, and dissemination of Russian medical literature. Because of the great quantity and variety of material available, selection is a difficult and significant aspect, and an effort is made to choose those materials of particular interest and importance to American scientists.

The actual translation is carried out under contracts and grants. Originally administered as a special project by Scott Adams, then NIH Librarian, responsibility for the awarding of grants and contracts was shared, during 1959, by the Scientific Reports Branch of DRS, and DRG. Early this year the administrative functions were wholly transferred to DRG, under

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NCI Meeting Transcript Sent to Key Personnel

Copies of the transcript of a symposium on the responsibility for public understanding of research and related programs of NIH were recently distributed by ORI to key personnel within DHEW-PHS and their subdivisions.

The symposium, one of a series of monthly meetings on information subjects conducted by NIH Information Offices, was arranged by the NCI Office of Information & Publications, headed by James M. Kieley. Panel members were Dr. Robert H. Felix, Director, NIMH, moderator; Dr. Howard B. Andervont, Chief, Laboratory of Biology, NCI; and Ruth E. Dudley, Information Officer, NINDB.

In distributing the transcript, ORI invited comment and stated that Mr. Kieley has a limited number of copies for additional distribution.

Leon Heppel Wins Hillebrand Award; Discoveries Cited

By Lillie Bailey

Dr. Leon A. Heppel, Chief of the Laboratory of Biochemistry and Metabolism, NIAMD, was awarded the 1959 Hillebrand Award of the Washington Section of the American Chemical Society, at the society's annual awards dinner, March 10, in Washington, D. C.

A recipient of the Guggenheim Fellowship in 1953, Dr. Heppel is the seventh NIH scientist to receive the Hillebrand Award.

He was cited in recognition of his discovery and isolation of several specific ribonucleases and phosphodiesterases, and for applying them in the elucidation of the structure and metabolism of ribonucleic acid. He was also commended for his studies on the role of polynucleotide phosphorylase in the biosynthesis of nucleic acid.

Recognized internationally as an authority in enzymology, Dr. Heppel has conducted research in toxicology and enzymology at NIH since 1942. He was appointed to his present position in March 1959, succeeding Dr. Bernard Horecker.

Dr. Heppel was born in Granger, Utah. He received his Ph.D. degree in chemistry at the University of California in 1937 and his M.D. at the University of Rochester in 1941. In connection with the Guggenheim Fellowship, he spent a year in Europe.

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Advises Venezuelan Gov't

Dr. George W. Luttermoser, Laboratory of Parasite Chemotherapy, NIAID, is in Venezuela at the request of the Pan American Health Organization. He is advising the Venezuelan government concerning their schistosomiasis control program, and is expected to return to Bethesda in late March.



Dr. Heppel

the Record

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NEWS from PERSONNEL

Health Benefits Plan

The Civil Service Commission is now negotiating for two Government-wide health benefit plans and is in the process of approving two non-Government-wide plans for participation in the Health Benefits program, to become effective July 1.

When arrangements have been completed the Commission will announce the names of all approved plans and, at a later date, the benefits to be offered by each.

Specific information on the four plans is not expected before May 1. However, the Commission intends to distribute a pamphlet outlining the general aspects of the program some time this month.

The CSC program will offer basic and major medical coverage for each employee and his dependents. There will be no medical exams, age limitations, exclusions, waiting periods, or cancellations. The amount paid by the employee will depend upon the plan selected. Through payroll deductions, the employee will pay the difference between the cost of the selected plan and the amount the Government contributes.

Absentee Ballots

Postcard applications for absentee ballots, enabling NIH employees to vote in their home resident states (if eligible), are available in the Employee Relations and Services Section, Bldg. 1, Rm. 21.

Training Information

Copies of the Civil Service Commission's pamphlet, "Interagency Training Programs," have been distributed to the Institutes and Divisions. The pamphlet describes 66 courses in such subjects as general administration, personnel

DR. HEPPEL

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genheim Fellowship, he worked and studied at the Molteno Institute, University of Cambridge, England.

He is a member of the NIH Biochemistry Study Section, an editor of the *Journal of Biological Chemistry*, and the author of more than 56 papers in the field of biochemistry.

Former NIAMD winners of the Hillebrand Award are the late Dr. Claude S. Hudson, who received the prize in 1948; the late Dr. Lyndon F. Small, 1949; Dr. Bernard L. Hovecker, 1954; and Dr. Bernhard Witkop, 1958. Two other NIH scientists, both of NCI, were winners of the award: Dr. Dean Burk, in 1952, and the late Dr. Jesse P. Greenstein, in 1957.

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need greatest in the professional, technical, and service fields. The demand for persons with higher educational qualifications to fill these positions will occur simultaneously.

To assure that a qualified work force will be available in the 60's, Dr. Wolfbein said, it will be necessary to expand and improve all forms of training on the job; to end all forms of discrimination in hiring and use of manpower; to develop effective placement services; to support and strengthen our school systems; to expand and improve guidance and counseling services; and develop better national and local information on manpower resources and requirements.

management, communications, safety, world affairs, etc., which are available at other Government agencies without cost. For further information, contact the Employee Development Section, Bldg. 1, Rm. 14.

Ralph Lillie, NIH Research Pioneer, Retires After 35 Years Service

Dr. Ralph D. Lillie, after 35 years of research at NIH, retired on February 29 as a Medical Director of the PHS Commissioned Officers Corps. At the time of his retirement he had served for six years as Chief of the Laboratory of Pathology and Histochemistry, NIAMD.

Dr. Lillie received his M.D. degree from Stanford University in 1917 and commenced his career with NIH in 1925, when he was assigned to the Division of Pathology and Bacteriology of the old Hygienic Laboratory.

During his first few years at NIH, he participated in laboratory studies involving the role of a specific dietary factor in the treatment and prevention of pellagra and the first fractionation of B vitamins. His studies of dietary cirrhosis in rats led to the identification of methionine and choline

as factors preventing this condition.

Dr. Lillie also conducted extensive studies on infectious diseases, including a pathological investigation of Q fever. He was the first investigator to describe pathologic lesions in lymphocytic choriomeningitis.

Dr. Lillie is the author of a textbook on histologic technic and practical histochemistry, and more than 200 scientific articles. His publications have served to establish histochemistry as a recognized field among the major disciplines of medical science.



Dr. Lillie

Dr. Ashburn Appointed To Succeed Dr. Lillie; Dr. Laqueur Promoted

Dr. Llewellyn L. Ashburn was appointed Chief of the NIAMD Laboratory of Pathology and Histochemistry, following the retirement of Dr. Ralph D. Lillie on February 29. Dr. Gert Laqueur was named Assistant Chief of the Laboratory, succeeding Dr. Ashburn.

A native of Gonyon, Va., Dr. Ashburn has been with the Public Health Service since he received his M.D. degree from the Medical College of Virginia in 1930. His duties at PHS hospitals located in Norfolk, New York City, and Baltimore were connected with the clinical practice of medicine.

Dr. Ashburn joined the staff of NIH in 1935. Since then, with the exception of an assignment in Baltimore from 1949 to 1953, Dr. Ashburn has been engaged in experimental pathology, particularly in the fields of nutrition, toxicology, and parasitic infections.

His assistant, Dr. Laqueur, received his M.D. degree from the University of Freiburg, Germany, in 1937, and came to NIAMD in July 1950. From May 1954 to May 1957 he worked as Chief of Pathology of the Atomic Bomb Casualty Commission in Hiroshima, Japan, where he conducted follow-up studies of the survivors of the atomic bomb explosion.

Income Tax Reminder

As previously reported, in the February 2 issue of the RECORD, income tax assistance is available in the Employee Relations Section of PMB. For further information call Ext. 707.

The histochemical approach, as developed by Dr. Lillie, or under his guidance, pursued three lines of investigation: 1) the successful application of chromogenic organic reactions to the identification of specific constituents at the histologic level; 2) the chemical characterization or classification of normal and pathological tissue pigment constituents such as enterochromaffin, melanin, and iron-containing pigments and the lipofuscins; and 3) the chemical mechanisms involved in the older empirical staining procedures.

In 1928 Dr. Lillie published the first of two articles on histologic methods entitled "The Gram Stain. A Quick Method for Staining Gram-positive Organisms in Tissues." For many years his work in this field dealt with the development of new methods or the improvement of established ones for the fixation, embedding and mounting of tissue, decalcification of bone, and selective and specific staining of tissue, cellular elements, bacteria, fungi, and blood parasites.

Dr. Lillie worked out the composition of an American Giesma

(See DR. LILLIE, Page 7)

Navy Duty for Imus

Dr. Henry A. Imus, formerly Assistant to the Director, NINDB, has been appointed Assistant Director of Research at the U.S. Naval School of Aviation Medicine, in addition to his duties as Head of the Department of Psychology there.

Science Section

This four-page section, devoted chiefly to summaries of research findings that have been reported by scientists of the National Institutes of Health, is prepared with the cooperation of the Information Offices of the Institutes and Divisions of the National Institutes of Health.

Electromagnetic Waves Used In Study of Brain Function

A new technique for the study of brain function has been indicated in recent research in the Surgical Neurology Branch, NINDB. Electromagnetic waves from a standard ground-to-air radio transmitter induced changes, ranging from drowsiness to death, in a group of young macaque monkeys.

Although previous studies have exposed the whole animal to frequencies above 500 megacycles with subsequent degenerative effects attributed to heating of tissues, in this study the head alone has been subjected to the 388 Mc range. It is believed by the authors that the phenomena observed are due to the use of this specific wave length. The studies were conducted by Dr. Maitland Baldwin, Dr. Sven A. Bach, and Shirley A. Lewis, R.N., of NINDB.

The investigators placed a monkey in a plastic primate chair, with his head protruding through a copper mesh screen insulated against possible burns. A copper mesh cylinder surrounded the animal's head, and a quarter-wave-

length probe from the transmitter, entering the roof of the cylinder, directed the radiation through the intervening space into the brain. No direct contact with the head was present.

Within the copper mesh cylinder the monkey's head was placed in either a high position, where there was freedom of movement, or in a low position, with the chin and neck extended and movement restricted.

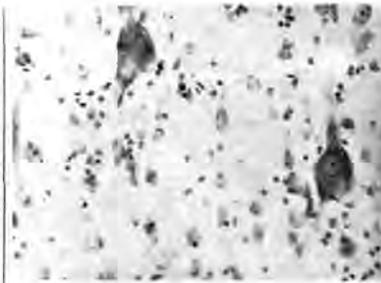
Measurements Taken

Photographs, electroencephalograms, and recording of respiration, blood pressure, pulse rate, and rectal temperature were made during the animal's exposure to the radio waves. Exposure lasted from two to ten minutes.

A monkey placed in the head-high, or free position, had a tendency to look frequently at the antenna during exposure, but showed no effects other than drowsiness.

However, a monkey positioned with the chin elevated and the back of the head held low showed a rapid series of changes. Shortly after the transmitter was turned on, the animal became agitated, then drowsy and weak. His eyes moved involuntarily and were incoordinate and his pupils dilated. A sharp noise could arouse him from drowsiness briefly. Then periods of seeming normalcy alternated with the drowsing. The rate and depth of respiration increased and saliva appeared as frothy bubbles. In some animals a convulsion followed. It was possible to kill an animal in two minutes, 55 seconds. However, when radiation was stopped short of death, monkeys recovered within 48 hours and showed almost no clinical changes.

The causes of the phenomenon are as yet undetermined. There is a definite relationship between the changes observed and the position of the monkey's head. When the direction of the radio wave coincided with the direction of the aqueduct of Sylvius, a three-quarter-inch canal deep within the mid-



Motor cortex of monkey. Total radiation, two minutes, fifty-five seconds. Death occurred at the end of this period. Betz cells well preserved. Small pyramidal neurons showing slight loss of Nissl substance.

brain, the effects were heightened. When the position of the head was shifted so that the aqueduct lay perpendicular to the axis of the wave, the effects were minimal. No changes took place when the animal's entire body was exposed.

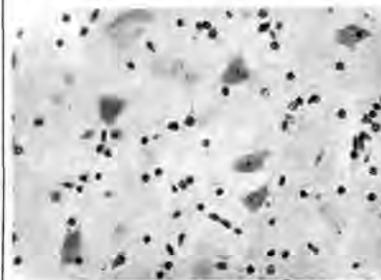
Another speculation points to the possibility that the 388 Mc frequency may produce a series of electronic resonances with systems in the brain influencing consciousness, eye movements, tone, posture, and autonomic function.

Although no pathological cause of death was observed on examining the brain tissue, there was some evidence of disturbance within the nerve cells. The resultant "washing out" of the Nissl substance, (granules scattered throughout the cell body which may represent a store of energy) may result in a molecular change caused by the particular frequency used.

Other factors believed important are the duration of exposure and the volume of tissue exposed to radiation.

Possibilities of exploring the relationship of sleep and arousal are opened by the ability of the 388 Mc radio wave to waken an animal immediately from surgical anesthesia. Speculations reach into the future to the day when this basic method may prove a useful tool to neurosurgery.

This study has been published in the February 1960 issue of *Neurology*.—B.D.M.



Ventrolateral nucleus of monkey thalamus. Total radiation, forty-eight minutes. Died during the last part of radiation. Note loss of Nissl substance in the neurons that have been photographed.

Drug Metabolism Rate Unaltered by Cirrhosis, New Findings Indicate

Preliminary studies at National Heart Institute and New York University suggest that normal rates of drug metabolism are not altered by cirrhosis, despite severe loss of functioning liver, wherein are located the special enzyme systems that inactivate drugs. Thus, the presumed sensitivity to certain drugs of patients with liver disease may require some other explanation, if these indications are borne out by more extended studies.

Conversion of certain fat soluble foreign compounds, such as drugs, into inactive derivatives is an important function of the liver, without which the action of many drugs would persist for a dangerously long time. The liver disposes of such compounds by converting them to derivatives which are less fat soluble, thus barring them from reabsorption into the body through the fat-like membrane lining the kidney tubules.

Recently Dr. Bernard B. Brodie and Dr. John Burns of National Heart Institute, and Dr. Murray Weiner of New York University Research Service compared the inactivation of various drugs in patients with severe Laennec's cirrhosis and in normal subjects. The drugs studied (phenylbutazone, aminopyrine, antipyrine, salicylic acid, and dicumarol) had previously been shown to be metabolized in the body through the action of liver enzymes.

Other Studies Indicated

The biologic half-life of these drugs was not significantly different in the cirrhotics and controls, indicating that the activity of the enzyme systems involved was not appreciably affected by the liver-damaging disease. Special precautions are usually advised in the administration of certain other drugs to patients with liver disease, for it is commonly believed that drug metabolism is generally impaired in the diseased liver. The present studies should be extended to patients with other types of liver disease as well as to other compounds that are metabolized along similar other pathways. If indications of the present findings are borne out by further study, some other explanation should be sought for the presumed sensitivity to certain drugs of patients with impaired liver function.

Dr. Brodie reported the findings in part at the 1959 Annual Meeting of the American Association for the Study of Liver Diseases. The findings will appear in more detail during 1960 in *Medicina Experimentalis*.



Top: Normal tracing one hundred forty seconds before stimulation. Center: Tracing four seconds after the beginning of stimulation. Note slow activity. Lower: Tracing four seconds after cessation of stimulation.

Taste Test Provides Genetic Clue In Geographical Disease Studies

A taste test is being used by Dr. Baruch S. Blumberg of the Arthritis and Rheumatism Branch, National Institute of Arthritis and Metabolic Diseases, to study one of the many inherited biochemical variations — polymorphisms — that exist among humans. The test employs the compound phenylthiocarbamide (PTC) which certain individuals can taste and identify and others cannot. Since the tasting trait is believed to be genetically determined, the test provides a way to determine the presence or absence of a single gene in the population.

Many such polymorphisms exist in both animals and man, such as unusual types of human hemoglobin, certain synthesized metabolites in the body, and variations that are found among serum hemoglobin binding proteins taken from different individuals. Dr. Blumberg's interest in these biochemical variations stem from the fact that although they are apparently harmless in themselves, they may be affecting an individual's susceptibility to various diseases.

The PTC polymorphism was first reported in 1932, shortly after the compound was synthesized by a Dupont chemist, when family studies of the phenomenon indicated that the trait was a genetically dominant for the gene and non-tasters being recessive for it. Since then the ratio of tasters to non-tasters has been determined in many populations by various investigators. The most recent study was made by Dr. Blumberg in an Alaskan Eskimo population and helps to clarify the worldwide distribution of the tasting trait. The study was made in collaboration with Dr. A. C. Allison of the National Institute of Medical Research, London, and was reported by Drs. Allison and Blumberg in the journal *Human Biology*.

For many years after its discovery the PTC polymorphism was thought to be only another biochemical oddity until it was discovered that certain other compounds could also be tasted by PTC tasters but not by non-tasters. The interesting observation was made that in the chemical structure of all of these compounds there was a characteristic thiourea grouping of nitrogen, carbon and sulphur which accounted for the tasting phenomenon. This same thiourea grouping is present in a large series of anti-thyroid substances and known goitrogens, and several studies by other investigators indicate that non-tasters



An aged Eskimo woman from the village of Wainwright, Alaska, waits for medical examination which included studies like the PTC taste test.— Photo by Dr. C. Dotter, Univ. of Oregon Medical School.

may be more susceptible to certain kinds of goitre than are the tasters. The possibility exists that there is some relationship between the PTC tasting polymorphism and the occurrence of thyroid disease and is being further explored.

In the Eskimo study, Dr. Blumberg found that the frequency of non-tasters was relatively high, 26 percent. This frequency is the same as that found in Western Europeans and comparable to the one existing in the white American population. It is in sharp contrast, however, to the very low frequencies found in American Indians, and the difference is in keeping with many other genetically controlled ones between American Indians and Eskimos which make



THE INCIDENCE IN PERCENT OF NON TASTERS OF PTC IN ABORIGINAL POPULATIONS

LYMPH NODE CELLS TRANSFER ALLERGIC ENCEPHALOMYELITIS

A successful transfer of allergic encephalomyelitis has been brought about by the injection of lymph node cells taken from donor rats sensitized to spinal cord into recipient rats pretreated neonatally with normal rat spleen cells. The study was undertaken at the New York University College of Medicine by Dr. Philip Y. Paterson of the National Institute of Allergy and Infectious Diseases' Laboratory of Immunology. Findings were published in the *Journal of Experimental Medicine* in a recent issue.

Dr. Paterson pretreated newborn rats with pooled, normal spleen cells from splenectomized adult donor rats. Five to 6 weeks later the donor rats were injected with guinea pig spinal cord in adjuvant. These were pooled, washed and injected intravenously into the pretreated and now adult, recipient rats. The recipients were observed for 6 to 8 hours after lymph node cell transfer, then sacrificed, and their brains and spinal cords examined microscopically for neurological lesions. Comparable lymph node cell transfers were performed using control donors injected with guinea pig kidney-adjuvant and control recipients which were not pretreated with spleen cells.

As a result of the transfer of lymph node cells to recipient rats pretreated with spleen cells from the same donors, 14 to 22 recipients were found to have allergic en-

cephalomyelitis lesions after injection of 10 to 156 million viable donor lymph node cells. The number of lesions demonstrable in each of these 14 positive recipients varied from a minimum of 2 to a maximum of 15 and both their number and intensity appeared to be directly related to the number of donor lymph node cells transferred.

Dr. Paterson performed additional lymph node cell transfers using recipients pretreated neonatally with spleen cells from rats other than those providing the transferred lymph cells. Of these a total of 6 of 29 recipients acquired allergic encephalomyelitis lesions. The investigator attributes the transfers to the use of recipients which have acquired immunological tolerance to donor lymph node cells, as a result of the spleen cell pretreatment, and in which, therefore, the donor cells can survive and function longer after transfer.

The successful transfer of allergic encephalomyelitis from diseased to healthy animals by means of lymph node cells alone establishes the role of these cells in the development of this disease and the importance of delayed sensitivity in its pathogenesis. These experimental results may furnish the means for answering several important questions about the true nature of allergic reactions to tissue antigens.

Radiation Sensitivity Enhanced by Drug

Dr. Robert E. Bases, of the National Cancer Institute's Radiation Branch, has reported that the antibiotic, actinomycin D, enhanced the killing effect of X-rays on single HeLa cells exposed to the drug just before or after irradiation and during clone formation. This laboratory investigation was prompted by an interest on the part of scientists in modification of the response of mammalian cells to ionizing radiation and by the observation that actinomycin D apparently produces an enhanced response to radiation therapy in cancer patients.

In the present study, actinomycin D was not unique in producing this response, as cells in culture medium containing a large percentage of heavy water were also more sensitive to radiation. In fact, prolonged exposure to D₂O (14 hours) enhanced the radiation sensitivity of the cells even after D₂O was removed.

This report appears in a recent issue of *Cancer Research*.

Demonstrations of Cellular Circuits Shown by NINDB Brain Charts

A study charting brain connections between cerebellum and cerebrum has been carried on in the National Institute of Neurological Diseases and Blindness. Little-known connections between the cerebellar hemispheres and the cerebrum have been demonstrated by electrically evoked potential.

The studies have confirmed the presence of nerve pathways by which the cerebellum exerts a controlling influence over the motor functions of the cerebrum. Single shock stimulation of the hemispheres of the cerebellar cortex has resulted in consistent responses in the sensory and motor areas of the contralateral cerebrum, thus demonstrating a "circuit" between these parts of the brain.

Although cerebello-cerebral connections have been inferred from anatomical evidence, responses between these particular cerebellar areas and the cerebral cortex have not been demonstrated consistently. The results of the study of the connections by the evoked potential method is reported by Dr. C. Murphy Coombs and Sue V. Saxon of the Laboratory of Neuroanatomical Sciences, NINDB, in *Experimental Neurology*.

Cats Provide Data

Data were obtained from 40 adult cats anesthetized with Nembutal or curare preparations. Silver ball electrodes were applied to the exposed cerebellar surface and a stimulus of from 7 to 12 volts was given. Responses from similar electrodes on the surface of the cerebrum were then re-

corded on a cathode-ray oscillograph.

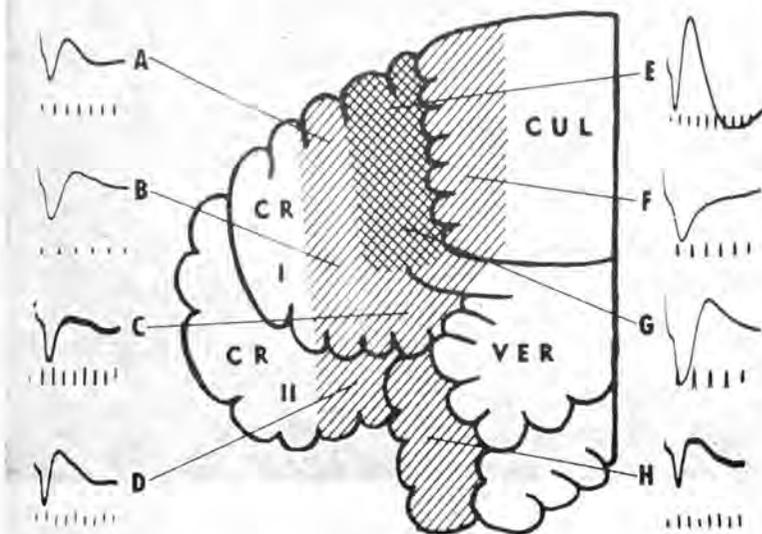
Responses Obtained

From these tracings, the investigators found that the largest cortical responses could be obtained from the midsection of the anterior sigmoid gyrus—an S-shaped convolution of the motor cortex. Smaller potentials were consistently obtained from the lateral part of the posterior sigmoid gyrus. As expected, responses were much greater on the side of the cerebellar cortex opposite from the side stimulated. When responses from the same side were present, they were small, inconsistent, and occurred only in the anterior gyrus.

Stimulation Unequal

Early in the experiments it was observed that not all parts of the cerebellum were equally satisfactory for stimulating purposes. The most active parts of the sigmoid gyrus were then chosen as the recording point for the evoked potentials and various parts of the cerebellar surface were stimulated to determine the most efficacious stimulating points.

Results of this experiment, contrary to a previous study, showed that the largest and most consistent results with the cerebellar hemispheres were obtained with low-voltage stimulation of the cerebellar area designed as crus I. The most active neocerebellar zone was found to be a longitudinal strip, bordered medially and laterally by unresponsive zones.



Cerebellar surface areas stimulated while recordings A through H were made from the contralateral anterior sigmoid gyrus. Nonshaded areas produced no responses. Lightly shaded areas evoked definite consistent potentials. Darkly shaded areas produced largest responses.

Control Mechanism of Genes Investigated in Basic Studies

One of the most fundamental problems in biology is the manner in which genes determine and control biochemical processes in cells. Basic studies of this control mechanism have been reported by scientists at the National Institute of Arthritis and Metabolic Diseases which suggest that genes are turned on and off and may explain how this is done.

Within the past few years, support has been gathered for the hypothesis that genes determine the metabolic pattern in an organism by determining the structure of enzymes, that is, by ordering the sequence of the amino acid building blocks in enzymes. This hypothesis does not account for the fact that some cells of an organism produce enzymes which other cells do not, even though all the cells have the same chromosomes and presumably the same genes. One possible explanation of this is that a mechanism exists for turning genes "off" or "on" and allowing differentiation among the cells.

Enzymes Studied

Dr. Bruce Ames and Miss Barbara Garry of the Laboratory of Biochemistry and Metabolism of the National Institute of Arthritis and Metabolic Diseases have approached this problem of genetic control through a study of six of the thousands of enzymes in bacterial cells. These specific enzymes are synthesized by the cell in order to produce histidine, an essential amino acid, and each enzyme catalyzes one step of a multi-step process, or metabolic pathway, the end product of which is histidine.

The NIAMD studies have shown that in *Salmonella* bacteria a feedback mechanism regulates the synthesis of the series of enzymes of histidine biosynthesis; the rate of enzyme synthesis slows down as the histidine pool increases. The significant aspect of the finding is that the rates of synthesis of each of the enzymes in the series of enzymes involved in this particular metabolic pathway were repressed to the same extent by histidine.

Other investigators have found that the rate of a single enzyme's synthesis will vary with the size of the pool of the end product, an occurrence called enzyme repression, but this is the first demonstration that a group of enzymes may respond in unison. The phenomenon has been named "coordinate repression" by the Institute scientists and occurs regardless of the amount or even of the presence of the individual enzyme substrates available in the cell. The NIAMD scientists reported their findings in part in the *Proceedings of the*

National Academy of Sciences recently, and additional aspects of the work will appear in the *Journal of General Microbiology* (in press).

This new observation is of interest in view of the genetic analysis of various histidine mutant strains of *Salmonella* bacteria. Dr. P. Hartman of Johns Hopkins University has isolated a series of different mutants of *Salmonella* all of which require histidine for growth. Each mutant is damaged in one of the genes involved in making an enzyme required for histidine biosynthesis. These genes have been mapped on the *Salmonella* chromosome by Hartman and shown to be in a cluster.

The investigations of the NIAMD scientists have shown that each type of mutant Dr. Hartman isolated is missing a different enzyme of the biosynthetic pathway. The genes could be associated with the enzymes they control. Dr. Hartman's genetic map in conjunction with the NIAMD biochemical studies has revealed the fact that the linear order of the genes on the chromosome corresponds to the sequence of the enzymes they control in the biosynthetic pathway.

Hypothesis Made

In view of these two sets of observations, an attractive hypothesis, though one for which direct proof is lacking, is that perhaps the feedback mechanism for regulating histidine production operates at the gene level, and that in some way histidine can functionally "turn off" that length or section of the chromosome containing the genes of the histidine enzymes. Therefore, when the synthesis of the necessary enzymes stops, the production of histidine would stop. The controlling factor may be histidine itself, or a histidine-nucleic acid repressor which has a specific affinity for the histidine section of the chromosome.

Although *Salmonella* exhibits this orderly clustering of genes, it is not found in *Neurospora* or in yeast. The histidine genes in these organisms are scattered on the chromosome, and the investigators are studying them in more detail.

The basic NIAMD research involved in these studies provides a fuller understanding of how genetic information controls biological activity, regulating normal biochemical processes in health, and where enzymatic defects or omissions occur apparently contributing to or causing biochemical derangements in "molecular" or metabolic diseases.

Dutch Neurologist Reports Method For Brain Damage Evaluation

The results of an extensive clinical study of brain damage in newborn babies were discussed at NIH February 18 by an NINDB guest lecturer, Dr. Heinz F. R. Precht, Chief, Department of Experimental Neurology, University Hospital, Groningen, the Netherlands.

Research conducted by Dr. Precht and his colleagues during the past 12 years has led to the development of a new quantitative method for diagnosing damage of the nervous system in newborns. The examination consists of comparisons of selected activities in "normal" babies with activities in babies with histories of complications before or during birth. A high rate of validity for the method was found in follow-up examinations given to the children a few years after birth.

In developing the examination, the investigators first quantitatively analyzed a number of behavior and motor patterns which occurred in a control group of 50 full term babies born without complications after normal pregnancies. Long term observation of the general behavior patterns of newborns was necessary to insure the reliability of standard methods and procedures used for testing.

Use New Criteria

Using the newly developed criteria, neurological examinations were given to 218 full term newborns with "histories of complications such as prolonged labor, forceps extraction, breech presentation, and asphyxia post partum." Of these infants, 92 (42 percent) were classified as "not pathological." The remaining 126 cases, however, showed symptoms which

had been marked as pathological, such as absence of certain reflexes, hyperirritability, or epileptic manifestations.

The highest percentage of abnormalities was found in children with histories of fetal distress and prolonged labor. Results appeared to show that a significantly higher proportion of pathological cases were boys. In addition, significant increases in pathology were found in babies weighing less than six and one half pounds, although asphyxia was found more often in larger babies.

Follow-up Made

The prognostic value of the neonatal diagnoses was verified by follow-up examinations of the children after two to four years. Neurological and psychological examinations were given to 119 of the children who had histories of complication and to 18 from the normal control group. Here, it was seen that 68 percent of those classified as pathological showed neurological deficits, while only 8 percent of controls were found to have abnormalities. Again, children with histories of past anoxia had a higher percentage of abnormal symptoms.

The investigators concluded that neurological abnormalities in newborn babies appear to have a prognostic value concerning the emergence of behavior problems. In addition, a comparison between behavior problems and unfavorable social surroundings did not show any significant correlation, suggesting that many behavior disturbances are due to organic damage.—P. MacP.

Protein Chemistry Studies Show Molecule Structure

Recent advances in protein chemistry at National Heart Institute and elsewhere have found that the myosin molecule is made up of three identical chains, each wound into a tight helical coil, the three chains themselves being wound together in the form of a long rope.

The protein myosin is of interest in terms of cardiovascular functions because it is believed to be the predominant component of the contractile system of muscle. A program of research on myosin at NHI has the immediate objective of interpreting some of the properties of myosin on the basis of its molecular structure, and is ultimately aimed at understanding its role in muscle contraction.

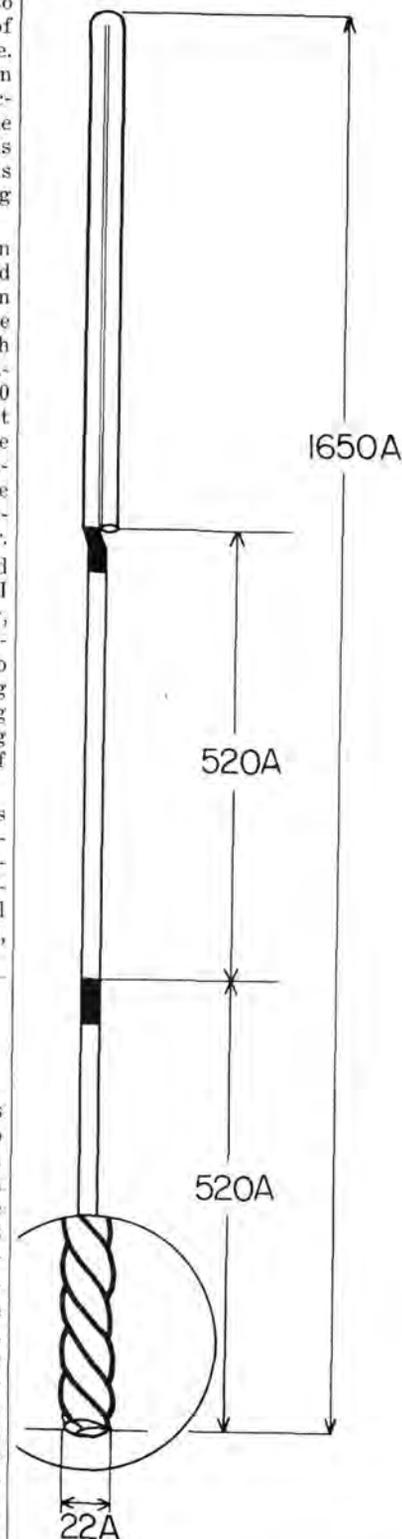
Like other proteins the myosin molecule is made of amino acid groups, bound together as links in the long chains which constitute its primary structure. Although myosin is known to be a comparatively long slender molecule (1650 x 22 Angstrom units), it has not been known how many polypeptide chains are held together by secondary bonds to form the molecule and, if more than one chain, whether they differ from one another.

Drs. W. Wayne Kielley and William F. Harrington, in the NHI Laboratory of Cellular Physiology, have approached this problem using guanidine hydrochloride to break the secondary bonds holding the chains together, while leaving intact the primary bonds holding together the polypeptide links of each chain.

Examining the products of this dissociating process by sedimentation in the ultracentrifuge, together with observations of their diffusion rates, viscosities, optical rotation properties, and other data,

the investigators have concluded that the myosin molecule consists of three identical polypeptide chains, each wound into a tight helical coil, the three chains themselves being wound together in the form of a long rope.

These findings will appear in *Biochimica et Biophysica Acta*.



A proposed model of the myosin molecule.

Collagen Fiber Changes in Periodontal Tissues Studied at NIDR

Periodontal disease is known to affect more than 50% of the U.S. adult population. Since degenerative changes of collagen fibers in the periodontal tissues constitute one of the most important consequences of this disease, National Institute of Dental Research investigators undertook explorations to determine whether these changes could be manifestations of the breakdown of collagen protein by oral micro-organisms.

In experiments conducted by Drs. Stephen E. Mergenhagen and Henry W. Scherp, Laboratory of Microbiology, reconstituted collagen from rabbit skin was exposed to mixed cultures started from gingival accumulations. After seven days' growth the protein remaining was compared with that of an

unexposed container of reconstituted collagen. Similar trials were also made with various single and combined strains of common oral microorganisms, as well as with *Clostridium histolyticum*, a known collagenolytic organism.

At the end of the test period, the mixed oral cultures had effected 20 to 30 percent reductions in the collagen hydroxyproline, thus indicating that oral microorganisms may contribute to the degeneration of collagen fibers seen in periodontitis. The lesser activity of these cultures on collagen, as compared to the essentially complete digestion by *C. histolyticum*, was regarded as consistent with the chronic nature of periodontal disease in contrast to the acute inflammation seen in clostridial

myositis.

The single and combined strains of oral microorganisms failed to produce any evidence of collagen digestion, apparently in line with the belief that these organisms are mutually supporting and that those most active in collagen degradation have yet to be isolated.

Previous investigations on the breakdown of native collagens, conducted elsewhere, appears to support the thesis that oral microorganisms were not involved, since studies with these organisms did not yield the appropriate products of collagen digestion. Recent experiments indicated, however, that the absence of these products was due to the fact that they also had been catabolized by the bacteria.

TV Medical Council Will Demonstrate Teaching Methods

The Council on Medical Television, of the Institute for Advancement of Medical Communication, will hold its second meeting April 20 and 21 in the CC auditorium.

The theme of the meeting will be "Pedagogic Technics in Medical Television."

Instructors from medical schools and institutions using televised teaching methods will demonstrate and discuss ways in which TV is used in teaching the basic sciences and clinical subjects.

The afternoon program of April 20 will show and explain ways in which television is being used in teaching in the laboratory and at the bedside or in the clinic.

The morning of April 21 will be reserved for a session on "Prepared Teaching Presentations," dealing with the more formal types of teaching.

DR. LILLIE

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stain in 1939 to replace the stain imported from Germany, and devised improved methods for its manufacture and standardization. This American-made stain was a major contribution to the malaria diagnostic procedure used during World War II.

A member of the Biological Stain Commission since 1936, Dr. Lillie became president of the organization in 1959 and is presently an associate editor of the *Stain Technology Journal*. He served as president of the International Academy of Pathology from 1948 to 1949.

Dr. Lillie was a principal in the organization of the Histochemical Society, serving as secretary from 1950-55 and as president in 1957-58. He founded the official publication of the society, the *Journal of Histochemistry and Cytochem-*



Cub Scout Peter M. Lynch smiles happily in Dr. Shannon's office after presenting a Boy Scout emblem to the NIH Director (right) in recognition of Scouting's Golden Jubilee Year. Dr. John M. Lynch, Chief of the NIH Employee Health Service, is the Cub Scout's proud father. Prominent Government officials, Members of Congress, and community leaders were chosen by the V.I.P. Committee, National Capital Area Council, BSA, to share the honor of wearing a Scout pin during this 50th Anniversary Year of the Boy Scout movement.

istry, in 1952, and has been editor-in-chief since then.

His outstanding accomplishments in the field of histochemistry were lauded by the Association of Military Surgeons when they presented him with the first Sustaining Membership Award in November 1958.

Dr. Lillie will continue his research with the Department of Pathology at the Louisiana State University School of Medicine, New Orleans 12, La.

Dr. Bunim Presents Paper At Stoneburner Lectures

Dr. Joseph J. Bunim, Clinical Director, NIAMD, will open the 13th Annual Stoneburner Lecture Series at the Medical College of Virginia on March 16 with an 8:30 p.m. presentation on "Inter-relationships of the Several 'Collagen' Diseases." He will also speak at 11:30 the following day on Sjogren's syndrome.

The Stoneburner lectures are sponsored by the Virginia chapter of the Arthritis and Rheumatism Foundation, the Medical College of Virginia's Connective Tissue Study Group, and the Admiral Cary T. Grayson Fund of the College.

R&W Sponsors Concert

A chamber music concert, sponsored by R&W, will be presented March 21 in the CC auditorium at 8:30 p.m. Dr. Charles Hutterer, Assistant Chief, Grants and Training Branch, NHI, is pianist for the ensemble.

Tickets are free and available at the R&W film desks in Bldg. 10 and the Robin Building.

Evanston Ceremonies Mark Completion of Fluoridation Survey

Dr. Francis A. Arnold, Director, NIDR, was a featured speaker at recent ceremonies in Evanston, Ill., celebrating the city's 13th year of fluoridation benefits.

Evanston began fluoridating its water supply for prevention of tooth decay in February 1947, following a survey conducted by Dr. H. T. Dean, former NIDR Director; Dr. Arnold, and other NIH dental researchers.

In this survey Evanston served as a non-fluoridated "control" in the history-making studies that eventually led to nation-wide adoption of fluoridation.

Honored guests at the 13th anniversary celebration were a set of caries-free twins born nine months after the measure was instituted.

Mock Check Presented

Dr. J. Roy Blayney, director of a study of fluoridation effects in Evanston, presented a mock check for \$154,202 to the city, representing estimated savings in dental bills for all children reared in the area.

The Blayney survey included chemical and bacterial analyses of saliva, water analyses at the filtration plant and at various points in the pipeline system, and tooth and bone studies. Its results added to the evidence of the beneficial effects of fluoridation reported in long-term studies by the Public Health Service in other areas.

The Evanston figures, based on statistics furnished by the Illinois State Department of Health, which cooperated in the survey, showed that children of all age groups in that city averaged 2.5 fewer decayed teeth than those of a neighboring non-fluoridated community.

Cohen Promoted in DRG

Sidney B. Cohen became Assistant Chief, Grants Management Branch, DRG, on March 6. He is working with Clarence Lowe, Branch Chief, in all phases of grant management, including the development and implementation of policies and procedures in connection with the grant field audit, liaison, and audit review.

Mr. Cohen was formerly supervisory constructive accountant and fiscal consultant in the Office of Vocational Rehabilitation, Office of the Assistant Director for State Administration, DHEW.



Soviet biochemists visiting the U.S. under the terms of a U.S.-U.S.S.R. exchange agreement meet with NIH officials during a three-day visit here, before beginning a tour of research centers throughout the country. Left to right: Drs. Floyd S. Daft, Director, NIAMD; Nikolai N. Demin, U.S.S.R. Academy of Sciences; G. Gilbert Ashwell, NIAMD, tour director; Grachiya K. Bunyatyan, Armenian Academy of Sciences; Ilya I. Ivanov, Leningrad Pediatrics Medical Institute; and Mikhail P. Chernikov, Institute of Biology and Medical Chemistry, U.S.S.R. Academy of Sciences.

Aging Study Grants Increase by 44%

The number of research grants for aging studies increased 44 percent during the 12 months ending January 31, 1960, according to a recent DGMS report.

Total dollar value of the grants increased 62 percent in the same period.

The majority of the grants, which were awarded by the seven Institutes and DGMS, are in the basic biological sciences, with a considerable number also in the behavioral and clinical sciences, including the field of rehabilitation.

During the past year research in the basic sciences has emphasized changes in collagen and the endocrinological changes accompanying aging. In the clinical sciences the association between atherosclerosis and aging is being studied extensively.

Law Appointed to Panel

Dr. Lloyd W. Law, Head of the Leukemia Studies Section, Laboratory of Biology, NCI, has been chosen to serve for five years as a member of the WHO Expert Advisory Panel on Cancer.

As honorary appointees, panel members are asked to give the organization the benefit of their knowledge and to inform it of important developments in their own subjects, particularly in the countries in which they are working.

Geisser to Teach at Iowa

Dr. Seymour Geisser, mathematician in the Theoretical Statistics and Mathematics Section of the Biometrics Branch, NIMH, has been granted a leave of absence to become Visiting Associate Professor of Statistics at Iowa State University for the spring quarter of 1960.



Nine high school students, winners of the 19th Annual Westinghouse Science Talent Search, question Dr. Charles V. Kidd, Chief, Office of Research Planning, OD, on the role of the undergraduate in scientific research during their recent tour of NIH. At left, rear: Charles H. Bennett, Croton-on-Hudson, N.Y. and John DeW. David, Evansville, Ind. Others, clockwise from left foreground: Robert R. Friis, Jr., Coral Gables, Fla.; Gayle Edlund, Phoenix, Ariz.; William L. R. Cruce, Houston, Tex.; Hazel R. Cuffey, Bloomington, Ind.; Richard P. Mills, Evanston, Ill.; David R. Brown, Minneapolis, Minn.; Richard A. Appelbaum, Brooklyn, N. Y.; and Dr. Kidd.

Standing Committees Named For 1960 Medical Board

Following the January appointment of the NIH Medical Board for 1960 (reported in the NIH RECORD of February 16), Dr. Shannon has named the members of the standing committees of this Board. The list follows.

Steering Committee: Drs. Charles G. Zubrod (Chairman), Robert W. Berliner (Co-chairman), Joseph J. Bunim, Jack Masur, George Z. Williams, Maitland Baldwin, Vernon Knight, and Nathaniel I. Berlin.

Clinical Research Committee: Drs. G. Milton Shy (Chairman), Charles G. Zubrod (Co-Chairman), Frederic C. Bartter, Vernon Knight, Mortimer Lipsett, and Jack Orloff.

Medical Record Committee: Drs. Ludwig von Sallmann (Chairman), Edward J. Driscoll (Co-Chairman), Andrew G. Morrow, David Ham-

burg, Henry K. Beye, Emil Frei, and N. R. Shulman.

Education Committee: Drs. Murray Brown (Chairman), Robert S. Gordon (Co-chairman), Charles G. Zubrod, Louis B. Thomas, Robert Stephan, Joseph J. Bunim, Frederick Stohlmann, and Edward J. Laskowski.

Credentials Committee: Drs. John P. Utz (Chairman), William C. Jenkins (Co-Chairman), and Edward J. Driscoll.

Organization & By-Laws Committee: Drs. G. Donald Whedon (Chairman), Clifton K. Himmelsbach (Co-chairman), and William C. Jenkins.

Tissue Committee: Drs. Jarvis E. Seegmiller (Chairman), Robert R. Smith (Co-chairman), and Louis B. Thomas.

Normal Controls Committee: Drs. Clifton K. Himmelsbach (Chairman), Albert Sjoerdsma (Co-chairman), William C. Jenkins, G. Donald Whedon, John M. Van Buren, and Nathaniel I. Berlin.

Radiation Committee: Drs. George Z. Williams (Chairman), Theodore F. Hilbish (Co-chairman), Nathaniel I. Berlin, Joseph E. Rall, Donald S. Frederickson, Urner Liddel, David B. Scott, Seymour Kety, and H. L. Andrews.

The latter committee is an NIH committee, composed of five physicians nominated by the Medical Board, and four scientists nominated by the Scientific Director.

Dr. Cole Named to Biophysical Journal Editorial Board

Dr. Kenneth S. Cole, Chief of the Laboratory of Biophysics, NINDB, has been elected to the editorial board of the new *Biophysical Journal*, to be published bi-monthly by the Rockefeller Institute Press. The appointment was announced February 24 at the Fourth Annual Meeting of the Biophysical Society in Philadelphia.

Dr. Cole said the journal will attempt primarily to publish the diverse research studies conducted by members of the Biophysical Society. The first issue of the publication will probably appear in September 1960.

One of the founders of the Biophysical Society in 1958, Dr. Cole is now a member of its Council and Executive Board. The Society now includes some 800 members.

TRANSLATION

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the direction of Dr. Samuel S. Herman.

Another phase of the program is the periodic production of a bulletin listing the publications available.

The products of this program are distributed to some 400 libraries throughout the country, including academic and medical research institutions, and Army, Navy, Air Force, Veterans Administration, Atomic Energy Commission, and PHS research institutions.

The material provided by the NIH program now includes:

- Full translations of a number of important Russian monographs on biomedical subjects by Soviet scientists.

- Translations of abstracts appearing in the principal Soviet abstract journals. These constitute what the Russian scientific community regards as the most significant of its current literature.

- Reviews by American scientists of Russian scientific research accomplishments in health-significant fields.

- Periodic information on the availability of translated Russian scientific material.

- Supporting materials, such as a directory of medical and biological institutes in the Soviet Union, a selected list of references on medical research in the U.S.S.R., a description of the structure and functions of the Academy of Medical Sciences in the U.S.S.R., and a Russian-English medical dictionary.



Sixteen Montgomery County women and two from Washington became Red Cross Gray Ladies at the Montgomery County Chapter graduation exercises, held in the 14th floor CC assembly hall February 26. Lt. Gen. Lewis B. Hershey, Chapter Chairman, extended greetings to the class. Also participating in the ceremonies were Dr. Jack Masur, CC Director; Dr. Robert M. Farrier, CC Assistant Director; Dr. Clifton K. Himmelsbach, CC Associate Director; Rev. William R. Andrew and Fr. Francis J. Veith, CC chaplains; Willard Maginnis, Chief, CC Patient Activity Section; and Mrs. Eric Collins, Montgomery County Gray Lady Chairman. The new Gray Ladies will serve as volunteers in the CC and other medical centers in the county, providing personal services for hospitalized patients.