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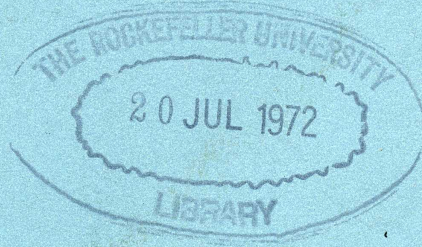
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THE ROCKEFELLER INSTITUTE

Quarterly

SUMMER • 1960



THE ROCKEFELLER INSTITUTE • A GRADUATE UNIVERSITY AND RESEARCH CENTER

THE ROCKEFELLER INSTITUTE

Quarterly

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The cover drawing by Vincent Furno shows the entrance to the hospital of the Rockefeller Institute, a small, but superbly equipped laboratory of human biology in which members of the faculty of the Institute investigate biological problems that can best be carried out in the human organism.

VIRUSES AND RESEARCH ON PLANT DISEASES AT THE INSTITUTE

PHYTOPATHOLOGY, the study of plant diseases, is of obvious economic importance. Moreover it is of direct and immediate concern to human welfare insofar as it bears on diseases of food plants. At a less obvious, though deeper level, plant pathology is of profound significance for the light it sheds on the nature of living organisms in general. In certain instances, the study of diseases of plants has enormously enlarged our understanding of the diseases of man.

No doubt the study of plant viruses that culminated in the demonstration of the crystalline nature of pure tobacco mosaic virus by Wendell M. Stanley at the Rockefeller Institute in 1935 was one of the most spectacular examples of the broad relevance of an apparently narrow inquiry. Today at the Institute, investigations of plant physiology and phytopathology are being carried on that are even now of the widest significance. Dr. Armin Braun's investigations of crown gall and its relevance to the study of human tumors were described in the previous issue, for example. Here work along quite different lines which grew out of the long and distinguished career of the late Dr. L. O. Kunkel will be presented.

A conviction that study of plant diseases might shed light on animal pathology led Simon Flexner and the Institute's Board of Scientific Directors as early as 1926 to consider establishing a Department of Plant Pathology. By 1931 a Laboratory of Plant and Animal Pathology was created at Princeton, New Jersey, under Dr. Carl TenBroeck's general direction with the

late Dr. Louis O. Kunkel as head of the Division of Plant Pathology. It had been planned to investigate all classes of plant disease, but Kunkel's own familiarity with plant viruses (acquired at the Bureau of Plant Industry of the U.S. Department of Agriculture and the Boyce Thompson Institute for Plant Research) led him to emphasize that newest and most active area of plant research. Moreover he chose to concentrate the resources of his able team of investigators on the mosaic diseases, especially tobacco mosaic. It was the study of the tobacco mosaic disease that had led to the discovery at the turn of the century of the concept of filterable viruses as a cause of disease.

ATTACK ON TOBACCO MOSAIC

Kunkel and his co-workers attacked the disease along a broad front. Dr. Francis O. Holmes, a protozoologist who had been with Kunkel at the Boyce Thompson Institute, pursued one line. He had studied certain inclusions in infected plant cells that were suspected of being protozoa, but this he had ruled out. Holmes then developed a technique for measuring the infectivity of viruses by standardized inoculations of plant leaves. He was thus able to show that virus resistance in plants varied greatly and could be developed by crossing, for resistance proved to be heritable. Holmes also found attenuated strains of virus and discovered cases of masked infectivity in which a virus resided in one plant without producing disease, but could produce infections in other plants. These investigations showed that the behavior of

plant viruses was essentially similar to animal and human virus diseases.

Dr. Holmes is continuing his studies of the genetics of virus diseases at the present time, with results of great practical as well as fundamental importance. A few years ago he found a gene in a non-commercial species of tobacco that prevents the spread of the mosaic virus throughout the infected plant. By clever cross-breeding Holmes has been able to introduce this gene into the common tobacco plant in the hope of limiting the spread of infection. He has also managed to incorporate genes for resistance from South American tomato plants into North American cultivated species to protect them from tobacco mosaic and spotted wilt, two virus diseases of importance to commercial tomato production.

In studying the susceptibility of different plants to tobacco mosaic and tobacco etch, Holmes discerned that plants susceptible to the etch virus were also susceptible to the mosaic virus suggesting to him that those viruses are very likely descended from common ancestors. Genetic studies have also led Dr. Holmes to deduce the New World origin of tobacco mosaic virus, for its three chief hosts, tobacco, tomato, and garden pepper, are all New World species, and resistant relatives of these species are more common in the New World than in the old.

CRYSTALLINE VIRUSES

To return to the early work of Kunkel's group at Princeton, there can be little doubt that Wendell M. Stanley's purification and crystallization of the tobacco mosaic virus stands as one of the landmarks of biological research in the twentieth century. Stanley, a young organic chemist who had

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been working at the Institute with Dr. W. J. V. Osterhout in New York, was brought by Kunkel to Princeton in 1932 as the chemist in the group attacking tobacco mosaic virus. Within three years, aided by the virtuosity John H. Northrop and Moses Kunitz had developed in purifying enzymes and other proteins, Stanley had astounded the world by showing that pure tobacco mosaic virus behaved in every imaginable way as a pure crystalline protein. Stanley's achievement raised new questions about the nature of life, for this crystalline molecule, biologically inert in its isolated form and presumably no different essentially from other pure chemicals, behaved in plants as if it were alive.

Soon F. C. Bawden and N. W. Pirie, then at Cambridge University, showed that Stanley's crystalline virus was not a simple protein. Instead, it was a nucleoprotein, i.e., a protein combined with a nucleic acid, ribonucleic acid or RNA,

the chemical nature of which had been partially identified by P. A. Levene at the Institute twenty years before.

In the years since, many plant and animal viruses have been purified and identified chemically as belonging to the class of nucleoproteins. Moreover, closely related complex organic compounds (deoxyribonucleic acid or DNA) are now known to play an essential role in the transmission of hereditary characteristics in all forms of life. The elaboration of this fact by O. T. Avery at the Institute has already been described (*Quarterly*, Vol. 2, No. 1, 1958). The 1946 Nobel Prize in Chemistry, shared by Wendell M. Stanley, John H. Northrop, and James B. Sumner, was recognition not only of their achievements in chemistry but also of the philosophical significance of the isolation of a self-reproducing and potentially mutable agent in crystalline form — a link between living and non-living matter.

In addition to Dr. L. O. Kunkel's very considerable achievement in organizing and directing the work at Princeton, he was able to carry on important research of his own as well. Even before 1932, when he came to the Rockefeller Institute, Dr. Kunkel had contributed significantly to the field of plant pathology.

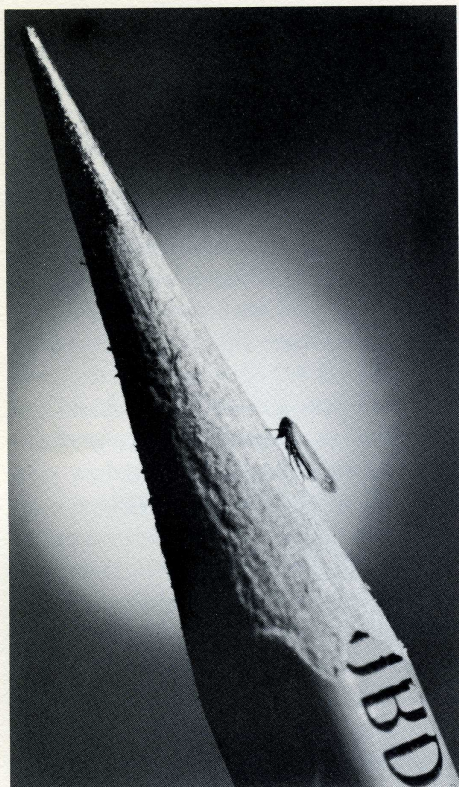
Soon after receiving his Ph.D., Dr. Kunkel's interests in the new field of virus diseases took him to the Bureau of Plant Industry of the Department of Agriculture in Washington. His particular interest then was the peach yellows disease, and through it he met Erwin F. Smith, the first discoverer of a bacterial cause of plant disease and the first to demonstrate the communicability of the peach yellows disease. It was Smith who persuaded Kunkel to go to Hawaii in 1920 where, at the Hawaiian Sugar Planters' Experiment Station, he worked on mosaic disease of sugar cane. In 1923 he returned from Hawaii to become pathologist at the Boyce Thompson Institute for Plant Research at Yonkers. He later told one of his colleagues that had he stayed in Hawaii only a little longer he would have lapsed into a state of tropical somnolence from which he might never have escaped. Dr. Kunkel spent nearly ten years at the Boyce Thompson Institute established in 1922 by Colonel Thompson, a wealthy New Yorker deeply interested in plant diseases. Dr. Kunkel first attacked aster yellows, similar to the peach yellows disease already familiar to him.

Kunkel discovered that the aster yellows disease is carried by a certain tiny gray leafhopper and is caused by one of the few viruses that is equally at home in hosts of the plant and animal worlds. The facts that he established in his study of the relationship between the plants and the leafhoppers have been of great importance. First he observed that during the hot summer months the aster yellows disease diminishes in plants, and he hypothesized that the causative virus is heat-sensitive. Later he proved this to be the case. With discovery of this fact Dr. Kunkel was able to cure infected plants of several virus diseases by growing them at temperatures which destroyed the virus without destroying the plants. Peach yellows, one of Dr. Kunkel's earliest interests, is one of the diseases which responded to heat-treatment. The previous article in this series (*Quarterly*, Vol. 4, No. 1, 1960) noted

The peach yellows virus disease causes branches to grow more vertically than normally with leaves smaller, closely spaced on the stem, and yellowish instead of deep green. The peach branch shown here first grew normally, then underwent a period of abnormal growth after the tree was infected, and finally resumed its normal direction of growth following incubation at a temperature of 95°F for about three weeks. Photograph from one of Dr. L. O. Kunkel's first papers on heat treatment of virus diseases.

Phytopathology, 1936, Vol. 26, No. 9, pp. 809-830.





A number of virus diseases of plants are transmitted by insects. Dr. L. O. Kunkel found the insect vector of the aster yellows disease to be a single species of leafhopper, the tiny *Macrosteles fascifrons* shown above perched on the end of a lead pencil. Photograph by Richard F. Carter.

how this technique was of value to Dr. Armin Braun's proof that the crown gall disease does not involve a virus.

The heat-treatment technique also enabled Dr. Kunkel to deduce that the aster yellows virus multiplies in its leafhopper carrier as well as in the plants it infects. To do this he heat-treated the insects and noted how they regained their infectivity. He concluded that the virus must multiply in the insects, reaching a level of maximum infectivity in about two weeks. Direct evidence for this was found by L. M. Black, who joined Kunkel's group in 1936 on a National Research Council Fellowship. Black, who is now at the University of Illinois, used a technique developed in Africa by the English scientist H. H. Storey to inoculate the minute leafhoppers with measured amounts of the virus. He then ground up the insects and injected their juices into virus-free leafhoppers. Black found that the longer he waited before grinding up the first batch of insects, the more of the second batch became infected with the virus. By passing the virus through successive batches of leafhoppers, diluting

the juices of the ground-up insects at each transfer, he showed in a striking manner that the virus multiplies in the insects. Though the virus present in the original insect had been diluted by nearly a billion billion billion times, the last insects inoculated were as infective as the first.

No technique has yet been found for inoculating the virus directly into the plants. By grafting infected plant tissue onto healthy plants, direct transfer can be effected, but this is very time consuming. Kunkel's group found, however, that a parasitic vine commonly known as dodder can transmit several kinds of viruses directly. With this technique, viruses could be "stored" by transmitting them to host plants which were not killed by the virus. These reservoirs had been of little value previously, because the leafhoppers could not be persuaded to feed on them, thus transmitting the virus. George W. Cochran (now research professor of plant pathology at the Utah State Agricultural College) even mechanized the dodder transfer technique while he was in Dr. Kunkel's laboratory. In 1947 he arranged a machine to wind dodder stems around cylinders covered with alternating leaves of diseased and healthy plants. The parasitic plant soon penetrated the tissues of the leaves it was in contact with and transmitted the virus from the infected plant to the healthy one. The use of dodder for transmitting viruses was discovered almost simultaneously by C. W. Bennett of the Bureau of Plant Industry of the Department of Agriculture at Riverside, California, and by Folke Johnson of Washington State College at Pullman, Washington. Dr. Johnson soon joined Dr. Kunkel at Princeton.

Dr. Kunkel, in his work on the transmission of yellows viruses, discovered two related strains of aster yellows virus, each of which will protect plants against infection by the other, a phenomenon known as cross protection. He also found cross protection between the viruses in the leafhoppers as well. Dr. Karl Maramorosch, who began work at the Institute with Dr. Kunkel, has continued his studies of plant viruses in Dr. Armin Braun's laboratory. In 1958 he was awarded the AAAS-Campbell Award for his confirmation of the complex relationships existing between two strains of the corn stunt virus and the leafhopper that transmits them from plant to plant. Of the two strains of the virus,

plants infected by one are protected against infection by the other, but the second will not protect a plant against the first. Similarly, infection of a leafhopper by the first will prevent it from subsequently becoming infected with and transmitting the second. In the insect, also, the second virus strain will not protect against the first. These findings regarding corn stunt virus confirmed Kunkel's discovery that two related strains of aster yellows virus would protect leafhoppers against each other, but Dr. Maramorosch was the first to find unilateral protection.

Maramorosch has also found that a leafhopper that normally feeds on corn can live on aster plants only if the asters are infected with the aster yellows virus. After they feed on diseased asters, the corn leafhoppers are then able to survive on uninfected aster plants. Moreover they are also then able to survive on healthy carrot plants, which they could not do before their diet of diseased asters. It would appear that the virus infection thus may actually benefit the insect by widening its potential food plants. The explanation of these phenomena is not yet clear, but Dr. Maramorosch is pursuing the problem, and with Dr. Virginia Littau, a cytologist in Dr. Armin Braun's laboratory, he has been studying changes in individual plant and insect cells caused by various virus infections.

With these paragraphs we have brought to the present an account of research in plant pathology that has spanned the overlapping careers of distinguished men of three generations. The field of plant pathology was only beginning to take shape in 1854 when Erwin Smith was born. He labored to advance it almost to his last days. Like him, Dr. Kunkel remained active until the end, foregoing an opportunity to retire in 1947, when the Institute's Princeton Laboratories were closed.

Dr. Kunkel is not alone among those at the Institute whose devotion to research made them forego retirement: Eugene Opie, who at 86 is in his laboratory every day; Peyton Rous, who carries the chief burden of the *Journal of Experimental Medicine* as well as his laboratory work; and Herbert Gasser, who retired from administration of the Institute to become active again in his laboratory. Such men inspire younger colleagues today to hope that their own devotion will sustain them as long.

DEGREE OF DOCTOR OF PHILOSOPHY CONFERRED ON NINE AT CONVOCATION

NINE GRADUATE FELLOWS received the degree of Doctor of Philosophy at a Convocation for Conferring Degrees at the Rockefeller Institute on June 10th. On the night before the Convocation a Ball for the students was given under the full moon, and following the presentation of degrees the Trustees were hosts to the Convocation at a reception on the lawn and a luncheon in Abby Aldrich Rockefeller Hall.

In his opening remarks at the Convocation Ceremony, which was held in the auditorium of Caspary Hall, President Bronk said: "Commencements are a blend of ancient customs and modern functions; they are of many varied patterns. We chose to dedicate this day to recognition of a few who have achieved a high degree of excellence in their studies and to only these. No one will speak at length of his concern or tell of his proposals for a better world as is so often done on these occasions. We will

resist temptation to tell of our needs and boast of our achievements. The achievements to be mentioned are those of you our graduands.

Accordingly, the academic achievements of each candidate for a degree were described by one of nine members of the faculty before the graduand was hooded: John J. Cebra was presented by Merrill W. Chase; Gerald M. Edelman by Henry G. Kunkel; Chandler M. Fulton by Norton D. Zinder; Irving H. Goldberg by Fritz A. Lipmann; Johns W. Hopkins III by Vincent G. Allfrey; Sanford A. Lacks by Rolin D. Hotchkiss; Stephen I. Morse by James G. Hirsch; Malcolm L. Peterson by Edward H. Ahrens, Jr.; and Martin A. Rizack by Vincent P. Dole.

The degree of Doctor of Science, *honoris causa*, was conferred on Alfred Newton Richards, Emeritus Professor of Pharmacology and sometime Vice President for Medical Affairs in the University of Penn-

sylvania. Few at the Institute had known that Dr. Richards received his first academic appointment fifty-nine years ago as scholar of the Rockefeller Institute upon graduating from Columbia University.

In closing, President Bronk spoke of being reminded that "at our first Convocation a year ago we had the rich privilege of conferring our degree upon John D. Rockefeller, Jr. That was uniquely appropriate as our expression of high regard for a great, good friend who was associated with the Institute and its objectives for more than 50 years. As a young graduate of Brown University, he was partner with his father in the dreams and visions from which our Institute evolved. From its inception he was a Member, then President, of the Board of Trustees which breathed life and spirit into this great institution. . . . During the beautiful and moving service of memorial which was held this week there was quoted from Ecclesiastes: 'His name shall live unto all generations.' . . . We have a richly privileged opportunity and duty to make the Institute, which bears his name, worthy of his noble spirit unto all generations."



President Bronk and Mr. Rockefeller, Chairman of the Board of Trustees, with recipients of degrees. Left to right: John J. Cebra, Chandler M. Fulton, Martin A. Rizack, Malcolm L. Peterson, David Rockefeller, Stephen I. Morse, Alfred N. Richards, Emeritus Professor of Pharmacology in the University of Pennsylvania, Detlev W. Bronk, Johns W. Hopkins III, Gerald M. Edelman, Irving H. Goldberg, and Sanford A. Lacks.

The Trustees

VINCENT DU VIGNEAUD

PURSUIT OF AN ever-branching trail of research in biological chemistry wherever it led has characterized nearly the entire career of Professor Vincent du Vigneaud, head of the Department of Biochemistry at Cornell Medical College and Trustee of the Institute since 1949. As an undergraduate at the University of Illinois he took biochemistry in 1921 from H. B. Lewis who communicated to him his own deep interest in sulfur compounds. Thirty-three years later Dr. du Vigneaud was to describe his research career under the title "A Trail of Sulfur Research" in a lecture accepting the 1955 Nobel Prize for Chemistry.

In addition to Lewis's influence, Professor W. C. Rose stirred du Vigneaud mightily with a lecture in 1923 at Illinois describing Banting and Best's exciting discovery of insulin. Another important influence was undergraduate and graduate research in organic chemistry with C. S. Marvel, which developed in du Vigneaud a strong interest in the relationship of chemical structure to biological activity.

The particular route of this trail—involving biochemicals of great human concern, such as insulin—may have been determined in part by chance, but certainly Dr. du Vigneaud's warm interest in his fellow men and the humor and vitality of his outlook must have played their own important parts. These qualities can be discerned in his scientific writings even by those who have not met him. He uses words too seldom seen in such prose: "intriguing," "surprising," "startling," "pleasant," often in that sequence, suggesting curiosity rewarded by satisfying new understanding. He is also acutely aware that every man's research is inextricably bound up with the ideas and endeavors of others. Thus he thinks and writes in terms of "we," not "I," and in his Nobel lecture he said "I have had the pleasure of following this trail of research in the company of a group of graduate students and post doctoral associates, without whose loyal and effective collaboration this trail...could not have been worked out."

The "trail of sulfur research" began in

1925. Professor J. R. Murlin, the noted physiologist, invited du Vigneaud to join his department in that year and to work on the chemistry of insulin at the newly-opened University of Rochester Medical School. Dr. du Vigneaud's research quickly led him to conclude that insulin was probably a derivative of the sulfur-bearing amino-acid, cystine; it was not until 1938, however, after more than ten years of research, that he was able to report with confidence that all of the sulfur in insulin is



contained in cystine. During that decade du Vigneaud obtained his Ph.D. at Rochester (1927) and did graduate research as an NRC fellow under J. J. Abel in the Department of Pharmacology at the Johns Hopkins Medical School and with Max Bergmann at the Kaiser Wilhelm Institute in Dresden, George Barger at the University of Edinburgh Medical School, and Charles R. Harrington at the University College Hospital Medical School in London. He returned to the University of Illinois on the staff in physiological chemistry under W. C. Rose. In 1932 he became Head of the Department of Biochemistry at the George Washington University School of Medicine, a remarkable achievement for a man only five years after receiving his Ph.D. In 1938, at the age of 37, Dr. du Vigneaud was invited to Cornell University Medical College as Professor and Head of the Department of Biochemistry, the position he holds today.

Dr. du Vigneaud's work on insulin aroused his interest in two other protein or protein-like hormones of the posterior

pituitary gland: oxytocin, the uterine-contracting hormone, and vasopressin, an anti-diuretic. Studies with partially purified samples of these hormones indicated sulfur was present as the amino-acid, cystine; accordingly, Dr. du Vigneaud undertook to isolate the pure hormones for further study, but he was interrupted by World War II.

Soon after the war, aided by the counter-current distribution technique for purification of organic compounds developed by Lyman Craig at the Rockefeller Institute and the column chromatography technique of Moore and Stein, also at the Institute, du Vigneaud and his group soon showed that oxytocin and vasopressin each consist of ammonia and eight amino-acids, six of which are common to both. Eventually du Vigneaud and his group succeeded in the prodigious task not only of determining the structure of both of the hormones, but of completely synthesizing oxytocin, the first polypeptide to be synthesized. These achievements, together with his other contributions on biochemically important sulfur compounds, resulted in Dr. du Vigneaud's receiving the Nobel Prize in 1955. Subsequently vasopressin was synthesized in both forms in which it occurs naturally, and du Vigneaud and his co-workers are now embarked on the study of the interrelation of the structure of oxytocin and the vasopressins to their biological activities.

Other of Dr. du Vigneaud's achievements must be mentioned even more briefly. He contributed much to our understanding of the metabolism of sulfur-containing compounds, establishing the concept of trans-sulfuration. His pioneer work led to the realization of the interrelationship of methylated nitrogen and sulfur-containing compounds within the animal body and established the concept of trans-methylation. He and his colleagues also worked out the structure of biotin, one of the B-complex vitamins, which they showed to be identical with the so-called vitamin H. During the war he made important contributions to the synthesis of penicillin and studies of mustard gases.

Only a few of Dr. du Vigneaud's many honors can be mentioned: notably, the Nichols Medal of the New York section of the American Chemical Society in 1945, the first Borden Award in Medical Re-

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search by the Association of American Medical Colleges in 1947, the Lasker Award from the American Public Health Association in 1948, the Osborne and Mendel Award of the American Institute of Nutrition in 1953, the John Scott Award from the City of Philadelphia in 1954, the Willard Gibbs Medal of the Chicago Section of the American Chemical Society in 1956 and, in 1959, the Alumni Achievement Award of the University of Illinois. Since 1944 du Vigneaud has been a member of the National Academy of Sciences and the American Philosophical Society. He has also been elected an Honorary Member or Fellow by the Chemical Society of London, the Royal Institute of Chemistry (London), the Royal Society of Edinburgh, and the Royal Society of Sciences of Uppsala.

Honored for his research, Dr. du Vigneaud also takes great pleasure and pride in his lifetime as a teacher. His background—organic chemistry, physiology, pharmacology, clinical biochemistry, and pre-medical biochemistry—has fitted him eminently for the teaching of medical students as well as graduate and post-doctoral students. His students have grown in number, and among the younger ones, even before he was fifty, were students of his students.

Mrs. du Vigneaud was an English major at the University of Illinois who, at du Vigneaud's urging, took Marvel's course in organic chemistry. He denies that it was a condition of their marriage in 1925, but it must have been of great satisfaction to her in the years afterwards to be able to share her husband's excitement in his scientific work. In college, while working on his Master's degree, he taught cavalry tactics and equitation as a reserve officer. He communicated his pleasure in riding to his wife, and they still enjoy it today at their summer home in the Berkshires near Sheffield, Massachusetts.

The du Vigneauds have two children, both of whom are pursuing careers in medicine. Their son, Vincent, Jr., M.D., is Assistant Resident in Obstetrics and Gynecology at the Columbia Presbyterian Medical Center. Their daughter, Marilyn Renée Brown, finished three years at the Cornell Medical College, was married in July, and will continue her medical training at the University of Rochester School of Medicine and Dentistry.

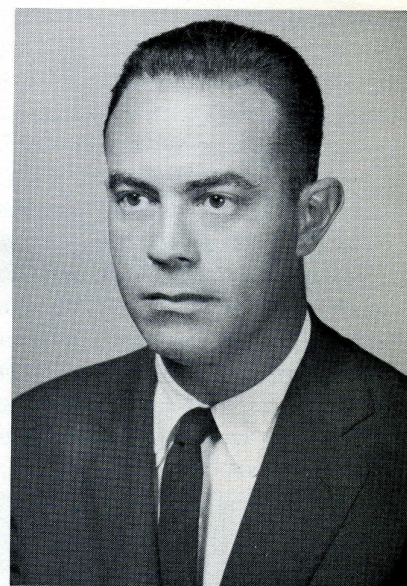
TWO PROMOTED TO PROFESSOR AND FOUR TO ASSOCIATE PROFESSOR

FOUR MEMBERS of the faculty have been promoted to Associate Professor: Vernon B. Brooks, a physiologist formerly at McGill University and the Australian National University, who has been at the Institute since 1956; Clarence M. Connelly, a biophysicist formerly on the faculties of Cornell University and The Johns Hopkins University, who has been at the Institute since 1954; Jules Hirsch, who joined the faculty of the Institute in 1954 after having interned in pathology and medicine at Duke Hospital and having been on the faculty of the School of Medicine of the State University of New York; and James S. Murphy, who came to the faculty of the Institute in 1951 from The Johns Hopkins Hospital, where he had been intern and then fellow in medicine.



EDWARD H. AHRENS, JR., promoted to Professor, has been Associate Professor since 1955. Dr. Ahrens, who was born in Chicago, Illinois, received his B.S. and M.D. degrees from Harvard University. He interned at Babies Hospital, Columbia Presbyterian Medical Center, and was Chief Resident there in 1951-52. Having come to the Institute in 1946 to study the biochemistry of the liver, Dr. Ahrens became interested in fat absorption in liver disease, and fat metabolism has been his dominant interest ever since. Dr. Ahrens is a member of the Association of Ameri-

can Physicians, the American Society for Clinical Investigation, the American Society of Biological Chemistry, the American Institute of Nutrition, the Society for Pediatric Research, the International Conference of Biochemical Problems of Lipids, and Chairman of the Metabolism Study Section of the U.S. Public Health Service.



JAMES G. HIRSCH, promoted to Professor, has been Associate Professor since 1956. Born in St. Louis, Missouri, he received the B.S. degree from Yale University and the M.D. degree from Columbia University. Dr. Hirsch was intern and assistant resident in internal medicine at Barnes Hospital in St. Louis. He has been on the faculty of the Institute since 1950. Dr. Hirsch's research has centered largely on study of the factors which determine the production of infectious diseases. He and his colleagues have made detailed studies of phagocytic cells and mechanisms by which engulfed bacteria are destroyed within leucocytes. Recently his interests have concerned sarcoidosis, a disease of unknown cause which resembles tuberculosis in some of its manifestations. Dr. Hirsch is a member of the Harvey Society, the Society of American Bacteriologists, the American Academy of Microbiology, the Society for Experimental Biology and Medicine, and the American Society for Clinical Investigation.

MISCELLANY

Graduate Fellows Plan and Teach Summer Course in Biology

Though the Rockefeller Institute is an exclusively graduate university, the opportunity to learn by teaching is available to those of its graduate students who participate in the summer course in biology for high school students.

At the same time high school students who attend the course have the remarkable opportunity of working and studying in the atmosphere and with the facilities of a great teaching and research center.

The course this summer is the second which the graduate students have planned and are teaching to a group of graduating high school students from the New York metropolitan area. This year thirty-one students, picked by their schools for their interest in biological science, attended the course. Classes were held for six weeks, beginning July 5th. Nearly two months before, on May 11th, students were given a preview of the program and invited to begin their reading then, with the privilege of using the Institute's library.

Financial support for the program both

last summer and this, provided by the Carnegie Corporation, has made it possible to give a scholarship to each of the high school students. Thus, while they were preparing themselves for college in the Fall they did not lose the income from summer employment on which many students depend.

Portrait of President Bronk Unveiled at Pennsylvania

A portrait of President Detlev W. Bronk was unveiled this Spring at a ceremony commemorating the 30th anniversary of the Eldridge Reeves Johnson Foundation of the University of Pennsylvania. The occasion was marked by the American Philosophical Society at a special session of its annual meeting on the morning of April 23rd. Dr. Bronk addressed the session on "Scientific Research as an Individual Adventure," and Dr. Britton Chance, who succeeded Dr. Bronk as Director of the Johnson Foundation, spoke on "Biology at the Molecular Level."

Dr. Bronk was the Foundation's director for 20 years from its beginning until 1949. The portrait, painted by John C. Johansen, will hang in the library of the Johnson Foundation's new laboratories, located, appropriately, in the Medical Research Building dedicated to Dr. Bronk's much admired friend, Alfred Newton Richards, Emeritus Professor of Pharmacology and sometime Vice President for Medical Affairs in the University of Pennsylvania.

The Alfred Newton Richards Medical Research Building was dedicated on May 19th at ceremonies at which Dr. Richard E. Shope of the Institute was one of the principal speakers.

Opie and Dubos Honored by Awards

Dr. Eugene L. Opie, Affiliate of the Institute and former Member, was awarded the coveted gold-headed cane of the American Association of Pathologists and Bacteriologists on April 28, 1960. The award,

announced during the 49th Annual Meeting of the Association, is made to a physician who "represents the highest ideals in pathology and medicine."

Dr. René J. Dubos was one of six honored by the Robert Koch Foundation in Berlin this Spring, for tuberculosis research, by award of a medal commemorating the fiftieth anniversary of Koch's death.

Faculty Members Elected to National Academy of Sciences

Professors Armin C. J. Braun, Stanford Moore, and William H. Stein were honored by election to membership in the National Academy of Sciences at its Annual Meeting in Washington, D. C., on April 26th. Their election brings to 37 the number of Institute Faculty and Trustees whose contributions to science have been thus recognized.

VIIIth International Anatomical Congress Meets at Institute

A symposium on fine structure arranged by Dr. Keith Porter was held in Caspary Auditorium on April 14th in conjunction with the Seventh International Anatomical Congress, which met in New York during the week of April 11th. A reception in Welch Hall followed the symposium.

FIFTY YEARS AGO AT THE ROCKEFELLER INSTITUTE

Experimental Cell Biology Introduced

The appointment of Jacques Loeb as a Member of the Institute on July 1, 1910, marked the introduction of experimental biology of the cell—what is now called general physiology—into medical research in the United States. During the negotiations leading to his appointment, Loeb had written to Dr. Flexner "The question is whether the R. I. wishes to add a department of experimental biology on a physico-chemical basis. I do not think that the medical schools are ready for the new departure. The only place in America where such a new departure could be made for the cause of medicine would be the Rockefeller Institute or an institution with similar tendencies."

JOHN DAVISON ROCKEFELLER, JR. 1874 • 1960

In deep respect for Mr. John D. Rockefeller, Jr., and with high regard for his devoted service to mankind, the Rockefeller Institute was closed during a Memorial Service for him held in Riverside Church on the afternoon of June third. Mr. Rockefeller was associated with his father in the formulation of plans for the creation of the Rockefeller Institute beginning in 1897. He was a member of the Board of Trustees for forty-four years and President of the Corporation for twenty-one years.

FACULTY ACTIVITIES

Academic Honors

DETLEV W. BRONK

Sc.D., The University of the State of New York

RENÉ J. DUBOS

D.Sc., Dartmouth College

Academic Appointments

MAURICE S. FOX

Instructor in Bacterial Genetics, Biological Laboratory, Cold Spring Harbor.

NORTON D. ZINDER

Lecturer on Genetic Recombination, Biological Laboratory, Cold Spring Harbor.

Lectures, Conferences and Symposia

EDWARD H. AHRENS, JR.

Henry Jackson Lecture, New England Cardiovascular Society.

ALEXANDER G. BEARN

Participant, Panel on Medical Genetics, 41st Annual Meeting of the American College of Physicians.

CARL BERKLEY

Lecture on Medical Electronics, Westchester IRE Sub-Section.
Lecture, Scientific Staff Meeting of the Rolling Hill Hospital and Diagnostic Center, Elkins Park, Pennsylvania.

ARMIN C. BRAUN

Lecture, Fourth Conference on Cancer Research, National Cancer Institute of Canada, Honey Harbour, Ontario.
Lecture, International Symposium on Growth: Molecule, Cell and Organism, Purdue University.

DETLEV W. BRONK

Louis H. Bauer Lecture, 31st Annual Meeting of the Aerospace Medical Association, Miami.

Panel chairman, Symposium on Food Additives at the Super Market Institute, Atlantic City.

Address at Exercises Marking the 30th Anniversary of the Eldridge Reeves Johnson Foundation, Annual Meeting, American Philosophical Society, Philadelphia.

VERNON B. BROOKS

Invited discussant, 85th Annual Meeting of the American Neurological Association, Boston.

MERRILL W. CHASE

Chairman of Subcommittee on Biophysical and Biochemical Separation of Allergens of Ragweed Pollen, NIAID Committee on Standardization of Allergens, Caspary Hall.

Invited paper, International Conference on Sarcoidosis, National Academy of Sciences—National Research Council, Washington.

GEORGE W. CORNER

President, 7th International Anatomical Congress, New York.
Participant, Seminar on Human Twins, Princeton, New Jersey.

LYMAN C. CRAIG

Lecture on Biochemical Regulators, NBC-TV Continental Classroom.

Lecture, American Cancer Society Biochemistry Symposia, Cleveland.

ARPAD CSAPO

Address, Macy Foundation Conference on the Physiology of Prematurity, Princeton, New Jersey.

Lecture, Albert Einstein College of Medicine, New York.

Lecture, Harvard Conference on the Mechanism of Action of Steroid Hormones, Endicott House, Massachusetts.

RENÉ J. DUBOS

Dedication Address, New Hampshire State University Biological Building, Durham.

Commencement Address, Cornell Medical School.

HUGH FUDENBERG

Member, International Reference Committee on Hereditary Human Gamma Globulin Groups, Rouen, France.

Participant, Cold Spring Harbor Symposium on Structure of Gamma Globulin.

Guest Lecture, Peter Bent Brigham Hospital, Boston.

SAM GRANICK

Chairman and participant, meeting on Erythrocytes and Porphyrins of the Biochemistry Section, Federation Meetings, Chicago.

JAMES G. HIRSCH

Participant, International Conference on Sarcoidosis, National Academy of Sciences—National Research Council, Washington.

FRANCIS O. HOLMES

Participant, Plant Science Seminar of the Campbell Soup Company Symposium on Resistance to Disease in Tomato, Hadonfield, New Jersey.

Lecture, Plant Virology Class, Rutgers University.

ROLLIN D. HOTCHKISS

Invited paper, Symposium on Biochemical Genetics, American Society of Biological Chemists, Chicago.

BERNARD JEANRENAUD

Lecture, Albert Einstein College of Medicine, New York City.

Lecture, Brookhaven National Laboratory, Upton, New York.

DANIEL E. KOSHLAND

Lecture, Delaware Section, American Chemical Society, Wilmington.

Chairman, Symposium on Protein Structure and Function, Brookhaven National Laboratory, Upton, New York.

FRITZ A. LIPMANN

Chairman and Organizer, Symposium on Biological Genetics, Federation Meetings, Chicago.

DAVID P. C. LLOYD

Lectures at University of Utah Medical School, Stanford University, University of Oregon School of Medicine, and University of Washington School of Medicine.

Lecture, International Symposium on Nervous Inhibition, Friday Harbor, Washington.

KARL MARAMOROSCH

Diliman Lecture of the National Research Council of the Philippines, University of the Philippines.

Participant, Coconut Research Conference, Tiaong, Laguna, The Philippines.

DAN H. MOORE

Seminar, Sloan-Kettering Institute.

Participant, Canadian Cancer Conference, The National Cancer Institute of Canada.

HANS J. MÜLLER-EBERHARD

Participant, Symposium on Complement, 60th Annual Meeting of the Society of American Bacteriologists, Philadelphia.

EUGENE L. OPIE

Participant, Symposium on the Pancreas, Endicott House, Massachusetts Institute of Technology.

GEORGE E. PALADE

Participant, Gordon Research Conference on Cell Structure and Metabolism, Meriden, New Hampshire.

S. WILLIAM PELLETIER

Lectures as an American-Swiss Foundation Fellow at the Chemisches Institut der Universität, Zurich, at the Organisch-chemisches Anstalt der Universität, Bern, at the Institut für Organische Chemie der Universität, Bern, and at l'École de Chimie de l'Université, Geneva.

Lectures at the Istituto di Chimica Generale del Politecnico di Milano, Istituto Superiore di Sanità, Rome, Imperial College of Science and Technology of the University of London, and at the National Institute for Medical Research, London.

KEITH R. PORTER

Participant, Symposium on Structure of the Eye, 7th International Anatomical Congress, New York.

Chairman, Symposium on Cell Fine Structure, Annual Meeting of the Tissue Culture Association, Chicago.

Lecture, Tissue Culture Course, University of Wisconsin.

Lecture, Yale University.

WILLIAM J. RAY, JR.

Participant, Symposium on Protein Structure and Function, Brookhaven National Laboratory.

HOWARD A. SCHNEIDER

Invited panelist, New York Academy of Sciences Conference on Culture, Society and Health.

ROBERT L. SCHOENFELD

Participant, Symposium on Educational Frontiers in Bio-Medical Engineering, University of Vermont, Burlington.

RICHARD E. SHOPE

Address, Dedication Ceremonies for the Alfred Newton Richards Medical Research Building, University of Pennsylvania.

PHILIP SIEKEVITZ

Speaker, Annual Meeting of Metabolic Discussion Group of the American Physiological Society, Chicago.

LOUIS E. SILTZBACH

Participant, International Symposium on Sarcoidosis, National Academy of Sciences—National Research Council, Washington.

Participant, Sarcoidosis Panel, American College of Chest Physicians, Miami Beach.

DAVID E. SMITH

Lecture, Meeting of the Society for Experimental Biology, Nottingham, England.

WILLIAM H. STEIN

Invited speaker, Symposium on Protein Structure and Function, Brookhaven National Laboratory.

NORMAN SUTIN

Lecture, Brooklyn Polytechnic Institute.

EDWARD L. TATUM

Lecture, Eastern Colleges Science Conference, Hunter College.

WILLIAM TRAGER

Member of Panel, Fourth U. S. Public Health Service Conference on Research Needs in Tropical Medicine, New Orleans.

Lecture, Scarsdale Chapter, Society of the Sigma Xi.

PAUL A. WEISS

Participant, Symposium on Nonmilitary Defense, 137th National Meeting of the American Chemical Society, Cleveland.

Inaugural address, Society of Sigma Xi Installation Ceremony, Marquette University, Milwaukee.

Seminar on Wound Healing, Ethicon, Inc., Somerville, N. J.

Participant, International Symposium on Neurochemistry, Varenna, Italy.

Other Appointments and Distinctions

ARMIN C. BRAUN

Member of the Advisory Board, Institute for Cancer Research.

DETLEV W. BRONK

Centennial Medal, New York Medical College.

Member, Board of Directors of the New York World's Fair 1964-1965 Corporation.

Chairman, Chemicals Panel of the President's Science Advisory Committee.

Councillor, University Club of New York.

RENÉ J. DUBOS

Robert Koch Medal of the Robert Koch Foundation, Bonn.

Passano Foundation Award for 1960.

Member, Executive Committee of the New York City Health Research Council.

Trustee, Trudeau Foundation.

ROLLIN D. HOTCHKISS

Member, Panel Committee on Genetic Biology, National Science Foundation.

Member, Scientific Advisory Committee, Institute for Cancer Research.

DANIEL E. KOSHLAND

Member of Editorial Board, *Journal of Biological Chemistry*.

EUGENE L. OPIE

Award of the Gold Headed Cane of the American Association of Pathologists and Bacteriologists.

VLADIMIR K. ZWORYKIN

Commander in the Order of Merit of the Italian Republic, conferred by the President of the Republic of Italy.

Society Elections

ALEXANDER G. BEARN

Secretary, Harvey Society.

ARMIN C. BRAUN

Member, National Academy of Sciences.

Member of the Advisory Council, Society for the Study of Development and Growth.

GEORGE W. CORNER

Honorary Member, Mexican Anatomical Society.

RENÉ J. DUBOS

Fellow, American Academy of Arts and Sciences.

FRITZ A. LIPMANN

President, American Society of Biological Chemists.

KARL MARAMOROSCH

Chairman, Scarsdale Chapter, Society of the Sigma Xi.

STANFORD MOORE

Member, National Academy of Sciences.

Fellow, American Academy of Arts and Sciences.

PHILIP SIEKEVITZ

Member, Harvey Society.

WILLIAM H. STEIN

Chairman, Editorial Committee, American Society of Biological Chemists.

Member, National Academy of Sciences.

Fellow, American Academy of Arts and Sciences.

EDWARD L. TATUM

Member, Board of Directors, Long Island Biological Association.

WILLIAM TRAGER

Chairman, International Meeting Committee, Society of Protozoologists.

DR. EMIL C. GOTSCHLICH, a former Intern at Bellevue Hospital, has been made a Guest Investigator in the laboratory of Drs. McCarty and Lancefield.

DR. JAMES T. HAMLIN III, former Instructor in Medicine at New York Medical College, will be a Guest Investigator in Dr. Dole's laboratory.

DR. JACQUES LIPETZ, who was formerly at Queens College and the New York Botanical Gardens, is working as a Guest Investigator in Dr. Braun's laboratory.

DR. MICHAEL LOCKE, from the University College of the West Indies, Kingston, has been appointed a Guest Investigator for the summer to work with Dr. David Smith in Dr. Porter's laboratory.

DR. GEORGE MIROFF, formerly with the Department of Biochemistry, University of North Dakota School of Medicine, has been appointed a Research Associate to work with Dr. Dan Moore in Dr. Porter's laboratory.

DR. YOSHIHISA MIZUNO, Professor of Pharmacy, Hokkaido University, is currently a Research Associate in the laboratory of Dr. Lorente de Nó.

DR. JANE H. MORSE, until now a Guest Investigator in Dr. Kunkel's laboratory, has been made a Research Associate.

DR. STEPHEN I. MORSE, who graduated in June from the Institute, has been appointed Assistant Professor in Dr. Dubos's laboratory.

DR. KURT F. M. OETTE, formerly of the Institute for Physiological Chemistry, University of Cologne, has been appointed a Research Associate in Dr. Ahrens's laboratory.

DR. C. KIRK OSTERLAND, formerly Chief Medical Resident at Winnipeg General Hospital and Teaching Fellow at the University of Manitoba, is now a Guest Investigator in Dr. Kunkel's laboratory.

DR. MIROSLAV D. POULIK, a Research Associate at the Child Research Center, Detroit, is a Guest Investigator in Dr. Bearn's laboratory.

DR. MARTIN A. RIZACK, a graduate of the Institute in June, has been made Assistant Professor and will work with Dr. Dole.

DR. IRWIN W. SHERMAN, from Northwestern University, where he was a Research Assistant, will be a Guest Investigator in Dr. Trager's laboratory.

DR. MALLORY STEPHENS, former Fellow in Medicine at Albert Einstein College of Medicine, will be a Guest Investigator in Dr. Dubos's laboratory.

DR. ELLIOT S. VESELL, who interned at Massachusetts General Hospital, has been appointed a Research Associate in Dr. Bearn's laboratory.

DR. COURTNEY T. WEMYSS, JR., Associate Professor of Biology, Hofstra College, was appointed Research Associate to work in Dr. Tatum's laboratory during July and August.

DR. CURTIS A. WILLIAMS, JR., who has been a Guest Investigator with Dr. Dubos, has been appointed Assistant Professor in Dr. Tatum's laboratory.

DR. JOHN B. ZABRISKIE, formerly Resident in Pediatrics, Babies Hospital, New York, has been appointed a Research Associate in the laboratory of Dr. McCarty and Dr. Lancefield.

INSTITUTE MENTION

New Appointments to the Faculty

DR. EDWIN L. BIERMAN, formerly Assistant Resident in Medicine at New York Hospital, has been appointed Assistant Professor in Dr. Dole's laboratory.

DR. J. MARION BRYANT, Associate Professor and Chief Cardiologist, New York University-Bellevue Medical Center, has been appointed a Guest Investigator to work with Dr. Bearn.

DR. GERALD M. EDELMAN, a graduate of the Institute in June, has been appointed Assistant Professor in Dr. Sutin's laboratory and Assistant Dean of Graduate Studies.

DR. STUART D. ELLIOTT, on leave from his post at the University of Cambridge, has returned to work as a Guest Investigator with Dr. Lancefield until the end of October.

MISS AUDREY H. EVANS, formerly Supervisor of Media and Glassware Service at the Institute, has been appointed a Guest Investigator in Dr. Hotchkiss's laboratory for the summer months.

Faculty Promotions

- DR. EDWARD H. AHRENS, JR., formerly an Associate Professor in Biochemistry and Metabolism, has been made a Member and Professor.
- DR. VERNON B. BROOKS, formerly an Assistant Professor in Dr. Lloyd's laboratory, has been appointed an Associate Professor.
- DR. PURNELL W. CHOPPIN, formerly a Research Associate in Dr. Tatum's laboratory, has been appointed Assistant Professor.
- DR. CLARENCE M. CONNELLY, formerly an Assistant Professor in the laboratory of Drs. Brink and Bronk, has been appointed an Associate Professor.
- DR. ARTHUR M. CRESTFIELD, formerly a Research Associate in the laboratory of Drs. Moore and Stein, has been appointed an Assistant Professor.
- DR. JAMES G. HIRSCH, formerly an Associate Professor in Dr. Dubos's laboratory, has been made a Member and Professor.
- DR. JULES HIRSCH, formerly an Assistant Professor in Dr. Ahrens's laboratory, has been appointed an Associate Professor.
- DR. WILLIAM P. HURLBUT, formerly a Research Associate in the laboratory of Drs. Brink and Bronk, has been appointed an Assistant Professor.
- DR. WILLIAM H. KONIGSBERG, formerly a Research Associate in Dr. Craig's laboratory, has been appointed an Assistant Professor.
- DR. JAMES S. MURPHY, formerly an Assistant Professor in Dr. Tamm's laboratory, has been appointed an Associate Professor.
- DR. ULRICH NÄF, formerly a Research Associate in Dr. Braun's laboratory, has been appointed an Assistant Professor.
- DR. MURIEL ROGER, formerly a Research Associate in Dr. Hotchkiss's laboratory, has been appointed an Assistant Professor.
- DR. MURRAY D. ROSENBERG, formerly a Research Associate in Dr. Weiss's laboratory, has been appointed an Assistant Professor.
- DR. MARIA A. RUDZINSKA, formerly a Research Associate in Dr. Trager's laboratory, has been appointed an Assistant Professor.

Newly Appointed Graduate Fellows

- HARRY SPANGLER ALWINE, JR., The College of William and Mary.
- STEPHEN OTIS ATHERTON, Pomona College.
- JOHN EDWARD BELLIS, Colorado College.
- RICHARD CHARLES BLINKOFF, Hamilton College.
- MERRILL BURR, Cornell University.
- PAUL THEODORE ENGLUND, Hamilton College.
- JOSEPH ANTHONY GALLY, Pomona College.
- LORNA GREEN, McGill University.

JAMES DOUGLAS JAMIESON, The University of British Columbia.

GORDON DAVID LANGE, California Institute of Technology.

BERNARD MACH, Classical College of Geneva and University of Geneva Medical School.

LEWIS KARL NADING, Oberlin College.

DONALD EDWARD OLINS, The University of Rochester.

MICHAEL ABRAM RUTTENBERG, Massachusetts Institute of Technology.

THOMAS WALTER SCHLEICH, Cornell University.

GEORGE JOHN SPYRIDES, Dartmouth College.

CHARLES FRANKLIN STEVENS, Harvard University and Yale University School of Medicine.

Departures from the Faculty

- DR. HANS G. BOMAN, who was a Research Associate in Dr. Lipmann's laboratory, resigned at the end of April to accept an appointment at the Institute of Biochemistry, University of Uppsala.
- DR. SZE-CHUH CHENG, who has been a Research Associate in the laboratory of Drs. Brink and Bronk, left the Institute at the end of June to join the Department of Pharmacology at the Psychiatric Institute of New York State.
- DR. HAROLD F. DEUTSCH, a recent Guest Investigator in Dr. Stanford Moore's laboratory, is spending six months at the Max-Planck-Institut für Biochemie, Munich, before returning to his post at the University of Wisconsin Medical School.
- DR. RENATA DIRINGER, a former Research Associate in Dr. Perlmann's laboratory, left the Institute the first of July to accept a postdoctoral fellowship at New York University College of Medicine in the Department of Microbiology.
- DR. JOHN W. ENSINCK, a Guest Investigator in Dr. Archibald's laboratory, left the Institute at the end of June to enter the Department of Medicine at the University of Washington School of Medicine, Seattle.
- DR. JOHN H. FRENSTER, a former Guest Investigator in Dr. Mirsky's laboratory, left in June and is now at the Army Chemical Center, Edgewood, Maryland.
- DR. HALSTED R. HOLMAN, who has been Assistant Professor in Dr. Kunkel's laboratory, has resigned to become Professor and Head of the Department of Medicine, Stanford University School of Medicine.
- DR. HAROLD J. HUMM, the 1959-1960 Jacques Loeb Associate in Marine Biology, has returned to the Department of Botany, Duke University.
- DR. BERNARD JEANRENAUD, a former Guest Investigator in Dr. Dole's laboratory, left the Institute on July 1 for the Geneva University Hospital, Switzerland, where he is Assistant in the Medical Department.
- DR. HIROSI A. KURIYAMA, who has been a Guest Investigator in the laboratory of Dr. Corner, has gone to Oxford University to work in the Department of Pharmacology.
- DR. BENJAMIN LOWENHAUPT, a former Research Associate in Dr. Corner's laboratory, has gone to the Department of Biochemistry at University College, Dublin.

- DR. GEORGE B. MACKANESS, a Guest Investigator in Dr. Dubos's laboratory, returned at the end of May to Australia.
- DR. HIROSHI MATSUSHITA, a Research Associate in Goebel's laboratory, returned on the first of May to the Department of Physiology, Wakayama Medical School, Japan.
- DR. LEE D. PEACHEY, a Research Associate in Dr. Porter's laboratory, left the Institute at the end of June to take up an appointment as Assistant Professor in the Department of Zoology, Columbia University.
- DR. ELLIOTT B. ROBBINS, a Guest Investigator in Dr. Weiss's laboratory, left the Rockefeller Institute for Albert Einstein College of Medicine, where he will be Senior Post-doctoral Fellow.
- DR. PEDRO N. RUDOMIN, who has been in Dr. Lloyd's laboratory as a Guest Investigator, left the Institute in June to return to the Instituto Nacional de Cardiologia, Mexico City.
- DR. ERNESTO SCOFFONE, until May a Guest Investigator in the laboratory of Drs. Moore and Stein, has gone to the Department of Chemistry at the University of Indiana.
- DR. NOBORU TAKAHASHI, a Guest Investigator in Dr. Porter's laboratory, left the Institute at the end of June to join the Pathology Department at University of Washington School of Medicine.

Visiting Professors in Residence

- DR. LUDWIG EDELSTEIN, Professor of Humanistic Studies, The Johns Hopkins University, April 13 and May 9-19, 1960.
- DR. RAGNAR GRANIT, Professor of Neurophysiology, Karolinska Institute, and Director of the Nobel Institute, May 20-29, 1960.
- DR. A. MONNIER, Professor of Psychophysiology, University of Paris at the Sorbonne, May 9-24, 1960.

New Grants and Contracts

From the United States Public Health Service:

- To Mr. Edmundson, for continuation of his work on the determination of the amino acid sequence of myoglobin \$3,860
- For isolation and identification of the mammary tumor agent, to Dr. Miroff \$25,875
- For Dr. Dan Moore's study of viruses and cancer literature and information sources \$9,665
- To Dr. Porter for publication of a supplement to the *Journal of Biophysical and Biochemical Cytology* \$5,000

From the National Science Foundation:

- To Dr. Hotchkiss for study of deoxyribonucleates having genetic transforming activity \$49,500
- For Dr. Edward Murphy's work on electrical conduction in hydrogen-bonded substances \$10,000
- For immunochemical and chemical analysis of the effects of gene mutation on proteins of *Neurospora crassa*, to Dr. Tatum and Dr. Curtis Williams \$65,200
- For study by Dr. Weiss of physical influences in the self regulation of development \$6,000

From the National Foundation:

- For investigation by Dr. Bearn of certain congenital and inherited metabolic disorders in man, by the combined use of biochemical and tissue-culture techniques \$129,393
- For work on the multiplication and inhibition of human viruses by Dr. Tamm \$134,029

From the American Cancer Society to Dr. Weiss for experimental analyses of cellular interactions in growth and differentiation \$14,250

From the Health Research Council of the City of New York for Dr. Rasmussen's study of the mechanism of action of peptide hormones \$118,842

From the Muscular Dystrophy Associations of America to Dr. Brooks for his investigation of the limiting factors of transmitter release at the neuromuscular junction \$7,074

From the New York Society of Electron Microscopists to provide secretarial assistance for Dr. Dan Moore \$3,200