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The Rockefeller University

THE ROCKEFELLER UNIVERSITY

JUNE, 1971
VOLUME 2 NUMBER 10

news and notes

Twenty-three Receive Degrees at Thirteenth Convocation

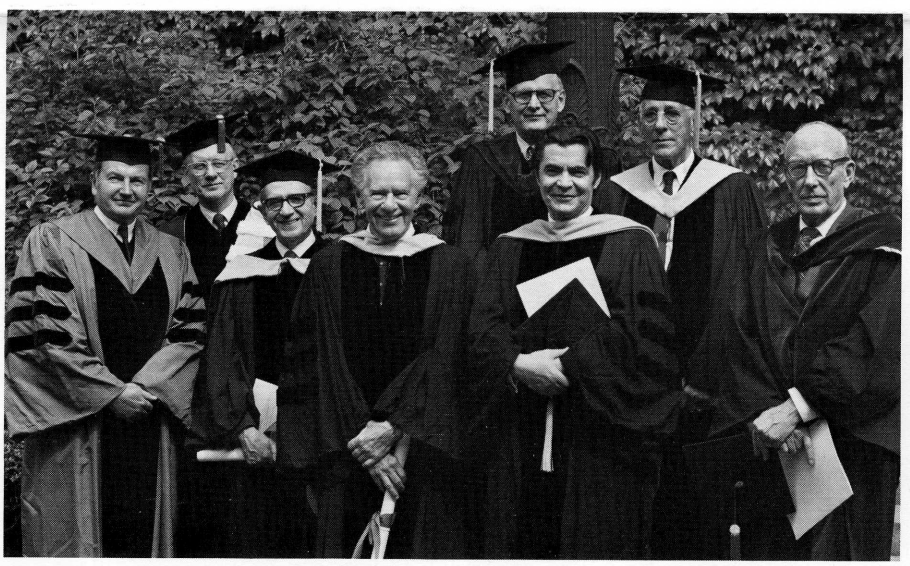
President Seitz conferred the degree of doctor of philosophy on 23 graduate fellows on Thursday, June 3, at the University's 13th convocation. Honorary doctor of science degrees were awarded to Dr. Albert Claude, professor emeritus of the Free University of Brussels, Belgium, and former director of the Institut Jules Bordet, to Nobel Laureate Fritz Lipmann, professor emeritus in biochemistry of The Rockefeller University, and to Dr. Robert F. Loeb, emeritus chairman of the Department of Medicine and Bard Professor of Medicine at Columbia University's College of Physicians and Surgeons and former vice chairman of Rockefeller's board of trustees. In attendance at the ceremonies in Caspary Auditorium were David Rockefeller, chairman of the board, who presented Dr. Loeb for his degree, as well as trustees, faculty, and graduate fellows of the University, and friends and families of the degree candidates. Each student was presented to Dr. Seitz for conferral by a faculty member with whom she or he has been closely associated.

Each of the honorary degree recipients has played a significant role at this institution. Until he assumed academic posts in Belgium in 1949, Dr. Claude pursued his research for nearly 20 years at what was then The Rockefeller Institute for Medical Research. He worked closely with Dr. George E. Palade, who served at convocation as his presenter, and with Dr. Keith R. Porter, now at the University of Colorado. In 1970, the three of them shared Columbia University's Louisa Gross Horwitz Prize for "their important contributions to our knowledge of the function and fine structure of cells." Dr. Claude is recognized as a pioneer in applying to biological research the techniques of cell fractionation and electron microscopy.

Fritz Lipmann spent the year 1930-31 at The Rockefeller Institute as a Rockefeller Foundation Fellow. He returned in 1957 and has remained since. Born and educated in Germany, he put aside a medical degree to pursue the study of biochemistry and went on to win a Nobel Prize in 1953 and the National Medal of Science. He is best known for isolating coenzyme A and identifying it as a key substance in the synthesis of a variety of cell constituents. Dr. Lipmann was presented by Dr. Edward L. Tatum.

In presenting Dr. Loeb, David Rockefeller cited his joint contribution as a doctor of medicine and as a major figure in national organizations, public and private, concerned with health and science—as a practitioner and teacher at Columbia University for 50 years, as a member of the board of the National Science Foundation, as a member of the President's Science Advisory Commission, and, for many years, as a trustee and vice chairman of the board of The Rockefeller University.

The convocation ceremony began at 2 P.M. The evening before a reception at the President's residence and a dinner in Abby Aldrich dining room honored the graduates and their presenters and families. A trustees' luncheon immediately preceded the convocation, and after it, an outdoor reception was held on the Esplanade. Celebrations were completed with the Convocation Ball that evening. Following are condensations of the remarks made by the presenters of degree recipients. The name of the recipient appears first.



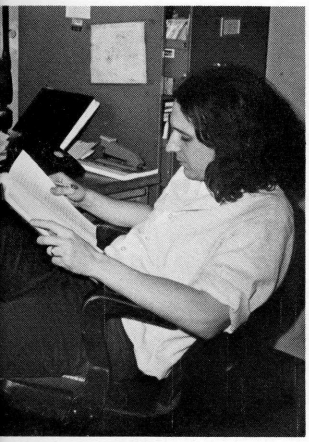
Honorary degree recipients are shown with presenters on Founder's Hall steps. Left to right: Board Chairman David Rockefeller, President Seitz, Albert Claude, Fritz Lipmann, Vice President Maclyn McCarty, George E. Palade, Robert F. Loeb, and Edward L. Tatum.

PH.D. DEGREES

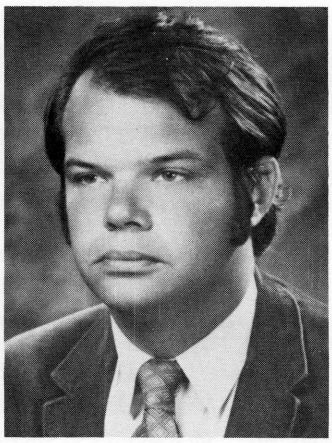
ANDREW E. BALBER

William Trager

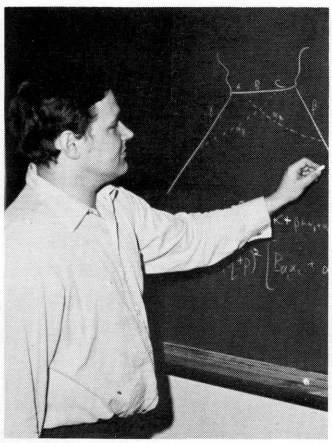
In the four million square miles of tropical Africa, man suffers from lack of adequate sources of animal protein. Productive cattle cannot be kept there. They soon become ill from infection with trypanosomes, parasitic protozoa transmitted by the bites of tsetse flies. Trypanosomes undergo cyclic changes in their physiology, losing and gaining whole enzyme systems, as they develop in the mammal and in the tsetse fly. It is reasonable to hope that if we knew more about these changes we might be able to devise intelligent ways of controlling African trypanosomiasis. Andrew Balber, in his thesis work, has contributed new information and new ideas concerning the nature and causation of these cyclic changes. This kind of work gives a biologist double satisfaction. On the one hand it deals with fundamental aspects of cellular biology; on the other, it bears directly on human welfare. I am happy to say that Andy will be continuing to work on physiology of trypanosomes at Yale University Medical School.



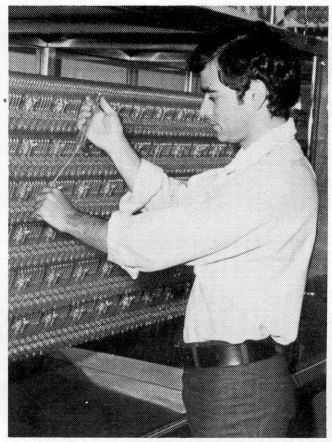
BALBER



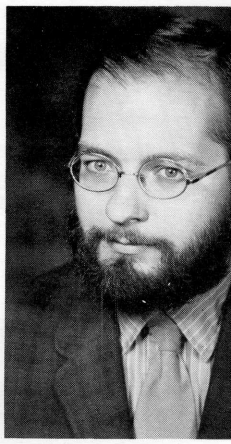
BEERS



BLAHA



BOCKMAN



CRUCE

WILLIAM H. BEERS

Edward Reich

When William Beers entered our laboratory five years ago, he was interested in analyzing biological problems with the tools of chemistry. In collaboration with Anthony Cerami, Beers devised the first experimental system which showed that the separation of DNA strands began in the middle and proceeded to the ends of the long linear molecules. Beers then turned to several problems in drug action. By analyzing the complex structures of a series of drugs, he was able to provide a chemical explanation for the fact that the transmitter substance acetyl choline produces different classes of effects in different parts of the nervous system. His main research effort involved a study of paralyzing botulinus toxins. These compounds occasionally cause small epidemics of food poisoning and they are the most toxic substances known. Beers purified completely and compared two of these substances, determined their nature, size, and chemical properties, and devised a reaction for labeling one of them as a basis for identifying their target in nerves. He is now analyzing the physiological action of the toxins in collaboration with Dr. Alexander Mauro's laboratory. Next year he will study the biochemical aspects of mammalian reproduction. Beers is polyglot in the languages of modern science. I can't conceive of an object or problem that he could not take apart and put together again.

STEPHEN BLAHA

M.A.B. Bég

Stephen Blaha came to us from Notre Dame University. Soon after his arrival, he succumbed to what is known in the trade as the "group theory bug." During the course of this infection, Steve made two substantive contributions to the theory of group representations. Steve soon realized that group theory, per se, could not be the full time occupation of a particle physicist. He turned his attention to problems of hadron dynamics. During a visit to the Stanford linear accelerator in the summer of 1969, he became extremely interested in the dynamical origins of a remarkable effect that had been observed in deep-inelastic electron-proton scattering, the phenomenon known as "scaling." Steve's investigations, carried out within the framework of quantum field theory, have illuminated many aspects of this fascinating problem. This fall Steve will be joining the faculty of the University of Washington. I am sure the serene beauty of the Pacific Northwest will provide an inspiring atmosphere in which he will continue to do creative physics.

RICHARD S. BOCKMAN

William A. Gibbons

Richard Bockman chose as his Ph.D. thesis to elucidate the three-dimensional structure of the clinically useful antibiotic peptide polymyxin B_1. By judiciously combining nuclear magnetic resonance spectroscopy, hydrogen exchange studies, and model building by high speed digital computers, he was able to postulate a conformation for polymyxin B_1. You may say that the conformation or topography of the first peptide was determined in solution in 1968 and that hydrogen exchange studies are at least 20 years old. What then is unique about Richard's work? Its uniqueness lies in the following: (*a*) he did his studies in water; (*b*) the amide hydrogens of polymyxin have exchange lifetimes of less than one second—he therefore had to use new methodology, fast fourier transform nuclear magnetic resonance spectroscopy, which will become standard practice in the next few years; (*c*) he related the exchange lifetime of each amide hydrogen of each amino acid residue to its location in space within the peptide—especially by use of digital computers. Early in the spring Richard accepted a staff position in the endocrinology laboratory of the Sloan-Kettering Institute for Cancer Research.

WILLIAM L. R. CRUCE

Bernice Grafstein

William Lovel Raney Cruce came to The Rockefeller University from Texas via The University of Chicago. His thesis work has been on the organization of the spinal cord in the frog. He recorded the electrical activity of the cord while it remained connected to the muscles of the animal, a difficult and demanding task. He also mapped out the topographical pattern of nerve cells controlling the muscles of the frog's leg. He did this by cutting the nerves to various muscles, then looking for changes in the nerve cells from which the cut nerves arose. He found that the nerve cells were arranged in a column in the spinal cord and that the cells controlling muscles closer to the body were nearer the front end of the column. For each leg joint, the nerve cells causing it to bend were nearer the front end of the column than the cells that caused it to straighten. This regular pattern already gives a hint of the more complex pattern seen in higher organisms, and its study may give us a clue to how the more complex pattern is developed.

SAIMON GORDON

Zanvil A. Cohn

Saimon Gordon has successfully pursued a wide range of topics related to the properties of cell surfaces and the initiation of DNA synthesis. By means of a virus, he fused macrophages with melanoma cells, thereby mixing both parental nuclei in a common cytoplasm. These cells were chosen since they differed widely in the activities of their surface membranes and because the macrophage was a nondividing cell whereas the tumor cell multiplied rapidly. Shortly after fusion, DNA synthesis was initiated in the dormant macrophage nucleus. Both RNA and protein were required to activate the macrophage nucleus. These components were supplied solely by the melanoma cell, were synthesized largely during the S phase of its cell cycle, and were then able to enter the macrophage nucleus and initiate DNA synthesis. Immediately after fusion, the surface membranes of both parents were distinguishable. Rapid mixing of membrane constituents then took place. Thereafter, specific macrophage receptors disappeared. In an ingenious series of experiments, Saimon showed that the melanoma cell synthesized a protein which masked the macrophage receptor.

Removal of the protein resulted in the full expression of the receptor and represented a novel mechanism for controlling the activities of cell surfaces. We are pleased that Saimon will join our faculty in the coming year.

PAUL D. GOTTLIEB

Gerald M. Edelman

In the last decade, it has become more and more certain that the key molecules of all types of immunity are proteins known as antibodies or immunoglobulins. Chemical studies of these molecules have revealed an unusual architecture: the part of the molecule that binds foreign molecules is variable whereas the remainder is constant in its structure. Paul Gottlieb undertook to study the fundamental question: How does the variability of antibodies arise? First he participated in the determination of the complete structure of an antibody. Then he devised ingenious experiments which showed that in mice the kinds of variation were under genetic control. This provided essential data for development of a theory on the origin of variability of antibodies. The experiments that he carried out required great skill, breadth, and insight in a variety of fields. They will stand as models for future studies of the immune response. Paul will continue his studies at Stanford University. Those of us who have had the pleasure of working with him are confident that his great experimental gifts and understanding will result in further advances in his chosen field.

GRETCHEN K. HASCALL

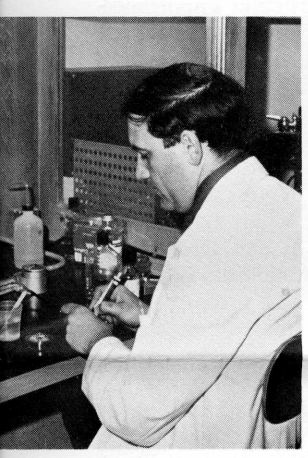
Philip A. D'Alesandro

Gretchen Hascall began her studies at the University by working in several laboratories to gain experience and to learn what research opportunities were available. Her interest finally centered on a fascinating little protozoan that spends its adult life firmly fixed in one location and reproduces by a form of internal budding, which gives rise to a free-swimming embryo. Within 10 minutes after finding a suitable site to settle down, this juvenile form undergoes a complete morphological transformation into an adult with its full reproductive potential. Gretchen decided to study various aspects of this transformation using electron microscopic and biochemical techniques. In her work, she learned a great deal about the many factors involved in this complex process and carried the study farther than anyone had before. She has thereby contributed to our knowledge of this group of organisms in particular and of cell biology in general. Two years ago, Gretchen's husband Vincent received his degree from this University and joined the faculty of the University of Michigan. Although her work was still incomplete at that time, it was necessary for Gretchen to leave with her husband because of the arrival of their infant son, Allen. At the same time, circumstances necessitated a change in research advisers, and shortly thereafter, my formal association with Gretchen began. During the past two years, communications had to be maintained through correspondence and occasional visits. There were other obstacles and difficulties as well, but Gretchen's resolve and determination were finally rewarded, and she brought her work to a successful conclusion.

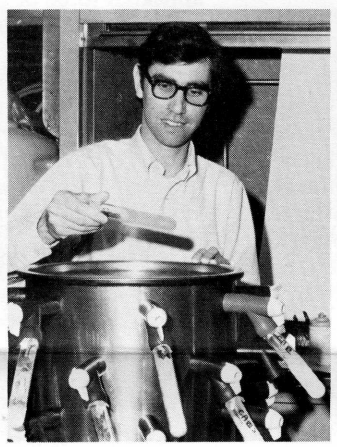
L. MARTIN JERRY

Henry G. Kunkel

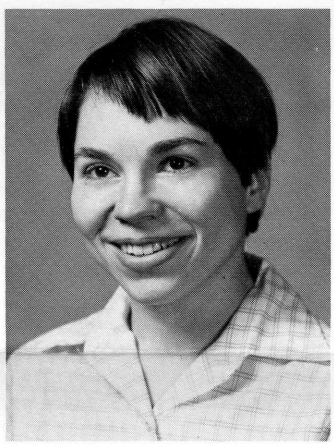
Dr. Martin Jerry joined the student body after extensive medical training at the University of Toronto. His main interest lay in immunology, in particular the immune defense system of the external secretions. Secretions, such as those from nasal, bronchial, or intestinal sources, contain antibodies in a very unusual and protected form. As a result they are resistant to enzyme degradation. Dr. Jerry became interested in the structural characteristics of some of these antibodies and made some intriguing observations concerning the linkage of the polypeptide chains. The usual disulfide bonds found in other antibodies were completely absent. This absence proved to be a genetic characteristic, with marked variation in



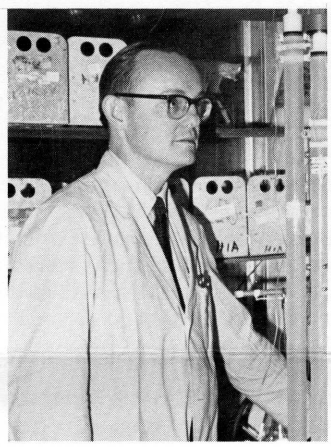
GORDON



GOTTLIEB



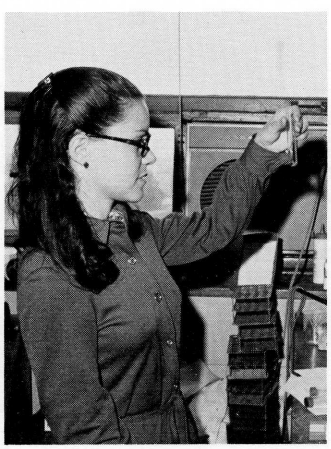
HASCALL



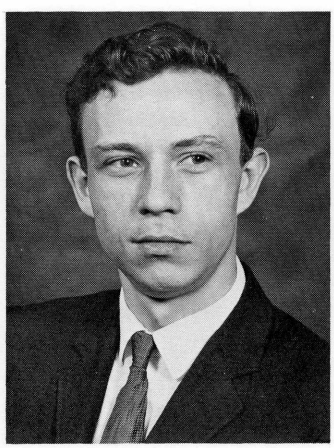
JERRY

LESTER

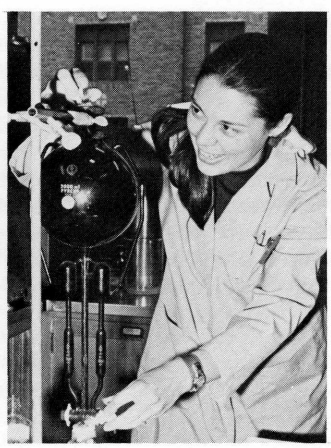
LOWRANCE



LYONS



MATHOT



MOSSER

PAULSON

incidence in different human populations. Time does not permit a complete recounting of his assiduous search for a rationale behind these unexpected findings. Suffice it to say that another characteristic story in biology slowly unfolded and in almost parallel fashion Dr. Jerry developed as a scientist. He returns now to his native Canada. It will be at McGill University that he will continue his career in science which has begun so auspiciously.

HENRY A. LESTER

Frederick A. Dodge, Jr.

To understand physiological mechanisms in terms of the laws of physics and chemistry, we must be able to identify the participating molecules. Henry Lester chose to study synaptic transmission, focusing particular attention on the acetylcholine receptors, which are macromolecules sparsely distributed within specialized regions of the membrane of vertebrate muscle cells. His thesis research established that a polypeptide neurotoxin from cobra venom is a highly specific molecular probe that binds irreversibly to this receptor. Next year, Henry plans to go to the Pasteur Institute where his experience will be used immediately on a research project for the chemical isolation of the acetylcholine receptor.

WILLIAM W. LOWRANCE, JR.

William C. Agosta

William Lowrance came to Rockefeller in the summer of 1965 from North Carolina with a degree in chemistry and an interest in almost everything. He enthusiastically embarked on a program of self-education in the life sciences. It was during his third year here that Lowrance determined to undertake thesis work in organic chemistry. This led to a focusing of his attention on synthetic chemistry and on photochemistry. For the next two and one-half years he sought ways to synthesize chemicals related to 3-carboxycyclohexenone and investigated photochemical reactions of the substances he made. Synthetic chemistry can be a frustrating activity, often more art than science, and an investigator with manual skills and a love of handling equipment has a real advantage. These faculties served Lowrance well. In this research he was able to elaborate two new synthetic routes to 3-carboxycyclohexenones, and to show that these substances are unusually reactive in photochemical cycloaddition reactions. He also made a notable contribution to our understanding of the photochemistry of cyclic ketones.

LINDA B. LYONS

Norton D. Zinder

One of the most powerful biological tools for the dissection of the physiology of any organism lies in the isolation of genetic mutants affecting specific functions. The study of the organization of these genes on the linear chromosome by genetic mapping procedures is especially revealing. The bacteriophage f1 is a small DNA-containing phage with at most 10 genes, of which 8 are known. It is to their localization on the circular DNA molecule that Mrs. Lyons addressed herself. With so few genes it should in principle be simple to map. Unfortunately, the phage makes heterozygous diploid particles which outnumber the genetic recombinants and have an almost indistinguishable phenotype. This necessitated the obtaining of two fixed reference points on the chromosome which were provided by two specific sites sensitive to breakage by the restriction enzymes in certain bacterial hosts. Mutants resistant to breakage can be obtained for each of these sites and by coupling them with the known phage genes by iterated mutation, one can map all genes with respect to these two fixed points. A genetic map of f1 was so obtained. On collecting mutants there are always those that don't fit into the scheme of things. Linda had a talent for isolating such and has left us a legacy of treasured exceptions which will hopefully lead in time to a deeper understanding of what on first sight look like extremely simple systems.

CHRISTIAN MATHOT

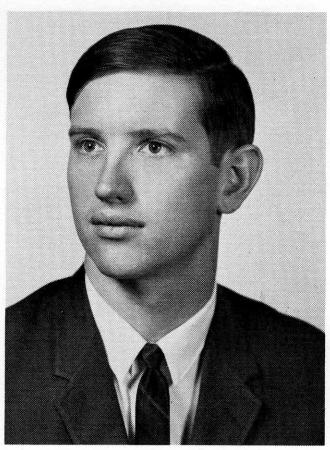
Alexandre Rothen

The application of surface chemistry methods to problems of biological interest is the subject matter of Christian Mathot's thesis. With great originality, he developed a new method called immunoelectroadsorption that permits rapid detection of immune reactions with much greater sensitivity than by any other conventional method. He has made a name for himself among parasitologists by successfully solving some of their problems with the help of this method. Mathot has realized the prediction made by Irving Langmuir some 25 years ago that techniques of surface chemistry would be able to help biologists in their endeavor. The results of Mathot are of special interest because they run contrary to the opinion of certain theorists who claim that all events taking place at a liquid-solid interface are explainable by our knowledge of interaction in solutions. This proved to be erroneous. I am glad to say that Mathot does not belong to the fair body of chemists who hold that you must not believe any data that are not confirmed by theory.

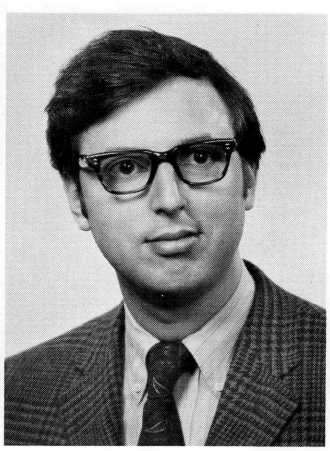
ANNE G. MOSSER

Lawrence A. Caliguiri

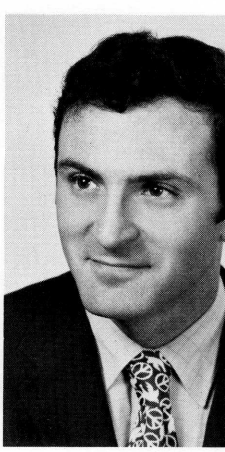
Anne Gift Mosser began her graduate education with a desire to study the replication of viruses in animal cells. She was interested in antiviral substances and joined Dr. Tamm and me in the study of the action of guanidine hydrochloride. Guanidine at low concentrations selectively blocks synthesis of the genetic material of poliovirus, its RNA. There are at least two classes of compounds which very rapidly reverse the antiviral action of guanidine. Anne's results suggested that cytoplasmic membranes may be the site at which both the action and counteraction occur. However, it became apparent that more detailed knowledge of virus-cell interactions was essential to the better understanding of the mechanism by which compounds affect viral biosynthesis. The poliovirus-induced stimulation of smooth cytoplasmic membranes appeared to be of particular importance. It is with these membranes that viral RNA synthesis is associated. Anne has shown that accumulation of smooth membranes after infection depends on synthesis of poliovirus RNA. It is noteworthy that formation of the membranes necessary for viral RNA synthesis is stimulated at a time when synthesis of cellular protein, RNA, and DNA is severely depressed by poliovirus infection. This work has provided a promising new approach to the control and regulation of viral biosynthesis and has significantly increased knowledge of membrane changes within the infected cell. Anne will continue her work next year at the State University of New York at Stony Brook.



RICHMOND



SCHOR



SHAPLEY

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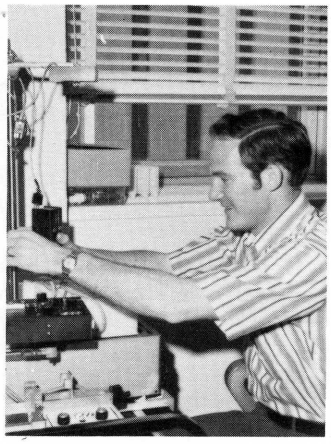

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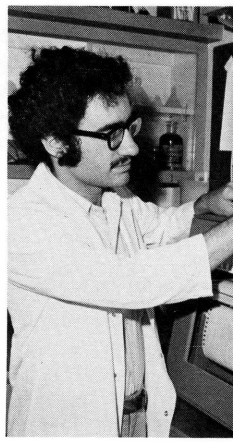

ZIGMOND

GLENN L. PAULSON

René J. Dubos

After joining our student program in 1963, Glenn Paulson began taking part in the movement of scientific information for the general public. In 1967, he obtained a leave of absence from the University to devote himself to this movement. Typical of his activities during this period was the campaign against lead poisoning among slum children. Step by step, Glenn became scientific advisor to legislators, public servants, labor unions, and industrial management. These practical contacts gave him a unique competence in the relationships between science and society. When he returned to the University, Glenn selected as a problem for his thesis the study of the biological effects of the organochlorine insecticides. He demonstrated that while these products are not obviously toxic under normal conditions, their toxicity becomes apparent when animals are under conditions of physiological stress. Glenn's larger concern was to illustrate through this study a new approach to the evaluation of technological and social innovations on human health. In my opinion, Glenn's thesis provides a larger view of technological assessment, encompassing along with technical and economic factors the various aspects of human health.

ROLLIN C. RICHMOND

Theodosius Dobzhansky

W. B. Yeats gave what I believe to be a perfect description of what education, at least education on the graduate level, should be: "Education is not the filling of a pail, but the lighting of a fire." Now, in Rollin Richmond a fire has been lit and is burning brightly. During his graduate student days he has published 11 papers. His most important work, and his thesis, is an analysis of allozyme polymorphisms in natural populations of a fly species, *Drosophila paulistorum*. This is a timely and a major contribution to one of the fundamental and unsettled problems of evolutionary genetics.

SETH L. SCHOR

Philip Siekevitz

Seth Schor has worked for the past few years with a synchronous culture of an algae, *Chlamydomonas reinhardi*. These unicellular, photosynthetic, flagellated organisms can be synchronized by an alternate 12-hour light and 12-hour dark cycle. He has discovered that there occur cyclic variations in the chemical architecture of the photosynthetic membranes of the chloroplast of this organism, in the functioning of these membranes, and in the rates of protein synthesis by the ribosomal particles, both within and outside the chloroplast. These findings have particular relevance to the main problem of the thesis, the biogenesis, or assembly, of chloroplast membranes. They also have general relevance to the question of how all organisms, from the lowest to the highest, even man, respond to the diurnal cycles occurring on our earth. Mr. Schor has done a careful and outstanding piece of work. A part of his thesis has already been published, and the rest is being readied for publication.

ROBERT SHAPLEY

H. Keffer Hartline

Robert Shapley's thesis research concerned the problem of "noise" in the sensory discharge of a photoreceptor. The trains of nerve impulses generated in response even to the steadiest illumination show irregularities which tend to obscure true signals—those small fluctuations in impulse frequency that are the response to small changes in light intensity. Shapley's analysis showed that such "spontaneous" irregularities are to be ascribed to the individual action of the discrete photons of the stimulating light, and to neural interactions with neighboring receptors. The latter is true "neural noise," significant because it limits the resolution of signals throughout all nervous systems. In combining sound understanding of the theory of stochastic processes with skill in designing and executing the right experiments to which that theory could be applied, Bob Shapley has made a significant contribution to a branch of neurophysiology that abounds in theory but is none too strong on fact.

PHYLLIS R. STRAUSS

William Trager

A large group of protozoan parasites, called hemoflagellates, includes the causative agents of some major infectious diseases of man in the tropics. The hemoflagellates are characterized by a peculiar organelle that is a mitochondrion having an exceptionally high content of DNA, up to one-fifth as much as the DNA of the nucleus. This DNA can be specifically removed by certain drugs such as acriflavine. To find out more about the mode of action of acriflavine, Phyllis Strauss produced an acriflavine-resistant strain of a species of hemoflagellate. She compared structural and physiological characters of the resistant and the sensitive strains. Most interesting was her discovery of a substance that removes the resistance of the resistant strain. Her work bears not only on the mode of action of acriflavine but also on the nature of drug resistance, a phenomenon of much practical importance. Phyllis will be working next year at the Harvard Medical School.

HWALING HAROLD SZU

George E. Uhlenbeck

Hwaling Szu came to our University from Taiwan via the University of Detroit. It turned out that he still had a lot to learn. He also was handicapped by not knowing the English language sufficiently well to understand the often rather abstruse jargon of the physics community. However, he worked really hard, and in the last year especially, he made remarkable progress. He worked mainly on problems in the kinetic theory of gases. After several small contributions he was finally able to prove in one case the so-called Einstein relation or fluctuation-dissipation theorem for all values of the so-called Knudsen number. I will not try

to explain this. Let me only say that it was never done before, that it required real ingenuity, and that it leads to a series of problems which now can be attacked. Hwaling will stay another year at The Rockefeller University with a postdoctoral fellowship.

ZENA WERB

Zanvil A. Cohn

Cholesterol is a molecule of fascination to scientist and layman alike. Although much is known concerning its physiology in the whole organism, our knowledge at the cellular level is fragmentary. This prompted Zena Werb to examine the biochemistry of cholesterol in pure populations of cultured cells. Employing the macrophage, a cell involved in many important pathological events, Zena studied the exchange of cholesterol and its distribution in subcellular compartments. Through the use of an elegant kinetic model she found that two-thirds of cell cholesterol exchanged rapidly with serum lipoproteins and one-third exchanged slowly. The rapidly exchanging pool was identified as the surface or plasma membrane whereas the slow pool was associated with the intracellular membranes of lysosomes. Removing cholesterol receptors on the cell surface blocked the uptake and release of cholesterol from the plasma membrane. Driving membrane into the cell by means of phagocytosis increased the size of the slow pool and ultimately led to a major increase in total cell cholesterol. Following this hint, Zena discovered that large amounts of new surface membrane were being synthesized after phagocytosis. In addition she characterized a lysosomal cholesterol esterase and demonstrated its importance in both the test tube and intact cell. Her studies have obvious importance to our understanding of biological membranes and the role of macrophages in the pathogenesis of atherosclerosis. Zena will be continuing her studies at Cambridge University.

DAVID D. WOOD

David J. L. Luck

David Wood's thesis was concerned with the isolation and study of a crystal from cells of the bread mold *Neurospora crassa*. The project sounds exotic, but it was related to a more general question applicable to all organisms, namely, how cells make the tiny structures mitochondria, which provide most of the energy for cellular function. David's first task, separation of the crystal from the cell, was truly the problem of the needle in the haystack. With ingenuity and good biological insight he devised a way of increasing the population of needles and a means of dissolving away the haystack. Having solved the problem of producing purified crystals, he turned his efforts to studying their character and function. It became apparent that in testing his ideas he was prepared to develop new techniques and apply a wide variety of scientific approaches. David was soon able to characterize the crystal rather completely as a single protein, making it very clear that many of our original ideas concerning its significance were wrong. This elegant study was innovative and complete. David Wood is an unusually gifted scientist who formulates his ideas with rigor and tests them with informed and broadly based experimental skill.

RICHARD E. ZIGMOND

Bruce S. McEwen

Richard Zigmond chose to study a steroid hormone, estradiol, which is essential for the appearance of female reproductive behavior under natural conditions. This hormone is known to produce its behavioral effect by acting directly on the brain. On the biochemical side, little was known about steroid hormone interactions with the brain, but information on other target organs showed that steroid hormones regulate the activity of the genome in the cell nucleus, leading to specific changes in the chemical composition and function of the target tissue. In all such tissues so far studied, there are proteins which bind the appropriate hormone in a stereospecific manner and which are located in the cell nucleus. Dick chose to look for such proteins in the brain, hoping to establish some correspondence between the anatomical loci where the hormone acts and the places where it concentrates and binds. Dick played a major role in developing a dissection procedure for removing anatomically defined brain regions and for isolating highly purified cell nuclei from these samples. The results of his study justified the careful preparation. The hypothalamus and preoptic region, where estradiol acts, accumulated several times higher concentrations of estradiol than other brain regions. Nearly 40 per cent of the radioactive hormone in these two regions was bound to cell nuclei, while other parts of the brain had very little nuclear binding. Dick also found that the binding sites were chemically specific for the natural form of the hormone. He found that steroids with low estrogenic activity did not bind, while a highly potent synthetic estrogen, diethylstilbestrol, did bind. It is clear that Dick has produced the first important step in analyzing the biochemical effects of a steroid hormone on the brain.

HONORARY DEGREES

ALBERT CLAUDE

George E. Palade

In honoring Albert Claude, our University recognizes a man of methods and facts who about 30 years ago, during his association with what was then The Rockefeller Institute for Medical Research, opened by his work in biological sciences a new field known today as cell biology. He strived to arrive at a full understanding of the organization and function of cells and, to this intent, introduced electron microscopy into cell research and devised techniques for the isolation in mass of subcellular components. The approach proved to be unusually fruitful and in due time the results obtained led to the recognition of the existence of cell organs, each endowed with its own functional specialization. In retrospect all this sounds simple, which is in fact a good measure of the greatness of the achievement, but in the early 1940s there was no retrospect. It took the inventiveness, the skill, the patience, and the untiring industriousness of Albert Claude to change so radically in our minds the image of the cell. Très sage, très puissant, très noble, et très honoré, prince parmis les hommes de science—to retire, to become emeritus, could be as cruel as to lose beyond retrieval a battle under the walls of a fortress in Lorraine. And the pain might last longer. But—at least—it is an occasion for your old house to acknowledge how much you have worked for its good name, and a time for your fellow scientists to remember how much you have done for this kingdom which is called Science, and for this fair fief which is called Cell Biology and which is—in full rights—yours.

FRITZ LIPMANN

Edward L. Tatum

Fritz Lipmann's scientific interests have centered on the once mysterious biochemical processes by which energy and building blocks made available by oxidations of carbohydrate in living cells are stored and used in the biosynthesis of complex cellular constituents. In 1941 he developed the concept of energy storage in specific molecules as high energy bonds, including phosphate, so that these activated molecules can participate in further synthetic reactions. In 1945 he isolated one of these complex high energy compounds, coenzyme A, and identified it as a key substance in many cell reactions. This work identified the biological function of the vitamin, pantothenic acid, and earned for him the Nobel Prize in Medicine and Physiology in 1953. In recent years, particularly in his work at The Rockefeller University, Dr. Lipmann has been studying one of the most complicated biosyntheses known, that of proteins. His work has very significantly clarified this process, particularly the activation of amino acids for peptide bond formation, and the mechanisms and biochemical factors involved in peptide chain initiation, elongation, and termination. To my mind, the work of Fritz Lipmann epitomizes molecular biology—the essence of which is the interpretation of life processes in terms of molecules and their structures.

ROBERT F. LOEB

David Rockefeller

The flowering of medical science in recent decades was nourished by the minds of a small group of outstanding leaders. We salute today one of these men, a medical scientist of extraordinary versatility, Robert F. Loeb. This versatility is evident from his many activities: his noted investigations in electrolyte physiology, his role as both a superb clinician and an inspiring teacher, and his organization and direction of an outstanding academic department of medicine. In another sphere, he served with great distinction in the highest scientific councils of the nation—in government, in learned societies, and in private foundations. This University is especially grateful for having had the benefit of his wisdom during his years as trustee and vice chairman of the board.

PERSONAL MENTION

On May 12, Bronxites celebrated Bronx Day for the first time in 36 years, and none more appropriately than Dr. **Detlev W. Bronk,** a direct descendant of Jonas Bronck who settled in the area in 1639 and for whom the borough is named. Dr. Bronk was a guest at the proceedings during which he recalled some of his boyhood memories of the Bronx.

With the closing of the academic year, those retiring from University service include:

James Burns, a watch engineer in the Power House, (retired on June 1) after nine years

Joseph Kral, security guard, after two years

Mrs. **Sybil Monahan,** a typist-clerk in the library, after three years

Mrs. **Ella L. Seaquist,** food service supervisor in the hospital kitchen, after five years

Mrs. **Frances Snizek,** a night cleaner, after nine years

Mrs. **Thekla Wolf,** a helper in the laboratory of Dr. Rollin D. Hotchkiss, after 11 years

John A. Wynne, a porter in the Instrument Shop, after seven years.

DEATHS

March 13, Mrs. **Irene Yanack,** 81, a laboratory helper from 1946 to 1958.

May 4, Mrs. **Anna Rice,** 87, a cleaner in the hospital from 1932 to 1947.

May 6, Miss **Mattie Belle Lewis,** 65, a counter helper in the cafeteria from 1963 to 1970.

May 29, Mrs. **Katherine Patrylow,** 83, a cleaner in the hospital from 1931 to 1947.

Set July Opening for New Cafeteria

The new cafeteria on the second floor of the Tower Building is scheduled to open in July. It will be for the use of all members of the University community for all meals. The present cafeteria in Smith Hall will be changed into a short-order canteen. The Welch Hall dining room will be converted into much-needed library space, and the dining room in Abby Aldrich will be reserved for use on special occasions only. The new facility has a seating capacity of 350. Initially, the lunch hour will extend from 11:30 to 2.

Diners will enter through the Tower Plaza behind South Lab (where underground snow-melters will be installed for the winter). Immediately inside, they will find a white marble lounge with two large conversation pits; accents and supports are bronzed aluminum and the floor-to-ceiling windows, consistent in all the rooms, are lightly bronze-toned. After making their selections in the stainless steel and tile serving area, they will emerge into two contemporary dining rooms, with sweeping views south and east, and with dark grey formica and aluminum tables, raised central platforms ringed with tiled floral panels, Italian crystal chandeliers, light grey cork walls, and soft carpeting.

Faculty Promotions

The promotions of 20 faculty members have been announced. They are:

To professor: Harry G. Frankfurt, philosophy, and Attalah Kappas, metabolism.

To associate professor with tenure: Fernando Nottebohm, animal behavior, and Maria A. Rudzinska, parasitology.

To associate professor: Bruce A. Cunningham, biochemistry, John Earman, philosophy, Bruce S. McEwen, physiological psychology, and Donald W. Pfaff, physiological psychology.

To assistant professor: Vincent Agnello, immunology, Viktor Bokisch, bacteriology and immunology, Joel Grinker, human behavior and metabolism, Thomas C. Jones, cellular immunology, Thomas J. Kindt, bacteriology and immunology, Christiana M. Leonard, physiological psychology, Ralph E. Norgren, physiological psychology, Daraius K. Panvelwalla, metabolism of lipids, Barry W. Peterson, neurophysiology, Daniel B. Rifkin, chemical biology, Shigeru Sassa, biochemistry, and William A. Scott, biochemical genetics.

IN PRINT

Four books recently released by Hafner Publishing Company bear the name of Paul A. Weiss as author or editor. *Bio-Medical Excursions: A Biologist's Probings into Medicine* contains the author's selections from his own previously published essays, many of which have been hard to find or out of print.

In a new volume, *Within the Gates of Science and Beyond: Science and Its Cultural Commitments,* Dr. Weiss again draws upon his own experience. In a more broadly philosophical framework, he discusses the meaning and spirit of science, its special attributes, and the implications of science's humanistic mission for our civilization. *Hierarchically Organized Systems in Theory and Practice* contains six essays by prominent scientists of different disciplines chosen by Dr. Weiss to accompany his own title essay and to illustrate its theme—that the systems dynamics of living organisms have specific implications for man's thinking and planning in the organization of human society. *Principles of Development: A Text in Experimental Embryology,* first published in 1939, has been reissued with a new foreword and essay by Dr. Weiss.

A fifth book, *Life, Order, and Understanding: A Theme in Three Variations,* published as a special supplement to the *Graduate Journal,* The University of Texas, deals with the problem of the degrees of order and of freedom in natural systems from molecules to man and society.

Exterior of Dome to Be Resurfaced

Caspary dome will live again! After the demise of the original blue Italian tile covering—victim of the harsh conditions of the city—the exterior of the dome will be resurfaced this summer. Those blue squares that rested rather inelegantly against it for so long were different samples being tested. The decision has gone to the lightest blue, flecked with white dots. The dome will first have to be smoothed with a treated coating called Insul-Mastic. Then the outer coating, a rougher texture of plastic and slate granules, will be sprayed on. The result should be both beautiful and long lasting. The job will take about five to six weeks, depending on weather. In addition, the tile bridge between the auditorium and Caspary Hall will be cleaned and waterproofed.

Sickle Cell Study

On May 21, at a University research colloquium, Drs. Anthony Cerami, James M. Manning, and Peter N. Gillette presented their preliminary findings on the application of potassium cyanate as a means of inhibiting the sickling of red blood cells, the critical condition in sickle-cell anemia, an incurable hereditary disease. They reported that they added potassium cyanate to blood in the test tube and found that it irreversibly inhibited 80 per cent of the cells from sickling or becoming crescent shaped. The sickling is the result of an abnormality in the formation of the protein hemoglobin which impairs transmission of oxygen to the tissues. One of the peculiarities of sickling is that it appears to affect blacks almost exclusively. Dr. Robert M. Nalbandian of Blodgett Memorial Hospital in Grand Rapids, Mich. has been experimentally treating patients with the chemical urea and has reported long-term improvement. His work led Drs. Cerami and Manning to consider cyanate as the possible active ingredient. (Drs. George R. Stark, William H. Stein, and Stanford Moore of Rockefeller already have shown that there is enough cyanate in urea to react with protein.) In their test tube experiments Drs. Cerami and Manning have found that cyanate works more slowly than urea but, unlike urea, forms a chemical bond with the hemoglobin to prevent resickling. Research is still in its early stages and problems of toxicity are being studied. In tests with mice over several months, there have been no deaths to date.

BRIEFS

Professor **René J. Dubos,** Environmental Biomedicine, received honorary doctor of science degrees from Marquette University on May 23 and from Bard College on May 29, and an honorary degree of doctor of humane letters from Williams College on June 6. Dr. Dubos delivered the commencement address at all three ceremonies as well as at Sarah Lawrence College on June 4.

Professor **H. Keffer Hartline,** Biophysics, received an honorary doctor of science degree from the University of Pennsylvania on May 24.

Dr. **Detlev W. Bronk** was appointed chairman of the United States delegation to the National Science Foundation–Binational Conference on Education and Research in the Life Sciences held in India June 20–30.

The National Academy of Sciences' new Institute of Medicine, which began operations last December, announced its initial list of members on June 11. Among them were four from the University's faculty—**Vincent P. Dole, Henry G. Kunkel, Maclyn McCarty,** and **James A. Shannon.** The purpose of the institute is to conduct studies and to influence national policy on major health issues.

Professor **Bruce Merrifield,** Biochemistry, received an honorary doctor of science degree from Yale University on June 14.

Dr. William Gibbons introduces Children's School visitors to the world of chemistry. Looking on, Dr. Lyman C. Craig and teacher, Mrs. Judith Vogel.

Governor Signs Air Rights Bill

On May 13, Governor Rockefeller signed a bill, passed recently by the legislature, which authorizes New York City to convey, by sale, the air space above the Franklin D. Roosevelt Drive, from 62nd Street to just beyond 71st Street. The right to use the air space for expansion of facilities had been requested by The Rockefeller University and neighboring institutions on York Avenue. (See *news and notes,* March, 1971.) Preliminary site plans for the use of the air space must now be submitted to the City Planning Commission for approval. Then the Board of Estimate must decide the terms of conveyance.

Lyons Appointment

David J. Lyons, who has served as director of economic planning since February, 1970, has been appointed controller of the University. A certified public accountant with a broad knowledge of applied mathematics and computer operations, he came to Rockefeller from the University of Rochester where he had been director of finance and, before that, assistant controller. Mr. Lyons received his B.A. and M.B.A. degrees from The University of Chicago, where he subsequently held the position of administrative assistant to the comptroller until moving to Rochester.

Dr. Stanley Dies

Dr. Wendell M. Stanley, a Nobel laureate and a pioneer in research on the nature of viruses, died June 15 in Salamanca, Spain, where he was attending a conference. Dr. Stanley, a professor of molecular biology and biochemistry at the University of California at Berkeley, was 66 years old. From 1931 to 1948, he was a member of the scientific staff of The Rockefeller Institute for Medical Research. In 1946, Dr. Stanley shared the Nobel Prize in chemistry with Dr. John H. Northrop, a colleague at Rockefeller, and Dr. James B. Sumner of Cornell University.

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