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NEWS AND NOTES 1979, VOL.10, NO.10

The Rockefeller University

THE ROCKEFELLER UNIVERSITY

news and notes

JULY 1979 VOLUME 10 NUMBER 10

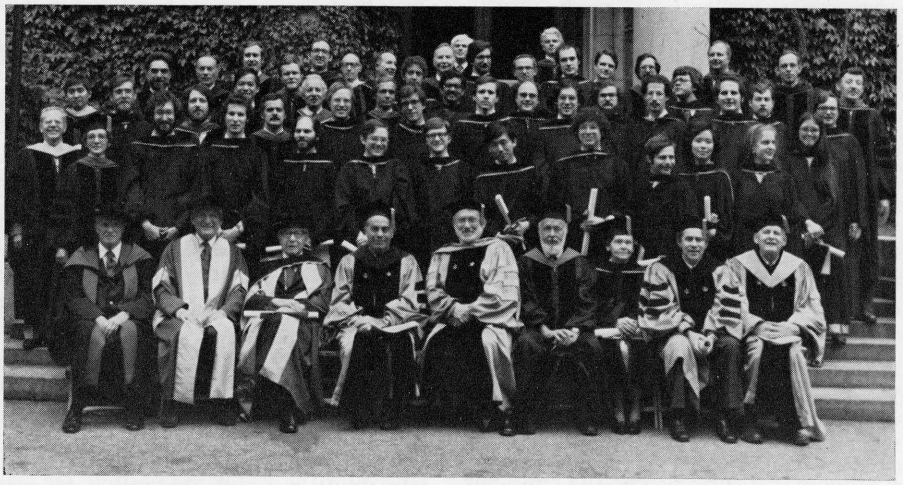
THE PRESIDENT'S COLUMN

On June 6, I performed for the first time what must surely be one of the most pleasurable of presidential duties as I handed the doctor of philosophy degree to the members of this year's graduating class. It happens that this year also marks the 25th anniversary of the inauguration of the graduate degree program. The University now has a grand total of 358 graduates.

The Ph.D. program was conceived on the principle that doctoral candidates who have already demonstrated in their academic careers a love of research and a high degree of self-direction should function as laboratory colleagues rather than as "students"; that the lab should be the primary "classroom." The evidence indicates that the principle is sound. Of 325 alumni surveyed last year at this time, 76 were full professors or the equivalent, 85 were associate professors, 84 were assistant professors, and most of the rest were in some form of postdoctoral or medical training. Ninety-five percent were engaged in full-time research and teaching. Two of our alumni, David Baltimore at MIT and Gerald Edelman of our own faculty, are Nobel laureates. A few years ago a survey evaluating graduates in biomedical sciences from 128 institutions ranked Rockefeller alumni at the top. This is a record of which the University can be proud.

On another note, I am happy to report that good friends beyond the campus continue to confirm their enthusiasm for the work of this institution. The most recent example, announced in this issue of *news and notes*, is a grant of $2 million to the University from the Charles Engelhard Foundation. I extend the warm thanks of this community to the members of the Engelhard family—Mrs. Charles Engelhard and Mrs. Annette Reed, a trustee of the foundation and of the University—for this superb expression of support.

Joshua Lederberg



Convocation, June 6. Front row, seated, left to right, Carl Pfaffmann, Norman F. Ramsey, I. I. Rabi, James G. Hirsch, President Lederberg, Patrick E. Haggerty, Barbara McClintock, Norton Zinder, and Maclyn McCarty. Standing behind them on the steps of Founders Hall are the Ph.D. degree recipients and their presenters.

28 Receive Ph.D.s at 21st Convocation

Twenty-eight young men and women—the University's largest graduating class—received the Ph.D. degree on Wednesday afternoon, June 6, at the 21st annual convocation.

The University also bestowed honorary doctor of science degrees on Barbara McClintock of the Carnegie Institution of Washington at Cold Spring Harbor, New York, whose work has anticipated some important developments in modern genetics, I. I. Rabi, Nobel Prize-winning Columbia University physicist and leader in world efforts toward peaceful uses of atomic energy, and Professor Paul A. Weiss, developmental biologist and member of the Rockefeller faculty for 25 years, who helped lay the foundation for understanding of the inner workings of nerve cells.

The degrees were presented by Joshua Lederberg, presiding over his first Rockefeller commencement since becoming president last July 1. Dr. Weiss, who was unable to attend because of ill health, was awarded his degree *in absentia*.

Ceremonies were held in Caspary Auditorium. Among those in the academic procession were Patrick E. Haggerty, chairman of the University's board of trustees and David Rockefeller, chairman of the board's executive committee and former board chairman. As is the University's custom, the proceedings were limited to talks by presenters who explained the significance of the degree recipients' work.

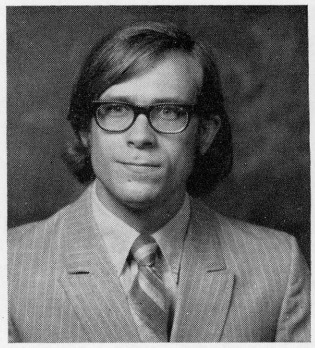
Through half a century of experimentation and analysis, working mostly

continued on page 2

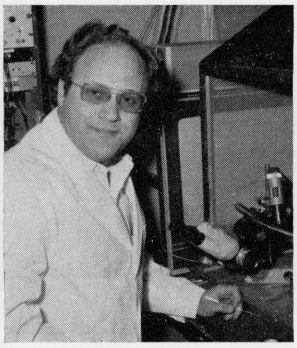
Engelhard Foundation Pledges $2 Million

The University has received a pledge of $2 million from the Charles Engelhard Foundation, a family foundation with special interest in supporting educational and cultural institutions.

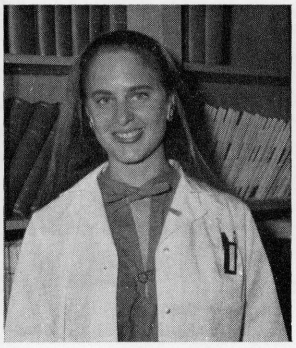
The grant, payable over several years, will be applied to the University's endowment, with special emphasis on the support of programs in parasitology and tropical disease research.



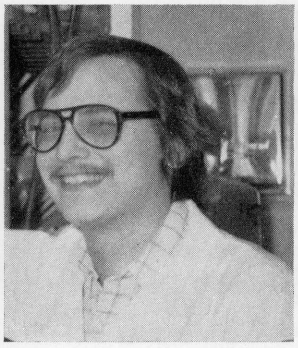
ALTOM



BRODIE



GOTTLIEB



HEMPERLY

HURLEY

TWENTY-FIRST CONVOCATION

continued from page 1

with the chromosomes of corn, Barbara McClintock showed conclusively that genes were on chromosomes. She helped to prove that chromosomes were not "static entities acting only as vehicles for keeping track of genes during cell division," but that "chromosomes recombine, they break, they transpose, and they exchange genetic elements," in the words of her presenter, Professor Norton D. Zinder.

Dr. McClintock has been with the Carnegie Institution since 1942 and has been Distinguished Service Member there since 1967. She was Andrew D. White Professor-at-Large at Cornell University from 1965 to 1974. Among her many honors she has received the National Medal of Science and the Kimber Genetics Medal of the National Academy of Sciences.

Isidor Isaac Rabi has been associated with Columbia University—where he now holds the post of University Professor Emeritus—since 1927 and has been credited with the creation at Columbia of one of the world's most illustrious physics departments. His research on the magnetic properties of atomic nuclei won him the Nobel Prize in 1944. He played key roles during World War II in the development of radar and atomic energy.

Dr. Rabi has been an advisor to the United Nations and NATO, a member of the President's Science Advisory Committee, consultant at large to the President, and advisor to the Atomic Energy Commission. He organized the first International Conference on the Peaceful Uses of Atomic Energy. He was a major figure in the establishment of Brookhaven National Laboratory, the International Atomic Energy Agency, and CERN (the European Organization for Nuclear Research). He was a visiting professor at Rockefeller from 1957 to 1959.

Among his many awards, he holds the U.S. Medal of Merit, Britain's King's Medal, the Priestly Memorial Award, the Niels Bohr International Gold Medal, and over 20 honorary degrees. He was presented by Rockefeller Trustee Norman F. Ramsey, Higgins Professor of Physics at Harvard University.

Paul A. Weiss, a graduate of the University of Vienna, served as assistant director of the Biological Research Institute of the Austrian Academy of Sciences. He studied subsequently at a number of major European research centers as a Rockefeller Foundation Travelling Fellow before going to Yale University as a Sterling Fellow. He was associated with the University of Chicago from 1933 to 1954 when he joined The Rockefeller. In 1964, he established the graduate school of biomedical sciences at the University of Texas in Houston and was University Professor and dean there while retaining his appointment at Rockefeller.

Dr. Weiss' work has ranged from basic problems of growth, differentiation, regeneration, and submicroscopic organization of tissues to the development and function of the nervous system. He succeeded in grafting fully developed amphibian limbs with restoration of functioning and developed mechanisms for nerve repair. A technique of sutureless splicing developed during World War II gained him citations from the War and Navy departments. His work resulted in the first tissue bank for surgical use. He discovered axoplasmic flow, the unceasing flow of materials within each individual nerve arising from its cell body, essential for normal function, growth, and regeneration of nerve cells. He has received many honors, including the Wakeman Award for Research in the Neurosciences and the Lashley Award. Dr. Weiss was presented by Professor Carl Pfaffmann.

* * *

Following are condensations of the remarks made by the presenters at the convocation. The degree recipients' names appear first.

MARK W. ALTOM

William K. Estes

Among the graduate fellows in our behavioral science program during the past 10 years, Mark Altom has come exceptionally close to realizing our model of a broadly trained behavioral scientist. He came here from Miami University, Ohio, in 1973 with a sufficiently strong background in experimental psychology that he could well afford to devote himself wholeheartedly to acquiring knowledge and expertise in a variety of related areas. This he did, with substantial work not only in experimental and mathematical psychology but also in psycholinguistics, the biology of communication, animal learning, ethology, the ontology of behavior, cognitive development, and mathematics. He has given scientific papers at meetings on topics as diverse as the development of young children's ability to use spatial and temporal information in recall and mathematical models of certain aspects of the adult's short-term memory scanning. His thesis research has isolated two constituent processes basic to human long-term memory for relative frequencies of events.

LARRY D. ALTSTIEL

Frank R. Landsberger

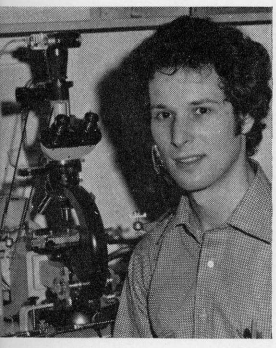
The nature of the interaction between the cell surface and a virus is of central importance in the infectious process. The initial step in virus penetration of a cell involves the attachment of the virus particle to a receptor in the membrane which forms the cell surface. Larry Altstiel investigated this event from a variety of viewpoints using strategies derived not only from virology but also from physical chemistry and organic chemistry. He showed that attachment of vesicular stomatitis virus to the cell surface causes an interesting structural change in the cell membrane. This structural change appears to involve microtubules which form a skeleton-like network on the inside of the cell. Larry also showed that the electrical forces, which in principal might prevent a virus particle and a cell surface from interacting, are in fact screened by ions under naturally occurring conditions. Furthermore, Larry found that the attachment of virus particles to the cell membrane is positively cooperative, making it easier for each subsequent

particle to attach. These studies correlating the biological and physical parameters have given significant new perspectives on the initial steps in virus infection.

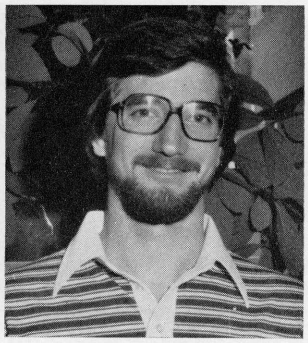
SCOTT E. BRODIE

Bruce W. Knight, Jr.

Scott Brodie's thesis research explores how the cells of an entire nervous organ collaborate to process information. He contributes a first in neurophysiology. While biology thrives on the reduction of life's processes to ever simpler components, we cannot claim understanding until we conceptually reassemble these basic bits and predict living activity in the large. Scott succeeded in that challenge. His material was the eye of the horseshoe crab, the one neural organ whose component cells are well enough understood to have permitted his undertaking. He began with a quantitative grasp of the subcellular mechanisms through which a single visual neuron's activity is deeply modified by its thousand neighbor cells' past histories. The electrical response of single neurons was recorded while a computer stimulated the entire eye with carefully chosen fluctuating visual displays. From the results, he quantified each particular eye's set of neuronal mechanisms which enabled him, in one profound algebraic step, to state how stimuli in general should transform into sensory response in the large. He then predicted with great precision each eye's response to more natural, moving stimuli. His results detail how nerve cells interact to suppress unimportant information but amplify key features of motion and contour. In an abnormal eye, his procedure predicted the sensory deficit and uniquely identified its subcellular cause. Scott's work gives challenge that like success may be achieved with analogous neural systems of higher creatures, including ourselves.

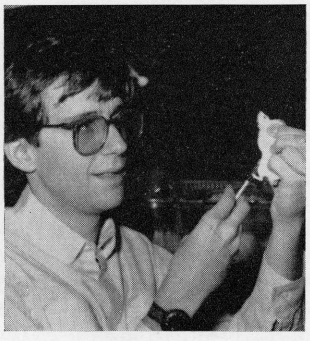


KORF

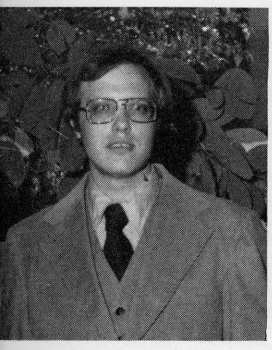


MANOGUE

MERZ



MESHNICK



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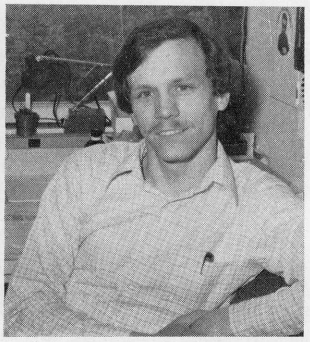


PELUSO

MILTON J. FRIEDMAN

William Trager

Malaria has affected human evolution. Where this disease is highly endemic, as in West Africa and Southeast Asia, there exists a high proportion of genetic abnormalities of the red blood cells. These abnormalities are thought to confer a relative resistance to fatal malaria in children, so that the selective pressure of malaria maintains them. The gene for sickle hemoglobin provides the best example. Even though this gene in the homozygous condition produces a fatal anemia, in the heterozygotes it confers so great an advantage against malaria that the gene occurs in up to 25% of the population of some parts of West Africa. How sickle hemoglobin does this, the cellular and molecular basis for this and for the effects of other red cell variants, has now been revealed through the work of Milton Friedman. He came to our laboratory when we had just found how to grow human malaria parasites in culture. He took full advantage of this and applied it to problems that combine his dual interests in the broad evolutionary aspects of parasitism and in its cellular and molecular mechanisms.

LARRY R. GERACE

Günther Blobel

Larry Gerace came to Rockefeller University in 1973 after he had received a bachelor of arts degree from The Johns Hopkins University. For his graduate work he focused on the nuclear envelope and associated structures. He defined biochemically a novel cellular polymer—the nuclear envelope lamina—that is associated with the inner nuclear envelope membrane. He found that this structure is common to all higher eukaryotic cells and showed that it undergoes reversible disassembly during mitosis.

ALICE BENDIX GOTTLIEB

Henry G. Kunkel

Alice Gottlieb entered the Ph.D. program after gaining a strong background in the basic sciences at Brandeis University. This continued here and gradually evolved into studies of some of the basic problems of immunology. Experience gained in two different laboratories solidified her status as a first-rate immunologist. This early period was noteworthy for the development of several important new immunological techniques. There also occurred a gradual transition in her primary interest. The problems of disease began to assume a dominant place. This led to her transfer into the M.D.-Ph.D. program, not an easy task with the deans of two universities involved. Her thesis work centered on the disease systemic lupus erythematosus, an arthritic disorder with many unique circulating antibodies. Studies of the lymphocytes of patients with this disease, utilizing the sophisticated methodologies she had learned as well as developed, brought out striking defects in the regulatory properties of these cells, which help explain the presence of the unusual antibodies.

JOHN J. HEMPERLY

Bruce A. Cunningham

Plant proteins called lectins bind to the sugar molecules on the surfaces of animal cells. This binding can clump the cells together, alter the receptors on the cell, change the state of the cell, or even stimulate it to divide. To understand how these proteins act, John Hemperly carried out a series of studies on the lectins concanavalin A (Con A), from jack beans, and favin, from fava beans. He prepared a derivative of Con A with a single binding site for sugar rather than the usual four. He showed that this derivative differed from normal Con A in many properties but that both molecules stimulated cell division and to the same extent. This is an important observation because it says that binding at a single site can trigger cell division. John next synthesized a sugar that had chemically active groups attached to it. He used this sugar to chemically label the binding site of Con A with a radioactive tag and was able to show, at least tentatively, that the sugar binding site in solution is the same as that found in crystalline Con A. This provides valuable data about Con A and also opens the way for locating the binding sites in other lectins. Finally, John was instrumental in determining the complete chemical structure of the lectin favin. Up to this time Con A was the only lectin whose structure was known. He showed that favin and Con A are closely related in evolution and provided a very surprising finding: the end of the favin molecule looks like the beginning of the Con A molecule. This is the first time such a circular permutation has been seen in proteins and suggests intriguing genetic mechanisms may operate in these plants.

JOHN N. HURLEY

Shu Man Fu

John Hurley came to The Rockefeller University as a biomedical fellow in our M.D.-Ph.D. program after a year of graduate

studies in the Department of Chemistry at Caltech. His research here has centered on the viral transformation of human lymphocytes utilizing the Epstein Barr virus. A series of continuously growing long-term cell lines were obtained from patients with chronic lymphocytic leukemia, the primary malignant disorder of the lymphocyte. By the use of idiotypic determinants as a leukemia specific marker, he demonstrated that some of these cell lines were derived from the leukemic cells. These leukemic cell lines represent first examples of continuously growing lines from patients with this particular disease and are proving a valuable tool for the study of these malignant cells. Furthermore, chromosomal abnormalities were identified in these lines as well as in the circulating leukemic cells in one of these patients. Thus, chronic lymphocytic leukemia has been added to a growing list of leukemias associated with chromosomal abnormalities. He also participated in the development of a series of lymphoblastoid lines from patients with various immunodeficiencies. These lines will undoubtedly help to clarify the pathogenesis of these diseases.

BRUCE R. KORF

Elaine G. Diacumakos

It has been hypothesized that chromosomes in mammalian cells form a continuous circle of genetic material as in many microorganisms. M.D.-Ph.D. Fellow Bruce Korf disproved this hypothesis. He chose as a model system the cells of the male Indian deer which have only seven chromosomes. Using microneedles and pipettes, he was able to remove intact all of the chromosomes from dividing cells. The chromosomes encircled a small, dense network. After many chromosome extractions and cytochemical tests, he was able to distinguish the types of connections he saw—from the chromosomes to the network, which is the mitotic spindle, and from chromosome-to-chromosome. The latter connections were artifacts. Bruce showed that it was possible to remove chromosomes microsurgically, without chemical pretreatment, to obtain chromosomes without artifacts. He demonstrated that the chromosomes encircling the spindle were in random order with no preferential chromosome association, an important insight into chromosome structure. Scanning electron microscopy of microsurgically isolated chromosomes reveals the surface to consist of looping fibers. Treatment of chromosomes with DNase results in complete dissolution of the chromosome arms leaving only the centromere regions; proteolytic treatment decreases the distinctness of the arms but does not cause their dissolution. Bruce stained the chromosomes with histone antisera and using indirect immunofluorescence showed that histones H1 and H2B lie more or less uniformly along the lengths of the chromosomes. He has shown that microsurgically isolated chromosomes are useful for studies of chromosome structure and three dimensional arrangement in the cell.

THEODORE S. LAWRENCE

Norton B. Gilula

Ted Lawrence entered the M.D.-Ph.D. program after receiving a bachelor's degree from Cornell University. He arrived on campus with a defined interest in neurobiology and cardiology. Within a short time he migrated to our laboratory through his interest in studying heart cell physiology in cell cultures. During the first year he perfected his expertise in handling and recording electrically from these single cells in culture while he received an exposure to the problem of communication between cells. After a brief intermission for marriage, he returned to consider the possibility of developing a "hokey" co-culture approach for studying the role of cell communication in transmitting hormonal stimulation between cells. Together with Bill Beers, we had the pleasant experience of successfully designing an appropriate co-culture system for this purpose. The "hokey" system was comprised of heart cells linked to ovarian granulosa cells. Ted pursued this project intensively for two years and the progress that he made has been outstanding. Not only has he succeeded in demonstrating that hormonal stimulation can be "communicated" between the two cell types, but he has also created an opportunity to identify the precise "signal" or molecule that may be responsible for this transmission.

VISHWANATH R. LINGAPPA

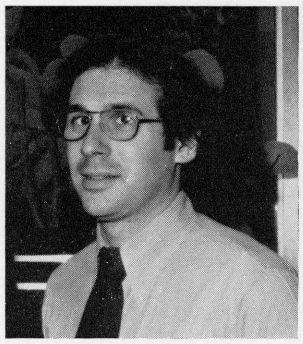
Günther Blobel

Vishwanath R. Lingappa, after graduation in 1975 with a bachelor of arts degree from Swarthmore College, enrolled as a medical student at Cornell Medical College. Parallel to his medical studies he embarked on several research projects in my laboratory. In 1977 he became an official Ph.D. student of The Rockefeller University. His graduate work focused on the mechanisms by which specific proteins either cross or integrate into distinct cellular membranes. Among the most significant of his numerous contributions is his work on how proteins integrate into membranes and his most recent demonstration that one of the secretory proteins (ovalbumin) contains an uncleaved "internal" (rather than amino terminal) signal sequence.

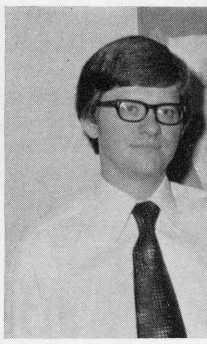
CECILIA WEN-YA LO

Norton B. Gilula

Cecilia Lo came to this University after completing the undergraduate program at M.I.T. in cell and molecular biology. She was initially interested in studying the biology of aging. After a couple of years she focused on a closely related topic—development and differentiation. At that time Cecilia married Rocky Tuan, a fellow graduate student. She developed a number of cell biological skills that she applied effectively to her research project. Cecilia



POMERANTZ



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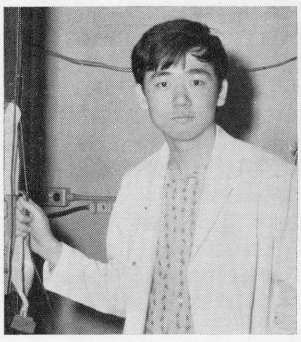

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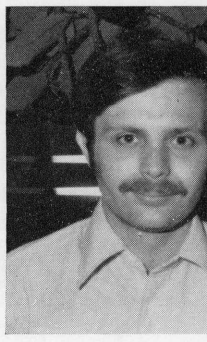

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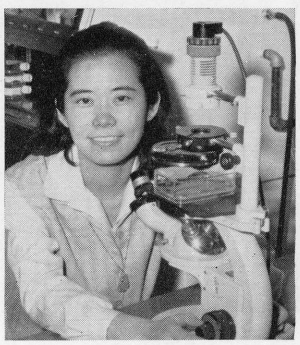

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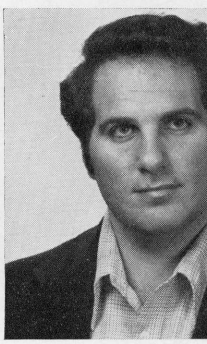


YARMUSI

applied her unusual skills and energy to study communication between cells in two closely related biological systems—embryos and a mouse teratocarcinoma. She integrated cell culture, physiological, cytological, and biochemical approaches to define the pattern of communication that exists in both systems, and to define the "differentiation" properties of the teratocarcinoma system. The results on the mouse embryo are the first to define the onset of communication between the embryonic cells and subsequently an apparent "compartmentalization" of communication during later embryonic stages when differentiation of various cells occurs. The results of her effort can now be used to try and "reconstitute" an embryo in culture that contains both embryonic and teratocarcinoma cells.

KIRK R. MANOGUE

Donald W. Pfaff

Nerve cells in the hypothalamus control the pituitary gland and several kinds of behavior. The anatomical routes by which

they control the pituitary are well known, but those by which they control behavioral responses are not. Kirk Manogue took as his thesis problem the analysis of which axon trajectories from the medial hypothalamus control female reproductive behavior. Kirk came to my lab with an interest in the study of naturally occurring behavior patterns and with a good instinct for observations of animal behavior in the field. For his thesis work he wanted the close experimental controls possible in laboratory studies of behavior and to use anatomical or physiological methods of analysis. Under Dr. Lee-Ming Kow's and my direction, Kirk used female rats in a series of experiments where he transacted selectively particular groups of nerve axons as they left the hypothalamus heading for the midbrain. In all animals he measured the effects of interrupting these axons on reproductive behavior responses and other parameters. He concluded that between two groups of axons leaving the ventromedial nucleus of the hypothalamus—those following a medial trajectory and those running laterally—the presence of one group can largely make up for the experimental interruption of the other. However, where losses of reproductive behavior occurred, they were quantitatively much larger after interruption of the laterally running axons exiting the hypothalamus.

KARL S. MATLIN

Nam-Hai Chua

One of the most important organelles in plants is the chloroplast, which is responsible for the conversion of solar energy into chemical energy. It is well established that chloroplasts are capable of protein synthesis but little is known concerning the number and nature of the proteins that are synthesized. Using the unicellular green alga *Chlamydomonas reinhardtii* as a model system, Karl Matlin found that at least 31 chloroplast polypeptides are made in the organelle. These chloroplast products include 3 soluble proteins, 4 ribosomal proteins, and 21 integral and peripheral thylakoid membrane polypeptides. The integral membrane polypeptides synthesized in the chloroplast include the apoproteins of the chlorophyll *a*-protein complexes; the most abundant peripheral proteins are three subunits of the chloroplast ATPase. In an attempt to define the biosynthetic pathways followed by chloroplast synthesized polypeptides, Karl Matlin translated poly A-deficient RNA in a wheat germ cell-free system. He identified a major product as the large subunit of ribulose bisphosphate carboxylase and another as the integral membrane protein, D1. These in vivo and in vitro studies on products of chloroplast protein synthesis provide an important foundation for future work on chloroplast biogenesis.

DAVID C. MERZ

Andreas Scheid

When David Merz joined this University his interest in nature had manifested itself in his admiration for living things, his accomplishments as a lepidopterist, and his success in immunological research as an undergraduate at the University of Minnesota. This broad perspective—keeping one eye on the unexplained phenomena, the other on the scrutiny of molecules—has also marked David's academic maturation at this University. When he joined us, we had just learned that certain viruses related to mumps and measles contain two proteins that allow the virus to gain access to a cell. David studied this process with specific antibodies and established the contribution of each protein in the infectious process: one protein provides the attachment of the virus to the cell; the other the transfer of the viral genetic material to the cell by means of fusion between the viral and the cell membranes. He discovered that antibodies against both viral proteins are needed to prevent the spread of infection in the laboratory host and to protect animals or man from infection. This led him to an explanation for a variety of puzzling diseases, such as atypical measles, that occur in people who have received certain inactivated vaccines. These individuals did have the neutralizing antibodies against the virus attachment protein but still became ill. David now has explained this: these people lack the antibody against the other protein, the membrane fusion protein, so that virus can spread by cell fusion and cause disease. David's work has shed light on the function of several virus proteins and the pathogenesis of these viral diseases. In addition, it has important implications for the design and production of improved vaccines.

STEVEN R. MESHNICK

Anthony Cerami

Six years ago, Steve Meshnick walked into our laboratory and suggested that we take on as a new project to design a new drug to treat African trypanosomiasis. The African trypanosome is an organism carried by the tsetse fly which in man causes the dreaded sleeping sickness and in domestic animals causes nagana, a disease which precludes the growing of cattle and other domestic animals in vast areas of Africa. Steve had never worked in the area of parasitic diseases and neither had we. In addition, the project was an especially difficult one for a graduate student to undertake since most drugs today are discovered by randomly screening large numbers of compounds. Steve was not fazed. He convinced us to take him on and his project soon developed into a learning experience for all of us. Looking closely at the life cycle of the organism, he was able to define a biochemical difference between the host and the parasite which could be exploited to kill the trypanosomes. Briefly, this discovery was that the organism produces hydrogen peroxide, a waste product, which it cannot dispose of. Although stable under many conditions, it can be triggered to react with an explosive force which will literally blow up the trypanosome. Steve was able to find several compounds which could act as such triggers, kill the organisms, and cure the infection in animals. One of these compounds is currently under evaluation in cattle in Africa. A significant amount of work in the area of parasitic diseases continues in our laboratory today as a result of Steve's zealotry.

DAVID L. NOREEN

William K. Estes

During his five years at Rockefeller, David Noreen made excellent use of the University's resources to develop the combined laboratory and mathematical skills needed to contribute to research and theory on human decision making. He came to Rockefeller from the University of Michigan where he received his B.A. with high honors in 1973, with additional recognition in the form of the Walter B. Pillsbury Award for the most distinguished undergraduate dissertation in psychology. Now, just at the completion of his training here, David is already widely recognized as one of the investigators with deepest understanding of the family of mathematical models that has been developed over the past decade for the purpose of analyzing the way an observer's sensory capacities and bias arising from preconceptions or habits interact to limit performance in discriminative situations of the type that arise in medical diagnosis. David has joined the technical staff of the Bell Laboratories where he will continue to follow up his interests in models of human decision making and has begun also to look more broadly at relationships between these and models of decision making in economics and other social sciences.

RICHARD W. PELUSO

Robert A. Lamb

Richard Peluso came here from the University of Maryland and tackled a difficult virus research problem which had eluded others—the mechanism of synthesis of the proteins of the parainfluenza virus SV5. He achieved success early and was able to examine the rates of synthesis of the viral proteins and identify a then unrecognized precursor to the viral protein responsible for cell fusion. He also found evidence for the existence of a virus-coded protein which was not a component of the virus particle. While this work was in progress Richard repeatedly observed the appearance of four other proteins in SV5-infected cells which he thought were unlikely to be products of the viral genes but more likely to be host cell proteins whose synthesis was stimulated by viral infection. He was intrigued by this phenomenon and found that the same proteins were also synthesized in cells infected with another parainfluenza virus, Sendai virus. After careful examination of the literature and detailed experimentation, he pursued his educated speculation which proved to be correct. Identical host cell proteins were found to be increased in cells transformed with RNA tumor viruses or in cells deprived of

glucose. These proteins are probably involved in glucose transport and the results of Richard's experiments led to the hypothesis that these polypeptides are induced in parainfluenza virus infected cells in order to maintain the cells' sugar transport at a normal rate during virus production. Thus, Richard's work has demonstrated a general phenomenon in cell behavior in which cell membrane proteins involved with sugar metabolism are stimulated by infection with parainfluenza viruses, as well as by malignant transformation by tumor viruses.

ARTHUR H. POMERANTZ

Vincent G. Allfrey

Arthur Pomerantz arrived from Yale University in 1974 and immediately began work on the biochemical mechanism of protein phosphorylation, a problem of basic importance in understanding gene activity because the phosphorylation of nuclear proteins modulates chromosome structure and function. A key enzyme involved in the transfer of phosphate groups to proteins was purified and analyzed with regard to its mode of action and requirements for recognition of its protein substrates. A number of synthetic peptides, prepared under the guidance of Dr. R. B. Merrifield, were shown to be effective substrates, while other peptides acted as inhibitors. With pure enzyme and pure substrates, Arthur then established that the reaction mechanism involves the formation of a ternary complex containing enzyme, substrate, and ATP. This fact opens the way to the design of "transition-state" analogues which can be used to inhibit the enzyme and observe the consequences for nuclear function. The wide range of research skills required for the solution of this problem was acquired with apparent ease while Arthur simultaneously prepared for the M.D. degree.

ALAN D. PROIA

Donald J. McNamara

Cholesterol metabolism has been of great scientific interest due to its involvement in the human diseases of atherosclerosis and gallstone formation. Alan Proia's career as a graduate fellow started when a new surgical procedure, portacaval anastomosis, was being promoted as an effective approach in the treatment of the most severe forms of hypercholesterolemia. As a biomedical fellow, Alan's curiosity in medical and biochemical questions stimulated his investigations of the metabolic consequences of portacaval anastomosis on cholesterol and drug metabolism in the rat. Alan's studies have validated the usefulness of a new animal model for the investigation of physiological and metabolic alterations induced by this surgical procedure. He has clearly documented that portacaval anastomosis results in decreased plasma cholesterol levels and in decreased hepatic cholesterol synthesis and drug metabolism. The model system employed demonstrated that this procedure accomplishes its benefits by reducing deposition of cholesterol into body tissues, resulting in a decrease of the body content of cholesterol. Alan's findings have raised many new questions and suggested new directions to the study of the usefulness and metabolic consequences of the treatment of severe hypercholesterolemia in man by this surgical procedure.

CARL W. RETTENMIER

Hidesaburo Hanafusa

So-called "endogenous" viral genes, which are homologous to known leukemia viruses, have been shown to exist widely in normal cells of many animal species. Since many endogenous viruses are harmless to their hosts, recombinants between these viruses and viruses known to be leukemogenic to the host are useful in any attempt to determine which portion of the viral genome is crucial for the viral leukemogenicity. Carl Rettenmier chose to investigate these recombinants utilizing various techniques for analysis of protein structures. He quickly discovered differences between endogenous virus and leukemia virus in their protein structures, and exploited these differences as genetic markers to identify the recombinants. Carl extended his skill to the analysis of the structure of intermediates in the process of proteolytic cleavage from a polyprotein precursor to individual viral structural proteins, and successfully constructed a genetic map for the individual proteins. The map of one of the major chicken endogenous viruses showed a significant deletion in this region of the genome, which explains why this endogenous virus is abortive in forming virus particles.

SAMUEL M. SILVER

Purnell W. Choppin

Thanks to an effective vaccine, measles is not a major problem in the U.S. today. However, in many developing countries, measles is a health problem of great importance, with a high incidence in young children, and a high death rate, particularly in the malnourished. Measles also provides a prime example of an increasingly apparent problem, persistent virus infection leading to chronic disease. Measles virus causes a chronic, fatal neurological disease, subacute sclerosing panencephalitis (SSPE), which may occur years after ordinary measles. It was this aspect of measles that attracted Samuel Silver and he undertook a study of measles virus multiplication. The medical importance of measles is matched by the difficulties in working with it. Nevertheless, Sam made a number of important contributions, and set the stage for further advances, including an understanding of the mechanisms involved in SSPE. He obtained the first clear picture of measles virus proteins and their synthesis in infected cells and settled a controversy about the biologically important proteins on the surface of the virus. He showed that early cell death after infection is due to cell fusion, but that another mechanism of cell injury also acts on a slower time scale. With a related virus, Sam showed that cells grown in culture progressively lose their ability to grow the virus, due to the loss of an enzyme which cleaves a viral protein into two parts, thus providing the first biochemical explanation for the loss by cells of their ability to support virus multiplication.

JOHN C. SIMMS

(*Degree granted* in absentia)

The topic of John Simms' thesis was Semi-hypermeasurables and Π^0_1 (Π^1_1) Games. His research advisor was Donald Martin.

YUEN TAT SO

Floyd Ratliff

As yet, there is no comprehensive neurophysiological theory of vision—unless chaos itself can be regarded as a theory. Mr. So's research has helped to bring some order into this chaos by providing detailed characterizations of various types of neurons in the lateral geniculate nucleus—the way station in the visual pathway between the retina and the visual cortex. Although the million or so geniculate neurons have many characteristics in common, So found that they can be separated into a few distinct categories. He accomplished this separation by means of an exact quantitative specification of the information in the pattern of light and shade on the retina in conjunction with an equally exact quantitative analysis of the information carried in the responses of the geniculate neurons. Mr. So studied at Queen's College, Hong Kong, and Northwestern University, where he received a B.S. in electrical engineering. He will now enter medical school.

JONATHAN D. VICTOR

Robert Shapley

For his doctoral thesis Jonathan Victor devised a completely new approach to the analysis of nonlinear systems, and then applied this new method in a brilliant series of investigations of the function of the mammalian retina. The retina is a highly structured piece of neural machinery. It is desirable to know how the retina works first because it is the "front end" of visual perception, and second because it is a good place to study those basic principles of neural interaction which are used by the brain not only for sight but also for thought. Jon's new way of stimulating the retina and analyzing its responses has revealed that there is a serial chain or cascade of neural filters in the retina. This cascade probably corresponds to the laminated structure of the retina. Furthermore, his work has led to the concept of a contrast gain control in the retina. This mechanism is a neural feedback which modifies the filtering properties of the retina contingent on the level of the total average contrast in the visual environment. The retina has not

become more complicated because of Jon's research, but now we can begin to appreciate the intricacy and elegance of its circuitry. The power and sophistication of the mathematical analysis Jon developed and used, his invention of this "sum-of-sinusoids" approach, is a major contribution in its own right independent of its application to physiology. Jon Victor's scheme is a direct descendant of Fourier analysis of linear systems and is also related to the method of nonlinear systems analysis devised by Norbert Wiener. Thus, Jon's work consists of sophisticated mathematical techniques and also sophisticated physiological insights as a result.

CHANG-YI WANG

Robert J. Winchester

Chang-Yi Wang arrived from Taiwan with the advance reputation of being a concert grade pianist of formidable dexterity. Indeed, digital as well as intellectual dexterity characterizes Chang-Yi's approach to the problem of understanding the structure and function of the human Ia system. The Ia system is a major element in the group of molecules that vary from individual to individual and the differences of which comprise the major barrier to organ transplantation. These same histocompatibility molecules function to regulate the immune response. Of great interest, genetic variants of this system are associated with susceptibility or resistance to a series of important diseases, among them: rheumatoid arthritis, systemic lupus erythematosus, diabetes mellitus and multiple sclerosis. Chang-Yi began by isolating the Ia molecule and she quickly found that Ia antigens were present on various leukemias and one form of tumor malignant melanoma, a finding which raises deep questions about why this is so. Study followed study as a series of papers told the story of probing deeper into the genetic control structure and function of this important regulatory glycoprotein.

JEFFREY WEBER

James E. Darnell, Jr.

Jeffrey Weber first began his interest in gene expression in mammalian cells and his association with our laboratory when he was an undergraduate biology major at Columbia University. After completing his first two years of medical training at New York University he returned to our lab as a Ph.D. student. Jeffrey brought with him as a natural gift, great care and precision in his approach to experimental work, an unremitting drive and energy, but also a pleasant sense of humor. He studied diligently and read widely and developed a fine facility to think about complicated biologic questions and design effective experiments to bring answers to these questions. The combination of all these attributes contributed to a very productive graduate student career for Jeff. His work is reported in two full length research papers of which he is the senior author and he contributed to four other reports as a contributing author. It was mainly Jeff Weber's work that first defined for any nuclear animal virus gene the boundaries of a transcriptional unit responsible for messenger RNA production. We believe this is an achievement of great importance.

MARTIN L. YARMUSH

Thomas J. Kindt

A little over four years ago Martin Yarmush appeared in my office at Rockefeller and outlined an experiment that he proposed to do in my laboratory using the immunogenetic models that were available. It was a very good idea, involving a molecular biologist's approach, to study latent or unexpected allotypes in the rabbit. The occurrence of low levels of latent allotypes had been one of those nagging problems that one encounters in serologic approaches to immunologic questions. Maish took over this project and in his characteristic manner took it by the horns. He obtained data so firm that no one could deny the relevance of the question and applied several approaches to physiologic aspects of the problem that have implications for the root causes of the occurrence of these allotypes. He has also obtained sufficient material for structural analyses which have shown latent and normal allotypes to be identical. Perhaps more significantly, just as he is ready to leave the laboratory, he has obtained material that will make possible the molecular biological approach to this question that was our original topic of discussion. This breakthrough involves preparation of interspecies hybrid cells that produce rabbit immunoglobulin chains and that can serve as a source of messenger RNA which can then be used to make suitable probes for a detailed study of this phenomenon.

HONORARY DEGREES

BARBARA McCLINTOCK

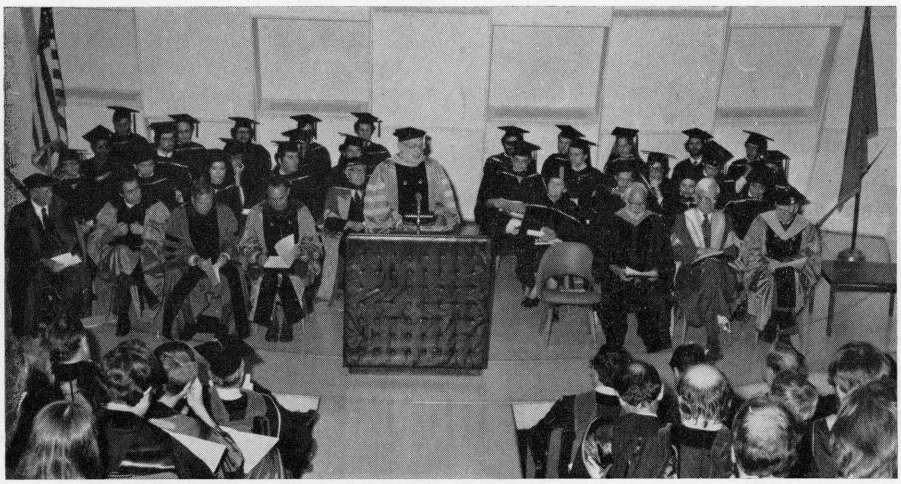
Norton D. Zinder

A little over 100 years ago the monk Gregor Mendel began the science of genetics with an extraordinary experiment that fixed for all time its basic structure. As if the shock of that experiment were too much to bear, genetics disappeared for 50 years. It began anew with a sequence of classic experiments that brought it to its current fundamental position in the life sciences. Barbara McClintock has contributed continuously to the growth of genetics. She received the Ph.D. degree from Cornell University in 1927, she has been successively an instructor at Cornell, assistant professor at the University of Missouri, and, since 1942, a member of the Carnegie Institution of Washington at Cold Spring Harbor. Her contributions have been recognized by many awards, most notably the Kimber Medal in Genetics of the National Academy of Sciences and the National Medal of Science. Her earliest studies were on the chromosomes of corn. The ten chromosomes were visualized, identified, and, most importantly, correlated with the appropriate linkage group. The physical genetic map of corn was fixed for all time. Moreover, homologous chromosomes from different strains could be differentiated. Thus the fundamental question could be asked: is genetic recombination correlated with a physical exchange of chromosomal segments? In a lovely piece of work in which genetic and cytological techniques were combined she showed unequivocally that the genetic markers followed the chromosomal segments in their segregation. Those scientists who still, in the early thirties, doubted that the genes were on chromosomes lost every vestige of argument. Next came a beautiful series of experiments analyzing translocation heterozygotes and ring chromosomes leading to the discovery and description of the breakage fusion bridge cycle. A broken chromosome no. 9 is very "sticky" in the gametophyte of corn. The chromosomes fuse and break apart over and over again resulting in chromosomal deficiencies, duplications, and translocations and thereby reorganize portions of the genome. In the course of experiments on this cycle, an unusual phenomenon was found. Suddenly, certain genes of corn became highly mutable. Years of careful work have led Barbara to the following explanation: there are elements in the corn genome that when located proximal to a particular gene suppress its ability to express its phenotype. During development these elements move from the site and transpose to another and the gene's functioning is restored. Moreover, such systems have a second element which regulates the transposition frequency of the first. Genes turn off and on and do so in time. Are these activities clues to the control processes of differentiation and development? This phenomenon has generated considerable excitement, particularly among molecular geneticists. Transposing elements are now known not to be unique to corn. Something like them have been found in bacteria. There are DNA elements which transpose from one genomic segment to another, often carrying particular genes with them. They can also affect the function of genes at the point of their insertion. Barbara's experiments, which in a way had confused many of us for a time, seem to have anticipated one of the most exciting areas of modern genetic research.

I. I. RABI

Norman F. Ramsey

Dr. I. I. Rabi has made major contributions to science, to philosophy, to our national government, and to international affairs. The molecular beam methods which Rabi invented, including the magnetic resonance method, opened whole new fields for precise measurements of the properties of nuclei, atoms, and molecules. Rabi and his associates measured the spins and magnetic moments of the proton, deu-

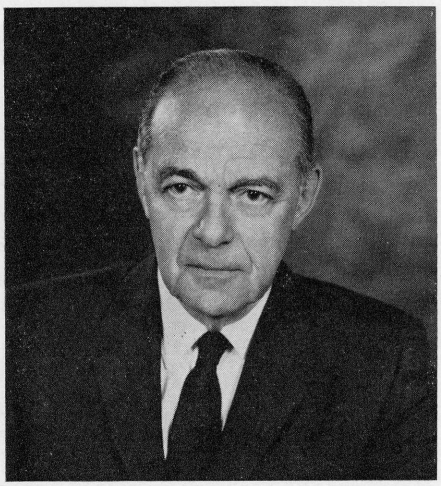


President Lederberg presiding at his first convocation.

teron, and many other nuclei as well as discovering the electric quadrupole moment of the deuteron and first observing the interaction between neutrons and electrons. Rabi is a great teacher and a stimulus to his students and associates; it is no accident that so many great physics discoveries have been made at Columbia after Rabi became a professor. Rabi has been a creative member and often the chairman of many important national and international committees. Proposals first made by Rabi have led to many of the most successful ventures in national and international cooperation, including Brookhaven National Laboratory, CERN, and the International Conference for Peaceful Uses of Atomic Energy. Rabi is an innovative scientist, statesman, and philosopher. He has invented new techniques for accurately exploring the structure of molecules, atoms, and nuclei and has created new paths of cooperation among scientists and among nations.

PAUL A. WEISS (*in absentia*)
Carl Pfaffmann

Paul A. Weiss has devoted his lifelong career to the study of basic problems of growth, differentiation, regeneration, and submicroscopic organization of tissues in the development and function of the nervous system. After earning the Ph.D. from the University of Vienna in 1922, he almost immediately made the first of what was to become a series of important and seminal discoveries in neurobiology. In studying the regeneration of amphibian tissue, he surgically transplanted fully functional supernumerary limbs to normal or abnormal sites on the body of a recipient animal. Not only did they "heal in" but they also resumed motor functions. In the case of an extra limb, each muscle contracted always and without exception exactly together with its namesake muscle in the neighboring normal limb. Such duplicate "myotypic" responses remained fixed for life quite without regard to whether the movements were useful or obstructive. This phenomenon stimulated much research by many other investigators in the search for embryonic factors controlling the interconnections of nerve cells. In the further search for factors controlling cell growth, he showed that cell movements and tissue growth in tissue cultures could be oriented by subjecting the culture medium to mechanical stress. Nerve cells similarly could be directed by "contact guidance." During World War II, he put his knowledge and expertise to the task of improving surgical nerve repair by his techniques for sutureless splicing of severed nerves by arterial



Paul A. Weiss

(and later tantalum) cuffs. One consequence of such work was the development of one of the first frozen tissue banks of arteries and nerve stumps, as well as corneas for subsequent grafting. The observation that too tight a cuff led to a damming up of cytoplasmic materials on the cell body regenerating side of the suture opened the way for the fundamental discovery of axoplasmic transport, the intensive unceasing flow of cellular materials within each individual nerve fiber from the living neuron's cell body. This flow has now been recognized to play an essential role in all of the nerve cell's normal activities as well as during growth and regeneration. Beyond his fundamental work in neurobiology, he has also made significant contributions to more general cell-biological problems, such as type-specific sorting of mixed cell populations in tissue culture (with Mascona) and the demonstrations (with Taylor) that random-mixed and random-reassembled suspensions of cells can reconstitute themselves into complete and typical miniature replicas of the donor organs. Throughout, Paul Weiss' career has been a mix of analytical experimentation and theoretical interpretation, teaching, and literary activities in academic posts in Europe, at Yale, Chicago, The Rockefeller University, and the University of Texas. His bibliography numbers over 350 papers, reviews, and articles. He has authored eleven books. His honors and memberships are far too numerous to recount here as are his activities in such broader domains as the role of science in education, the historical and philosophical foundations of science, the relation between science and art, the place of science in society, and science in the international scene.

New Directions

The members of the University's 1979 graduating class are off in new directions. Ten of them will complete their final year of medical training at Cornell University Medical College as part of the University's joint Ph.D.-M.D. program with Cornell. They are: **Scott Brodie, Alice Gottlieb, John Hurley, Bruce Korf, Theodore Lawrence, Vishwanath Lingappa, Arthur Pomerantz, Alan Proia, Carl Rettenmier,** and **Jonathan Victor. Samuel Silver** completed both degrees this year and is now going into a residency in internal medicine at H. C. Moffitt-University at California Hospitals, San Francisco.

Remaining at Rockefeller as postdoctoral fellows are **Larry Gerace, John Hemperly** and **Kirk Manogue. Steven Meshnick** has been appointed an assistant professor at the University and holds a joint appointment in the new Division of International Health, Department of Medicine, Cornell University Medical College.

Yuen Tat So and **Martin Yarmush** enter Yale University School of Medicine. **Jeffrey Weber,** who interrupted his medical training to come to Rockefeller, will complete his final year at the New York University School of Medicine. **David Merz** goes to The Johns Hopkins University School of Medicine.

Mark Altom has been appointed an assistant professor at Rutgers University and is a visiting assistant professor for the summer at the University of Illinois, Champaign.

Cecilia Lo has a Damon Runyan Fellowship in the Department of Biological Chemistry at Harvard Medical School where her husband, 1977

Rockefeller graduate Rocky Tuan, is a research fellow.

Karl Matlin crosses the ocean for a postdoctoral appointment at the European Molecular Biology Laboratory, Heidelberg, Germany.

David Noreen has become a member of the technical staff of Bell Laboratories in New Jersey.

Richard Peluso is a postdoctoral fellow in virology at the Veterans Administration Hospital in San Francisco.

John Simms is currently a visiting lecturer in the department of mathematics, Texas Tech University, Lubbock.

Chang-Yi Wang has a research appointment in the Department of Developmental Immunobiology, Sloan-Kettering Institute for Cancer Research.

HONORS & AWARDS

President Lederberg received an honorary doctor of letters degree from the Jewish Theological Seminary on May 13, an honorary doctor of laws degree from the University of Pennsylvania on May 22, and an honorary doctor of science degree from the Mount Sinai School of Medicine on May 31. He was also recently named a Foreign Member of the Royal Society, London.

In addition, he delivered the commencement address at Cornell University Medical College on May 23, at Marymount Manhattan College on May 30, and at Stuyvesant High School, his alma mater, on June 22.

He also delivered the Third L. C. Dunn Lecture at the New York Blood Center on June 4. His subject was The Difficult Marriage of Genetics and Microbiology: A Historical and Biographical Perspective.

President Emeritus **Frederick Seitz** received his second NASA Distinguished Public Service Medal presented for his "dedicated service as chairman of the NASA Space Program Advisory Council from 1973 to 1977," at ceremonies on May 8 in Washington, D.C.

Adjunct Professor and 1961 Rockefeller Alumnus **Aaron J. Shatkin,** head of the Laboratory of Molecular Virology at the Roche Institute of Molecular Biology, Nutley, New Jersey, received an honorary doctor of science degree from Bowdoin College on May 26. (Dr. Shatkin was graduated summa cum laude from Bowdoin in 1956.)

Rita Henry, Treasurers Office, has been awarded the Associate in Risk Management designation and diploma by the Insurance Institute of America.

Hanafusa Reports on Cancer Research

Recent research in the viral oncology laboratory of Professor Hidesaburo Hanafusa has led to a new hypothesis on how some viruses, interacting with animal cells, give rise to cancer cells by stimulating overproduction of normal cellular gene products: that at least some cancer-promoting viruses are created by the insertion of normal host cell genes into certain viruses.

Dr. Hanafusa reported his findings at the 79th annual meeting of the American Society for Microbiology held May 6 in Los Angeles.

In the research, Dr. Hanafusa and his colleagues used Rous sarcoma virus, which causes cancer in chickens, in a mutated form from which most of the virus gene responsible for tumor formation had been removed. They found that after newborn chickens had been injected with these mutated viruses, no tumors appeared until two months later, and then only at sites in the body quite distant from the original point of injection. From every such tumor they were able to isolate viruses which had regained the ability to rapidly induce tumors at the site of injection and to transform cultured cells. (Cell transformation is believed by many scientists to be equivalent to the process which makes regular body cells cancerous.) They also found that even though the original material used had been deleted or mutated the newly isolated sarcoma viruses regained the complete genetic information of the original deleted gene.

This meant that there was probably a genetic recombination between the nontransforming, mutated virus and a normal cell gene, and that this cellular gene supplied the information responsible for the transforming activity of the virus.

According to Dr. Hanafusa, "This supported the hypothesis that the protein products of the viral and cellular gene perform very similar functions." Such a protein product has indeed been found in normal, uninfected chicken cells in amounts far less than that found in the transformed cells.

Dr. Hanafusa and his colleagues believe that their experiments provide a good model for the insertion of the normal cellular genes into the virus genome. Because viral genomes can be expressed efficiently in infected cells, the resulting overproduction of the normal cellular gene products could lead to the malignancy of that cell.

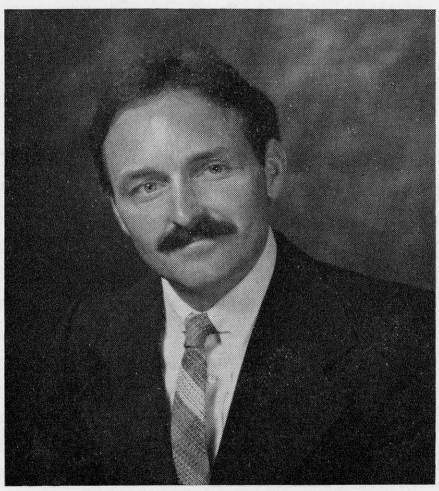
Food Service Director

Michael J. Smith was appointed food service director at the University on May 15.

A native of Binghamton, New York, and a 1974 graduate in food management from the Rochester Institute of Technology, Mr. Smith comes to Rockefeller through the SAGA organization for whom he has previously served as food service director with Bankers' Life Company in Des Moines, with Mutual of Omaha, and with the Hewlett-Packard company in Andover, Massachusetts. He has also been a manager with the Red Lobster Inns of America chain.

Mr. Smith says his own favorite cooking is Chinese and Mexican food. (He's thinking of introducing do-it-yourself tacos and enchiladas at the University.) A regular diet of football—he was on a football scholarship at college—as well as baseball, lacrosse, and a three-mile-a-day run balance any occupational hazard to his waistline.

He and his wife, Linda, a pension administrator, make their home in Greenwich, Connecticut.



Michael J. Smith

Car Rental Discount

A new auto rental discount service is now available to all members of the University community for both personal and business use. The Avis Rent A Car System will give discounts ranging from 10 to 15 percent, depending on rental plan and location, in the United States, Europe, Africa, Asia, Latin America, and the Middle East.

To obtain the discount, University personnel must have a special Avis sticker which can be picked up in the purchasing office or from Mrs. Regina Titus at the reception desk in Caspary.

APPOINTMENTS

Jacques Genest, professor of medicine, University of Montreal, and scientific director, Clinical Research Institute of Montreal, as a visiting professor in the biology of addictive diseases laboratory of Professor Vincent P. Dole, effective July 1.

Arnold Lebow, professor of mathematics, Yeshiva University, as a visiting professor with Associate Professor Morris Schreiber, Mathematics, effective July 1.

Jun-ichi Toyoda, professor of physiology, St. Marianna University School of Medicine, Japan, as a visiting professor in the biophysics laboratory of Professor Floyd Ratliff, effective August 15.

PERSONALS

Kathy Kleinbard, Hospital Administrator, was married on June 3 to Kris Heinzelman, an associate with the law firm of Cravath, Swaine & Moore.

Born, June 14, to Research Associate **Lei Chen,** Cellular Physiology and Immunology, and her husband, Minm-Yi Chen, an engineer with Sperry-Rand, a son, Anders, their second child.

Born, May 30, to Professor **Joel E. Cohen,** Populations, and his wife, Audrey, a son, Adam Ezra, their second child.

Born, May 22, to Assistant Professor **Nadia M. Araujo Nogueira,** Cellular Physiology and Immunology, and her husband, Robert V. Budny of the research staff of the Princeton Plasma Physics Laboratory and formerly a research associate at Rockefeller, a daughter, Alexandra, their first child.

DEATHS

Stanley A. Greenhalgh, 81, who was associated with the University for 28 years before his retirement in 1964, on May 20. Better known as "Steve" to his Rockefeller co-workers, Mr. Greenhalgh was appointed a skilled helper in 1936 and technician in 1939.

Gilbert Watts Humphrey, 62, chairman of the Hanna Mining Company, Cleveland, and a member of The Rockefeller University Council since 1976, on June 17.

1979-80 Concert Schedule

There will be 14 Rockefeller University Concerts presented during the 1979–80 season beginning October 3. They will be on Wednesdays (with the exception of the second performance on Thursday, October 18) at 8 P.M. in Caspary.

Applications for tickets will be mailed to all University personnel. Tickets may be ordered for the full series, at $56 ($42 for Rockefeller students), or for half series, designated A and B, at $33 each ($25 for students). Because of the anticipated heavy demand, orders should be sent as soon as possible, with checks made out to The Rockefeller University, to the accounting office cashier. No orders will be accepted after September 17. (Students must order through the Dean's Office.)

Series A: The Prague Chamber Orchestra (October 3); The King's Singers (October 31); Rudolf Firkusny, pianist (November 28); Kyung-Wha Chung, violinist (January 30); Caliope, renaissance ensemble (February 27); The Kalichstein-Laredo-Robinson Trio with Walter Trampler (April 9); Quartetto Italiano (May 7).

Series B: Hermann Prey, baritone (October 18); the Tokyo String Quartet (November 14); the Guarneri Quartet (December 12); Dizzy Gillespie with jazz quintet (January 16); Horacio Gutierrez, pianist (February 6); Viktor Tretyskov, violinist (March 19); the Orpheus Chamber Ensemble (April 23).

RU Council Meets

The 10th full-day meeting of The Rockefeller University Council, on the subject of Reproductive Biology and the Process of Scientific Research, was held on June 7.

After a welcome by University Trustee and Council Chairman James A. Linen III and Board Chairman Patrick E. Haggerty, President Lederberg introduced the speakers: Vincent G. Allfrey, Donald W. Pfaff, Robert G. Lahita, and Dennis M. Stark.

The Rockefeller University Council is a group of leaders in industry, public affairs, education, and the professions who assist the University in increasing public understanding of its programs and objectives. New members this year are: Charles F. Barber, chairman and chief executive officer, American Smelting and Refining Co., New York; Thomas E. Drohan, president and chief executive officer, Foremost-McKesson, San Francisco; Suliman Olayan, chairman, The Olayan Group, Jeddah, Saudi Arabia; Dr. George Rosenkranz, chairman, Syntex Corporation, Mexico City; Dr. Arthur Sackler, physician and medical publisher, New York; Howard S. Turner, chairman, Executive Committee, Turner Construction Company, New York.

IN PRINT

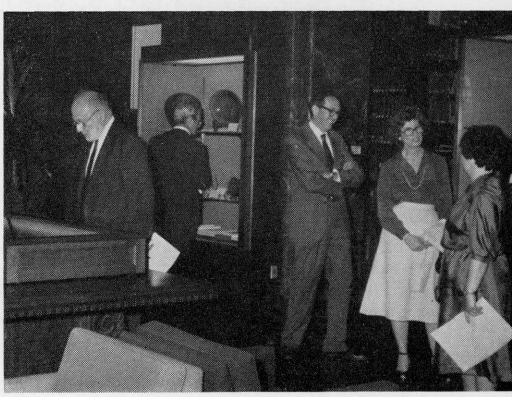
A new book, *Mammalian Vestibular Physiology*, by Professor **Victor J. Wilson,** Neurophysiology, and Professor Geoffrey Melvill Jones of McGill University, Montreal, has been published by Plenum Press. The vestibular system is a sensory system whose receptor is buried deep in the skull. There has been a significant upsurge of research activity on the vestibular function recently. In the 365-page illustrated volume, the authors give an overview of new knowledge, relating physiological and anatomical studies and behavioral and psychophysical research.

Sigma Xi Elects

New officers of the University's chapter of Sigma Xi, The Scientific Research Society of North America, are: Kenneth Case, president, Joseph Becker, treasurer, and Robert Dooling, secretary. (A new vice-president has not yet been elected.)

Recently elected to membership are: Mark W. Altom, Vinh Cam, Jonathan M. Charry, Polly Rose Etkind, Adele Fekete-Mackintosh, Allan Gibofsky, Michael Gochfeld, Elliot F. Hahn, William W. Hall, Angela M. Hyman, Fritz Lipmann, Yoshio C. Okada, Christian C. Patrick, Valerie Reyna, Thomas J. Reynolds, Robert A. Rosenberg, Robert H. Schor, Marilyn L. Yodlowski, and Jack Ziffer.

President Lederberg, left, and Mrs. Lederberg, far righ at the opening of the exhibit of Chinese ceramics from t Alfred E. Mirsky Collection, in the Library.



news and notes is published from October through July. This is Volume 10, Number 10. Suggestions for articles are welcome and may be sent to *news and notes*, Box 194, phone extensions 1420 or 1051. Photographs: pages 1–4, Henrik Boudakian and George Byron; pages 8 and 10, George Byron; page 9, Henrik Boudakian. Printed in the United States of America.