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The Rockefeller University

THE ROCKEFELLER UNIVERSITY

JULY 1975
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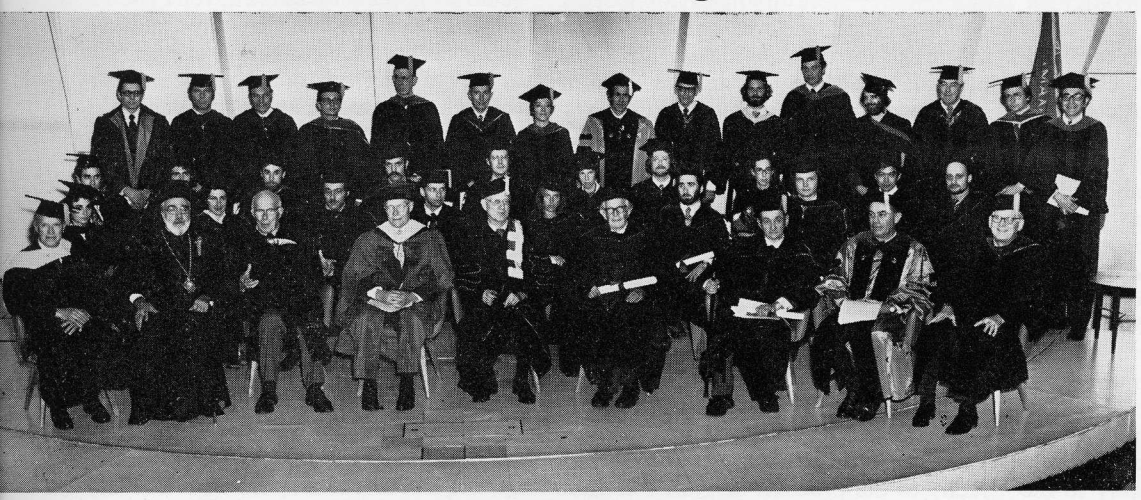
news and notes

Twenty Receive Degrees at Seventeenth Convocation



Front row, left to right: Vice President Carl Pfaffmann, His Eminence Archbishop Iakovos, Professor René J. Dubos, Trustee William O. Baker, President Seitz, Dr. Jean Piaget, Professor Theodore Shedlovsky, Dean James G. Hirsch, Vice President Maclyn McCarty. Second row, Ph.D. recipients. Standing, faculty presenters.

On Thursday, June 12, President Seitz awarded the Ph.D. degree to 20 young men and women at the University's 17th annual convocation. The University also bestowed honorary doctor of science degrees on three great men of science, Swiss psychologist Jean Piaget and the University's own René J. Dubos and Theodore Shedlovsky. Ceremonies were held at 2 P.M. in Caspary Auditorium before an invited audience of family, friends, and colleagues of the recipients. William O. Baker, vice chairman of the board of trustees, represented the board in the absence of David Rockefeller, who was out of the country.

Jean Piaget was presented for his degree by Professor George A. Miller, who traced the course of a career that led from a degree in natural science and an interest in philosophy to the construction of "a profound and highly original theory of human perceptual and intellectual development." Born in Neuchâtel, Switzerland, on August 9, 1896, Piaget earned his Ph.D. from the University of Neuchâtel in 1918 with a dissertation on the mollusks of Valais. Believing that the methods of biological science could be applied to the problems of epistemology, Piaget thought to begin his investigations by studying the mental processes of children, a project which ultimately engaged him for decades. The resulting observations and ideas have, in Dr. Miller's words, "inspired students of child psychology all over the world."

René J. Dubos and Theodore Shedlovsky both came to this campus in 1927, at the beginning of their respective careers. Together, they represent nearly a century of service to the advancement of science and humanism. In presenting Dr. Dubos, Professor James G. Hirsch spoke of the village boy who wanted to become a bicycle racer and who became, instead, one of the world's leading microbiologists—the discoverer of the first antibiotic—and, in his later years, the "elder statesman" of the ecology movement. Professor Vincent P. Dole described Theodore Shedlovsky as a scientist whose contributions to electrophysiology represent "classics of precise technique" and as a man whose love of music, of people, and of this University inspired him to establish the Rockefeller Concerts and the University's Children's School.

René Dubos was born in Saint Brice, France, on February 20, 1901. He earned a degree in agricultural science in Paris, and, in 1927, a Ph.D. in soil biology from Rutgers University. Among his early achievements was the isolation of the antibacterial substance, gramicidin. Although it proved too toxic for general use, gramicidin paved the way for the subsequent development of penicillin and streptomycin. Later in his career, his research on tuberculosis, a disease which is affected by environmental factors, led Dubos to an interest in the effects of environment on the overall quality of human life. A Pulitzer Prizewinning author, he has written 15 books on science, ecology, and humanism. Dr. Dubos has received 33 honorary degrees from leading universities all over the world.

Theodore Shedlovsky was born in Leningrad, Russia, on October 29, 1898. He came to the United States in 1908 and earned his S.B. in 1918 and his Ph.D. in physical chemistry in 1925 from the Massachusetts Institute of Technology. His major work has been on conductivity and the thermodynamic activity of ions in solution. He is one of a small band of pioneers at this University who, under the leadership of the late Duncan MacInnes, applied the techniques of physical chemistry to the exploration of the physical forces involved in the chemical activities of living tissues. Dr. Dole characterized his longtime friend as "a special person who makes the world around him richer."

In keeping with the University's tradition, each Ph.D. candidate was presented to President Seitz by a faculty member with whom he or she worked closely. Three degrees were awarded *in absentia*. The ceremonies were followed by a reception on the 17th floor of the Tower.

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

MICHAEL E. BRATMAN

(*Degree granted* in absentia)

The topic of Michael E. Bratman's thesis was Intentional Action and Acting Against One's Better Judgment. His research advisers were Donald Davidson and Joel Feinberg.

EVE I. BRILES

Alexander Tomasz

Eve Briles joined our lab just at the time when we were trying to understand how DNA molecules enter a bacterial cell during genetic transformation, and our

attention turned to the surface envelope of the bacterium. These intricate and beautiful structures are built from about 15 different building blocks, sugars, amino acids, amino sugars, woven into a giant network that forms a continuous envelope around the cell. Perhaps the most remarkable property of these structures is that they have the same size and shape as the bacterium and they retain this size and shape even when separated from the live cells by the methods of biochemistry. The unique morphology of a bacterial cell is imprinted into these macromolecules by the unique arrangement of tens of thousands of chemical bonds that hold the whole structure together. How such an incredibly large and complex macromolecule may be reproduced is bewildering to think about. Yet, a test tube full of bacteria can produce millions of precise copies of these microscopic masterpieces of architecture every minute. Eve designed an ingenious and elegant experiment to find out something about this morphogenetic process. By tagging the cell envelope with radioactive atoms she was able to show that these structures were reproduced by the bacteria in a beautiful, symmetrical fashion, incorporating new elements only to the exact center. She could also show that entire hemispheres of these envelopes were passed on to daughter cells, apparently intact, during cell division. Eve's new project was the biochemical characterization of another, lipid-containing component of pneumococcus. This work was important for the subsequent identification of the biological function of these compounds as key regulatory agents of an important enzymatic component of cell surface growth.

NICHOLAS L. CROSS

(*Degree granted* in absentia)

The topic of Nicholas L. Cross's thesis was The Fate of Erythrocyte Iron Following Phagocytosis by Macrophages. His research adviser was Zanvil A. Cohn.

SHU MAN FU

Henry G. Kunkel

Dr. Shu Man Fu came to Rockefeller University after obtaining his M.D. degree at Stanford University Medical School. He was sent here on the recommendation of our former colleague, Professor Halstead Holman. He adapted well to the University environment—the usual remarks about the fictional Chinese character were suitably ignored. His initial research work was directed toward the membrane immunoglobulins of the lymphocyte, the receptor molecules for antigen that initiate the terminal differentiation of this cell. He explored primarily the anomalous finding of two different receptors on single lymphocytes. It proved possible to demonstrate in an ingenious set of experiments that both had identical specific antigen binding sites despite large differences in the rest of the receptor molecule. This was solid work and constituted the main body of his thesis. However, as so often happens in science, serendipity also crossed his path, and he made a most surprising unrelated observation. The complement system which consists of at least 12 interacting protein components is an important accessory branch of immunity. Dr. Fu found that the genes controlling the second component of complement were closely linked to those of the histocompatibility complex, which relates directly to the problem of graft rejection. This linkage has been confirmed and extended to at least four other complement components as other laboratories have joined in exploiting his fortuitous finding. A fascinating story with broad implications is unfolding.

JAMES GOULD

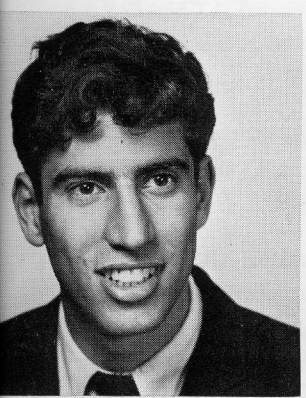
Donald R. Griffin

When James Gould came to The Rockefeller University from Cal Tech, he had already published an excellent paper on the question of whether honey bees communicate symbolic information through the "dances" discovered by Karl von Frisch. This important conclusion had been challenged by critics who claimed that responses to odors could account for the results of von Frisch's experiments and that the close correlation between dance pattern and the location of food is an accidental epiphenomenon. Working at our Field Research Center in Millbrook, Jim devised an entirely new procedure which increases the precision of the important experiments carried out by von Frisch many years ago. In order to control for the effects of odors brought back by foraging bees from the place where food has been gathered, Jim developed a method to alter the dance pattern experimentally so that a dancing bee points to a different place from the actual food source. Almost all of the bees recruited by these altered dances flew to the place indicated by the dance rather than to the actual food location. These ingenious experiments confirm von Frisch's original conclusion that information about distance and direction can indeed be conveyed from one bee to another through the dances, and also open up a new and greatly improved method for analyzing this unique case of symbolic communication between animals.

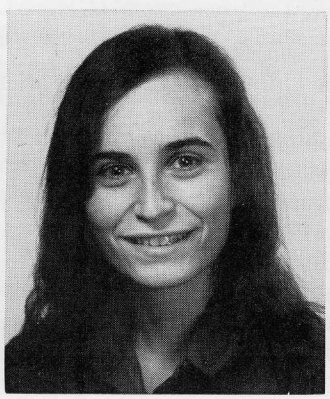
BEVERLY GREENSPAN

Donald R. Griffin

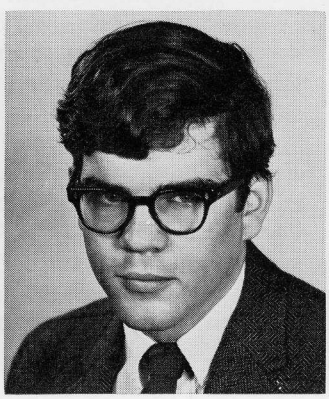
Inspired by Professors Marler and Struhsaker during their field course in ecology and ethology, Beverly Greenspan managed to combine her long-standing interest in invertebrate animals with the new developments in sociobiology. She selected for study the fiddler crabs of the genus *Uca*, building upon the observations and experiments of Jocelyn Crane. The males of these small crabs have one claw enormously enlarged, which is used almost entirely for waving displays which serve for communication. Female fiddler crabs when ready for mating walk through these groups of displaying males and are courted by increased waving activity and attempts by each male to entice, lead, or herd the female into his burrow. Females inspect the burrows, feeling their entrance with one claw, and either continue on their way or crawl down in. The successful male then follows, plugs the burrow, and neither is seen for a day or two. By extensive and very laborious quantitative studies of the successes and failures as a function of male size, burrow location, phase of the tidal cycle, and many other ecological factors, Beverly has produced the most thorough quantitative analysis of the mating strategy in an invertebrate species. Behavioral ecologists and sociobiologists have been developing general theories to



BRATMAN



BRILES



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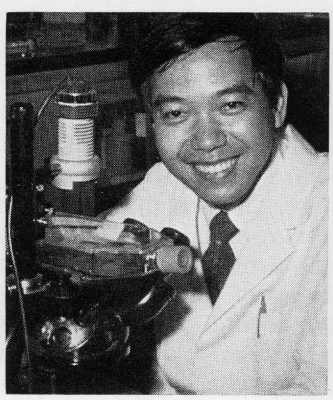

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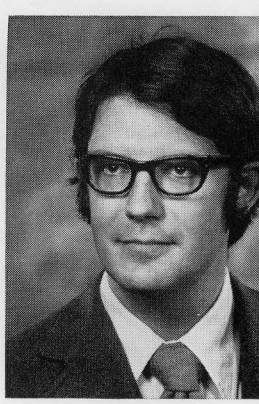
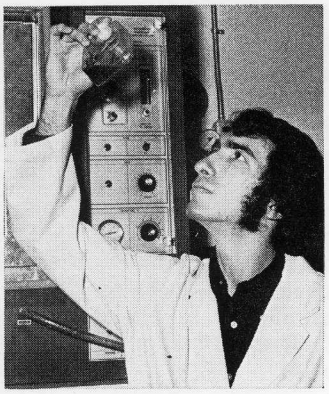
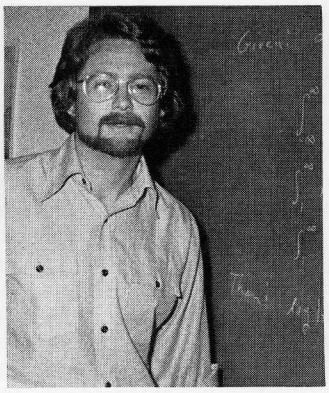


GOULD

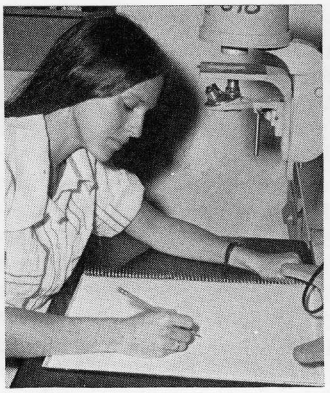
GREENSPAN



GUNTHER



HENDRICK



KELLEY

LAZAROWITZ

account for ecological influences on social behavior. Her investigations have provided one of the very few examples where quantitatively adequate data are now available to begin the process of calibrating theory against reality.

GARY R. GUNTHER

Gerald M. Edelman

In the immune response, the lymphocyte bearing an antibody on its surface is induced to divide after the binding of a foreign antigen to that antibody. This division is an essential feature of the immune response and its study is rewarding both in its own right and as a model of the fundamental process of cell division. In his graduate work, Gary Gunther chose to analyze lymphocyte division or mitogenesis and in a series of elegant experiments has discovered several new features of the mitogenic response. Using cleverly prepared derivatives of certain plant proteins that are known to trigger cell division, he found that each lymphocyte responds on a schedule of its own. This important and seminal observation opened a new view of the control of mitosis in these cells. Pursuing the matter further, he used drugs such as colchicine to show that the response is regulated by protein structures in the cytoplasm known as microtubules. This suggests that the response of a cell to divide is under control of definite macromolecular assemblies. These studies have an important bearing on division in other cells and have excited much interest in the fields of cell biology and immunology. We look forward with excitement to Gary Gunther's continuing work in these areas of study.

EDWARD HENDRICK

Nicola N. Khuri

Feynman has conjectured that the physical description of multiparticle production in high energy collisions is mathematically analogous to that of a gas in statistical mechanics. Ed Hendrick's thesis has concentrated on some general mathematical aspects of this analogy which turn out to restrict the growth in energy of the total absorption cross section for the collision of two particles. The resulting restrictions are quite general and independent of the dynamical details of the theory. His results also put the Feynman analogy on a firm mathematical footing and provide the first step for generating useful models that can describe particle production at high energies. In addition to his thesis, Ed's other research in the past two years typifies the unique opportunities offered to a graduate student at this university. He has published one paper in collaboration with a senior physicist who visited us from France, another in a joint effort with a young visitor from Denmark, and a long paper in collaboration with several of the research associates in our group. In this latter effort he worked closely with members of Professor Cool's experimental physics laboratory and got fully involved in the exciting results they obtained at the Fermi National Accelerator Laboratory. Ed leaves us with already established experience and solid contributions in different areas of elementary particle physics.

DARCY B. KELLEY

Donald W. Pfaff

Many advances in reproductive biology began with work on amphibians. Darcy Kelley used for her thesis research the frog *Xenopus laevis,* for several reasons a good strategic choice for the study of hormone effects on brain and behavior. She demonstrated for the first time steroid hormone control over reproductive behavior in this animal. Then, with help from Joan Morrell and Bruce McEwen, she found cells in specific portions of the brain which accumulate radioactive testosterone or radioactive estradiol. There were significant differences between testosterone and estradiol concentrating neurons, but there were no differences between male and female *Xenopus* in the locations of these cells. Together with work on many other species in the lab, these results support the generalization that all vertebrates have neurons in specific brain regions which accumulate steroid hormones. Since the animals studied range from fish through frogs, birds, and Rhesus monkeys, it seems difficult to imagine that accumulation of steroid hormones by neurons is not also a property of the human brain. Darcy's thesis, a combination of neuroanatomical, behavioral, and endocrine research, is the kind that can be done especially well at Rockefeller University.

SONDRA G. LAZAROWITZ

Purnell W. Choppin

In 1970, Sondra Lazarowitz came to Rockefeller University after an outstanding record at the Massachusetts Institute of Technology. Here in the virology laboratory, she made a "Newe Acquayantance" (a 16th century English term for influenza), and since then neither Sandy nor the influenza virus has been quite the same. She plunged immediately into research on the mechanisms of multiplication of the virus. From the very beginning, Sandy showed a talent for both the formulation and execution of experiments that was truly remarkable for someone so early in her career, and her efforts rapidly yielded new and exciting results. She produced the first clear picture of the synthesis of the proteins of influenza virus in infected cells and discovered a new virus protein. She identified the rate-limiting step in the assembly of the virus at the surface of the cell, discovered that the major protein of the viral envelope may be cleaved into two subunits, and identified an enzyme responsible for this. She then showed that under certain conditions the infectivity of influenza virus, and its ability to spread, is enhanced by this cleavage. These findings have added greatly to our knowledge of this virus, which continues to cause epidemics that periodically sweep the world. One facet of Sandy's experience here is an important feature of Rockefeller University itself, that is the ability of a student to move between laboratories. On many occasions she has availed herself of the advice, help, and equipment of members of Dr. Norton Zinder's laboratory, particularly Doctors Robert Webster and Peter Model. We have seen Sandy develop into a talented and accomplished scientist and scholar.

DAVID B. MALAMENT

Donald A. Martin

David Malament's thesis director, John Earman, is no longer at The Rockefeller University and could not be present to-

day. I am pleased to substitute for him. David's attention has been mainly directed toward the philosophy of general relativity and its bearing on the general philosophy of space and time. Many philosophers have objected to space-time as a fundamental notion and have attempted to define spatio-temporal relations in terms of causal relations between events. David has concerned himself with whether or not this program is soundly motivated and whether or not it can be carried out. His research has led to significant philosophical arguments about this issue, arguments which he has supported by proving some very interesting and often difficult mathematical theorems. Examples of these theorems are results stating that if a space-time in the sense of general relativity is not extremely causally anomalous then its causal structure determines its topological and metrical structure.

MICHAEL MAUTNER
Frank H. Field

Michael Mautner's thesis research has comprised studies of the chemical physics of gaseous ions. Ions play an important role in chemistry, but they interact very strongly with their surroundings, and consequently it is quite difficult to determine their intrinsic properties. To decrease their interactions and to determine these intrinsic properties, our laboratory has been studying the properties of ions in the gas phase using mass spectrometric techniques. Michael has studied a number of different specific aspects of this general problem, and perhaps his most interesting discovery, which was made in collaboration with another worker in our laboratory, is that certain types of bimolecular ionic reactions have strong negative temperature coefficients. This behavior means that the reactions go slower as the temperature increases, and if all reactions behaved in this fashion, you would cook your morning egg by placing it in the deep freeze and preserve your milk by keeping it on the back of the stove. The phenomenon that Michael helped discover permits a deeper understanding of the factors that influence the rates of chemical reactions and, as such, its importance transcends the bounds of ionic chemistry and has a significance for chemical kinetics in general. Michael is a man of high intellectual capabilities, which are coupled to a high degree of independence of thought and action. Ideas are important to him, and discussing and debating scientific matters with him has for all of us in the laboratory been a joy and a challenge.

BARBARA MAZUR
Norton D. Zinder

The molecular details of the control of and the mechanism of DNA replication are still being unraveled. Barbara Mazur chose to study the control of DNA replication in the small single-stranded DNA containing bacteriophage f_1. Following infection, the DNA of the phage becomes a double-stranded closed circular ring using host enzymes to accomplish this. Two phage gene products are necessary for further replication: one product of gene II which nicks the closed double strand so that replication can proceed, and a second gene product, that of gene V, which controls the ratio of single- to double-strand synthesis. The gene V product is a DNA binding protein. Barbara has shown that gene V product is accumulated in cells infected at high temperature with mutants that produce a temperature-sensitive gene II product, and upon a shiftdown in the temperature of incubation, single-strand synthesis proceeds immediately; thereby demonstrating explicitly that it is the gene V protein that switches double- to single-stranded DNA synthesis. By a series of ingenious temperature-shift experiments, using a variety of temperature-sensitive and nonsense mutants and inhibitors of protein synthesis, Barbara was able to show that the gene V product, after binding to single-stranded DNA and then being displaced by the gene VIII product to form the virus particle, is recycled. It is this recycling, coupled with the synthesis of new gene V product and new gene II product—the synthesis of the latter probably under control of the gene V protein—which maintains the appropriate ratio of single- and double-strand synthesis necessary for the continuous production of viral particles as the host bacterial cells continue to grow. Another bit of knowledge about the control of DNA synthesis has been obtained.

CLARKE F. MILLETTE
Gerald M. Edelman

Perhaps no objects in the known biological world contain so much information in so small a space as the male gametes of certain species. Yet these fascinating cells remain largely unexplored at the level of detailed biochemistry and molecular biology, and we still know very little about the details of fertilization in mammalian systems. After preparing himself in cell biology and biochemistry, Clarke Millette set out to explore some of this biochemistry. The task he set himself was rather simple: to cleave the mammalian sperm (for example, that of a mouse) into its component parts: head, tail, and midpiece, so they could be analyzed separately by biochemical methods. No consistent way of doing this was known, but as a result of Clarke's graduate research, it is now possible to dissect a sperm by enzymes into its regions and to fractionate these by physical means. This not only provides a tool for exploring the surface of the sperm head and its relation to fertilization but also provides a new way of collecting sperm tails. Furthermore, it suggests how a sperm might shed its tail at the right point in fertilization. These techniques have been taken up already by various laboratories with fruitful results. No more essential and socially important field of biological research exists than reproductive biology, and it is encouraging that this field will gain by the admission of another skilled devotee.

JAMES B. RAND
Edward L. Tatum
(read by Zofia K. Borowska in Dr. Tatum's abence)

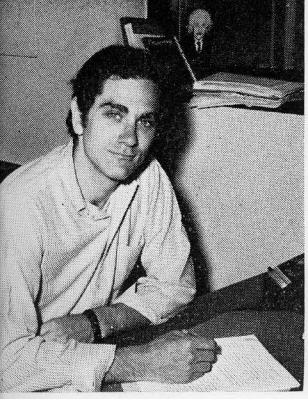
James B. Rand's work has concerned the mechanism and regulation of galactose metabolism and transport of this sugar and others in *Neurospora.* This rather esoteric subject may seem surprising in a laboratory which has concentrated primarily on the biochemistry and genetics of morphology of the mold *Neurospora.* Actually, in his exploratory studies on form and shape, Jim discovered a new way of changing *Neurospora* morphology by feeding it the sugar galactose, instead of glucose. His analysis of this phenomenon led him to the detailed study of the kinetics of galactose uptake by the mold cells, of the transport mechanism itself, and of its regulation by galactose and by other sugars. His really classic study has been very carefully and imaginatively done, and adds considerably to our basic knowledge of *Neurospora.* Although it has not yet provided a definitive answer to the role of galactose in morphology, the results strongly indicate the involvement of cell membrane structures and functioning. Jim has thus opened an exciting new aspect of *Neurospora* morphology. During such experiments deep into the wee hours, he often had what he felt to be profound philosophical insights, and would adorn the blackboards with snatches of poetry, original limericks (it's not easy writing a limerick to a fungal mutant), political diatribes, snatches of philosophy, and an occasional cartoon.

BRIAN J. SCHLOSSER
(*Degree granted* in absentia)

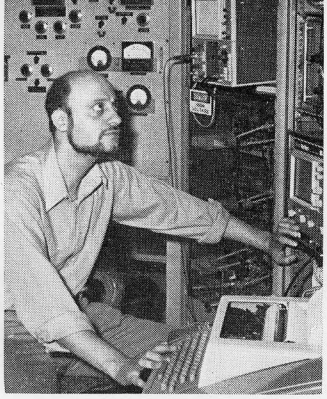
The topic of Brian J. Schlosser's thesis was A Defense of Ethical Naturalism. His research advisers were Joel Feinberg and Robert Schwartz.

KEITH STENNING
George A. Miller

Keith Stenning came to Rockefeller from Oxford in 1969. As an undergraduate his major interests were in psychology and philosophy. Although he has since added theoretical linguistics to the list of academic topics in which he is an expert, his interest in combining psychology and philosophy as mutually supporting ways to understand human mental processes



MALAMENT



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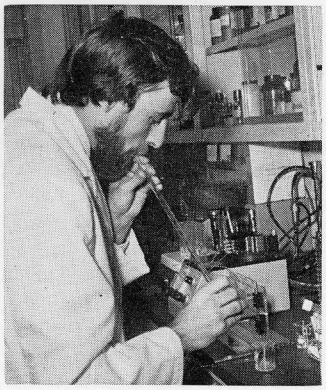

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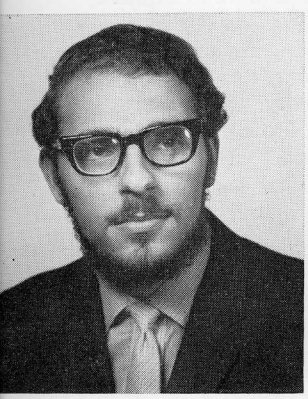
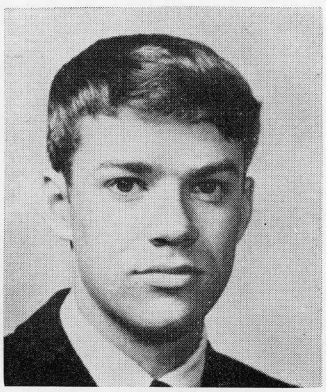
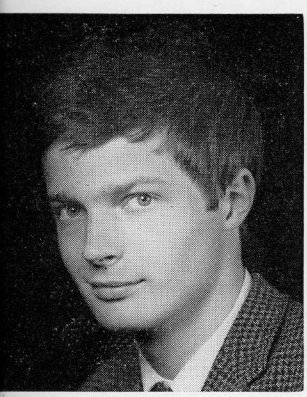


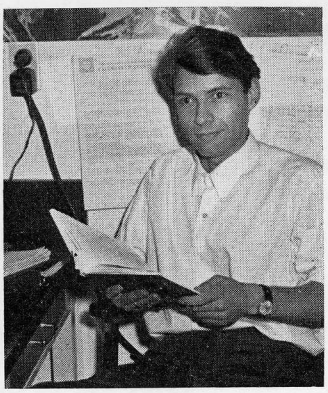
RAND



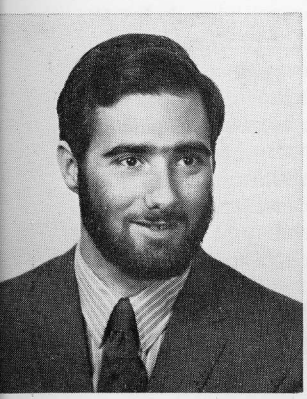
SCHLOSSER



STENNING



TAUBER



DE LA TORRE-BUENO

WEINSTEIN

survived his transatlantic crossing. In his dissertation, on Understanding English Articles and Quantifiers, he tried to understand *a*, *the*, *some*, *all*, and *any*. The importance of these words is not due merely to the fact that they are among the most frequently used. They lead directly into the most difficult questions about the way human language works: quantifiers are critically important to logicians, and linguists have written extensively about their grammatical properties. Keith Stenning's contribution was to construct and test experimentally a psychological theory of these words and how they are used and understood in ordinary discourse.

JURG W. TAUBER

John B. Zabriskie

The exact mechanism whereby we maintain the delicate balance between "self" and "foreign" looms as one of the major unsolved mysteries in immunology. Included in the search for this Holy Grail is the desire by many scientists to regulate this recognition system in such a manner as to accept certain tissues but maintain a rigorous defense system for all other foreign antigens—an area of science that we now recognize as the field of transplantation immunology. It is a difficult and lonely quest with many obstacles on the way and requires an individual with special talents. This person must have infinite patience, an open and inquisitive mind, the ability to utilize multiple disciplines, and, above all, a stubborn and determined character. Such a person is Jurg Tauber. He has shown that the presumed cross-reaction between streptococcal antigens was, in reality, based on inactivation of complement components by streptococcal structures. Pursuing this finding, he then convincingly outlined the pathways of complement activation by these structures—an activation of the alternate pathway which was quite unusual. While the results have created a diversion from the original quest, they may provide valuable insights into mechanisms of bacterial host interactions. Yet Dr. Tauber's search for the mechanisms of immune regulation will continue, and we wish him well on his journey.

JOSE DE LA TORRE-BUENO

Donald R. Griffin

Even before he had graduated from the State University of New York at Stony Brook, Jose Torre-Bueno was already participating with Rockefeller scientists in radar observations of migrating birds. The summer following graduation, he collaborated on studies of the social behavior of electric fish in Guyana. Later, he studied behavioral ecology with Professors Marler and Struhsaker in East Africa. He participated in two oceanographic cruises from Woods Hole in which our tracking radar gathered data on the migrations of small birds across the western North Atlantic Ocean. One of the most impressive aspects of these radar observations was the relatively slow air speed of many small birds that had already flown hundreds of miles from the coast. Jose was so impressed by the demands of such prolonged flights—many extending for three days or more without any opportunity to rest, eat, or drink—that he turned to physiological studies of temperature and water regulation in flying birds. He modified a small wind tunnel so that he could induce flights of many hours duration within a small space where detailed measurements became feasible, although far from easy. (One warbler flew without landing for 16 hours.) The hardy and abundant starling proved to be the most suitable species for these experiments. Jose worked out methods for measuring the rate at which starlings consume fat and lose water during flights lasting several hours. Miniature radio transmitters surgically implanted in starlings measured body and surface temperatures without appreciable behavioral distortion. Jose has achieved a unique synthesis of analytical, physiological experiments on flying birds with radar and other observations of actual migration in the real world.

SCOTT WEINSTEIN

Saul A. Kripke

Scott Weinstein did distinguished work at Rockefeller in two rather disparate areas. In the philosophy of language Weinstein found a method of applying Tarski's technique of truth definition to languages containing demonstratives. His results were published in a leading philosophical journal, *Nous*. Aside from the philosophy of language, Weinstein's primary interests have been in mathematical logic and the philosophy of mathematics, especially intuitionism. Though his motivations were philosophical his thesis was austerely mathematical. Weinstein discovered a powerful new method (independently discovered in another recent doctoral thesis) for applying the "Kripke models" for intuitionistic logic to prove independence results and other proof theoretic properties of intuitionistic formal systems of number theory and analysis. By an ingenious use of saturated models not to be found in the other thesis, Weinstein succeeds in applying the method even to systems with choice and continuity principles. His methods yield elegant proofs of previous results and solutions to outstanding problems. I expect that major applications of it are yet to come.

HONORARY DEGREES

RENÉ J. DUBOS

James G. Hirsch

Two events highly significant for today's ceremony occurred in 1901. The Rockefeller Institute was founded in that year, and it was also the year in which René

Dubos was born in a tiny village 30 miles north of Paris. As a boy his ambition was to become a champion bicycle racer. Dubos went to college in Paris, earning the equivalent of a master's degree in agricultural science. After working for a couple of years as an abstractor and translator at an agricultural institute run by the League of Nations in Rome, he pulled up stakes and set sail for America, with no definite plans or arrangements. Fate intervened; he encountered on the boat Dr. Selman Waksman, who suggested that Dubos come to Rutgers to study soil microbiology. René followed the suggestion, earning his Ph.D. degree in a little less than three years. Shortly before graduation, René applied for a National Research Council postdoctoral fellowship. His application was rejected because he was an alien, but some unidentified secretary wrote a P.S. on a rejection letter suggesting that Dubos seek advice from his countryman Alexis Carrel at The Rockefeller Institute. René visited the Institute in May of 1927. The visit ultimately resulted in the offer of a fellowship. Except for a two-year period as Fabyan Professor at Harvard in the 1940s, Dubos spent his entire professional life, nearly 50 years now, at our institution. His work may be divided into three periods. The first period was concerned with studies in basic microbiology. He found an enzyme that degraded the pneumococcal polysaccharide. He did pioneering work on the phenomenon of adaptive enzyme formation. He isolated from a soil organism the antibacterial substance gramicidin, a discovery that played a seminal role in the most significant therapeutic advance in the history of medical science, the development of antibiotics for the control of infectious diseases. Although gramicidin proved too toxic for general use, the work on it stimulated Florey to develop the production of penicillin, and led Waksman to the discovery of streptomycin. In his middle years, Dubos studied tuberculosis, an interest stimulated by a death from this disease in the family. The studies on tuberculosis initially were in the area of bacteriology and experimental pathology. As Dubos observed tuberculosis in experimental animals and in patients in a special unit in our hospital, he became more and more struck with the role of environmental factors in determining the onset and course of the disease. The third phase of Dubos' career, the past 15 years, has been directed mainly toward the environment. René was one of the principal leaders of the modern ecology movement. Throughout his career, Dubos has excelled as an author. He has written some 15 books, ranging from hard science through biography to ecology and humanism. He is currently hard at work on a new book, a biography of Oswald Avery. René is characterized further by some of his own book titles that are apt descriptions of the author; he began as a *free lance of science*; his life and career exemplify well *man adapting*; he is and has always been *so human an animal*. René, The Rockefeller has been your home for essentially all of your professional life. Here are your colleagues and your warmest memories, here are your beloved rows of plane trees, here are some of us who think with pride of ourselves as your sons.

JEAN PIAGET

George A. Miller

Jean Piaget is a biologist, philosopher, educator, psychologist. The scope of his many contributions to modern thought cannot be briefly summarized. The occasion permits mention only of the work for which he is best known, his construction, over a period of more than 50 years, of a profound and highly original theory of human perceptual and intellectual development. Jean Piaget was born and educated in Switzerland, receiving his doctorate in natural sciences from the University of Neuchâtel in 1918 for a dissertation on the mollusks of Valais. As a young man he was interested in philosophy and became convinced that the methods of biological science could be applied to problems of epistemology. His initial efforts to realize this application led him to Paris, where Binet and Simon had begun testing children's intelligence. Piaget became fascinated, not with the correct responses of the average Parisian child, but with their mistakes and the developing mental processes they revealed. His clinical method of eliciting those mental processes produced results that made him internationally famous before he was 30 and established him as a leading scholar in Geneva. Initially, Piaget intended to spend only a few years studying the mental and perceptual development of children, then to attack the problems of genetic epistemology. This plan was defeated by success, as he began to discover unexpected regularities in the developing child, to improve his methods of observing them, and to elaborate his observations and ideas in theoretical forms that have inspired students of child psychology all over the world. Before he returned to his original plan, the "few years" had stretched into 30. Space, time, quantity, causation—these concepts provide the coordinate system within which we organize our experience and transform it into knowledge. They are basic to our attempts to understand the world we live in, and to all our scientific accomplishments. The genius of Piaget has been to trace the development of these fundamental concepts in the growing mind of the child, and thereby to enrich, not only our understanding of children, but our appreciation of the nature and limitations of all human knowledge. For his courage and imagination in a far-ranging intellectual adventure, this University is proud to salute him.

THEODORE SHEDLOVSKY

Vincent P. Dole

Professor Theodore Shedlovsky combines many rare qualities. In his scientific work he is distinguished as an electrochemist. His work on conductivity and the thermodynamic activity of ions in solution are classics of precise technique. In the field of science, these and other achievements have been well recognized by his peers, as evidenced by his membership in learned societies including the National Academy of Sciences. There is much for us to admire in his scientific achievements, and yet they are not the only reason why we honor him today. As a person, Ted Shedlovsky represents something even rarer than electrochemistry—he is a special person who makes the world around him richer. He has launched conferences, started and guided our remarkable concert series, created a school for University children, and counseled many of us; all this with a gentle humility and an unending flow of forgettable jokes. No wonder he has so many friends. And yet there is more to explain. During the past 20 years, as our institution grew from a relatively small Institute for Medical Research to the present wide-ranging University, there was always the danger that growth would lead to fragmentation, and that in this we could lose the spirit that has made this institution great. No matter how distinguished the individual laboratories, the whole must be greater than the sum of its parts if our institution is to be strong. It is to this sense of community that Ted Shedlovsky has made a unique contribution. The concert series and children's school are more than conveniences; they are essential components of our community, bringing us together over the gaps of age and divergent scientific interests. Someone once said that The Rockefeller University is a place where people are better than they really are. If this is true—and I believe that it is—then Theodore Shedlovsky has contributed greatly to the magic of this environment.

WHERE TO NOW FOR THE CLASS OF '75?

Despite the uncertainties of the times, the graduating class of Rockefeller, 1975, will be fully and impressively employed in the coming year.

MICHAEL E. BRATMAN is already holding a post as an assistant professor in the Department of Philosophy at Stanford University in California.

EVE I. BRILES has been serving since July 1974 as a postdoctoral fellow of the Jane Coffin Childs Memorial Fund for Medical Research in the Departments of Hematology and Oncology at the Washington University School of Medicine, St. Louis.

NICHOLAS L. CROSS is pursuing studies in reproductive biology as a research fel-

low in the Department of Obstetrics and Gynecology at the Cornell University Medical College, next door on York Avenue.

SHU MAN FU, who came to Rockefeller with a medical degree, will remain after graduation as an assistant professor in the immunology laboratory of Professor Henry G. Kunkel.

JAMES GOULD, after a vacation in Great Britain, will become an assistant professor in the Department of Biology at Princeton.

BEVERLY GREENSPAN will continue her studies of the sociobiology of invertebrates as an assistant professor at Bowdoin College, Brunswick, Maine.

GARY R. GUNTHER will receive postdoctoral training at the Yale University School of Medicine working in the laboratory of George E. Palade, under the direction of James D. Jamieson, both previously associated with Rockefeller.

EDWARD HENDRICK will become a research associate in theoretical particle physics at Carnegie-Mellon University.

DARCY B. KELLEY will remain at Rockefeller as a postdoctoral fellow working with Professor Fernando Nottebohm, Animal Behavior.

SONDRA G. LAZAROWITZ also remains at Rockefeller, as a Helen Hay Whitney Fellow working with Professor Hugh D. Robertson, Genetics, until next June. Then she will go, also under a Whitney Fellowship, to the Department of Microbiology of The Johns Hopkins University School of Medicine. Dr. Lazarowitz's husband, Gary J. Hoffman, who already holds three degrees, including a medical degree, is working to complete his Ph.D. at Rockefeller in the cellular physiology and immunology laboratory of Professors Zanvil A. Cohn and James G. Hirsch.

DAVID B. MALAMENT has been appointed assistant professor in the Department of Philosophy of the University of Chicago.

MICHAEL MAUTNER will remain at Rockefeller as a research associate in the physical chemistry laboratory of Professor Frank H. Field.

BARBARA MAZUR has been appointed a postdoctoral fellow at the University of Chicago.

CLARKE F. MILLETTE is the recipient of a Special Fellowship in Reproductive Biology at the Laboratory of Human Reproduction and Reproductive Biology of the Harvard Medical School. He takes away from Rockefeller, in addition to his degree, a bride—Pat Watson, formerly a secretary in the Purchase and Supply Service.

JAMES B. RAND has received an appointment as a research associate in the Division of Biology of the California Institute of Technology.

BRIAN J. SCHLOSSER, whose thesis was completed earlier this year, has been serving as a postdoctoral fellow in the Department of Philosophy of the University of Adelaide in Australia.

KEITH STENNING will continue his work at the University in the experimental psychology lab of Professor George A. Miller as a research associate.

JURG W. TAUBER, who came to the University as an experienced physician and surgeon, will remain here as an assistant professor in the laboratory of bacteriology and immunology, although his "heart is still in the Swiss Alps."

JOSE DE LA TORRE-BUENO has been appointed a research associate at Duke University.

SCOTT WEINSTEIN, who has been teaching in the Department of Philosophy at the University of Maryland-Baltimore County for the past year, will assume a post as visiting assistant professor in the Department of Philosophy at the University of Pennsylvania.

IN PRINT

An article, "The Brain as a Target Organ of Endocrine Hormones," by Professor **Bruce S. McEwen,** Physiological Psychology, appears in the May issue of *Hospital Practice.* In it, Dr. McEwen gives an overview of the background, current theories, and work in progress on the effects of endocrine hormones on the brain in experimental animals, particularly in relation to sexual differentiation, sexual behavior, mood, and perception.

The work being conducted by Professor **Victor J. Wilson** and his neurophysiology laboratory on the neural basis of postural reflexes is described in an article, "The Labyrinth, the Brain, and Posture," in the May–June issue of *American Scientist.*

"How the Liver Metabolizes Foreign Substances," is the subject of an article in the June issue of *Scientific American* by Professors **Attallah Kappas,** physician-in-chief, and **Alvito P. Alvares,** Metabolism-Pharmacology. A large number of drugs that enter the body as well as most other foreign substances that man is exposed to are metabolized by the liver to generally inactive substances. As the authors explain, "biotransformation in the liver is therefore a critical factor not only in drug therapy but also in defending the body against the toxic effects of a wide variety of environmental chemicals such as insecticides, herbicides, dyes, food preservatives, and a number of substances that are suspected of inducing cancer."

Shannon Receives Medal of Science

The White House announced on June 23 that James A. Shannon is one of 13 who will be honored by President Ford with the National Medal of Science, the government's highest award for achievement in science, mathematics, and engineering. (The date for the presentation has not yet been determined.) This brings to eight the number of Rockefeller recipients since the medal was established in 1959. The others were President Seitz (1973), Theodosius Dobzhansky and Neal E. Miller (1964), Peyton Rous and Donald D. Van Slyke (1965), Fritz Lipmann (1966), and Detlev W. Bronk (1968).

Lipmann Honored

Professor Fritz Lipmann, Biosynthesis, received the Orden Pour le mérite für Wissenschaften und Künste from the German Bundespräsident Walther Scheel, in a ceremony held in Bonn June 1–3. The original Orden Pour le mérite was a military order founded by Frederick II of Prussia. On the recommendation of Wilhelm von Humbold, Frederick William IV of Prussia, in 1842, instituted a class for civilians in the sciences and arts. Other recipients have been Sir Hans Krebs, co-winner with Dr. Lipmann of the Nobel Prize, ethologist Konrad Lorenz, writer Thornton Wilder, sculptor Henry Moore, and composer Carl Orff.

In addition, a Ciba Foundation Symposium volume (No. 31), *Energy Transformation in Biological Systems,* has been dedicated to Dr. Lipmann.

RU Chess Club Turns Harvard Crimson

On May 22, the Rockefeller University Chess Club demolished the previously unbeaten Harvard Club Chess Team—on Harvard's own ground—in a five-to-two victory. Rockefeller's number one player, Mark Wieder, beat Gisela Gresser, nine times U.S. Women's Chess Champion. Other members of the Rockefeller team were Steven Wolff, captain, George Barany, Harry Frankfurt, Ivan Lieberburg, Carl Rettenmier (who bested author Cleveland Amory), and Mark Troll.

This is the final issue of news and notes *for the academic year. Publication will resume with the October issue. During the summer months, we look forward to receiving news items—by mail or phone.*

APPOINTMENTS

Effective July 1: (This a partial list. Further July 1 appointments will be announced in October.)

Lewis Thomas, president, Memorial Sloan-Kettering Cancer Center, professor of pathology, New York Hospital-Cornell Medical Center, professor of medicine, Cornell University Medical College, as adjunct professor.

Lewis Krey, Physiological Psychology, and **Bruce S. Schneider,** Human Behavior and Metabolism, as assistant professor.

Dorothy L. Buchhagen, Viral Oncology, **Teruhiko Hagiwara,** Theoretical Physics, and **Kenneth L. Traupmann,** Comparative Human Cognition, as research associate.

READ TO CORNELL

Stanley E. Read, previously assistant professor in the laboratory of bacteriology and immunology, has been appointed an assistant professor in the Department of Pediatrics of the Cornell University Medical College, effective July 1. He will remain associated with his Rockefeller lab as an adjunct assistant professor.

PROMOTIONS

Effective July 1: (This is a partial list. Further July 1 promotions will be announced in October.)

Emil C. Gotschlich, Bacteriology and Immunology, to associate professor with tenure.

Alvito P. Alvares, Metabolism-Pharmacology, **William E. Bowers** and **Brian H. Poole,** Biochemical Cytology, **Joel A. Grinker,** Human Behavior and Metabolism, **Alfred Maelicke,** Chemical Biology, **Peter H. Model,** Genetics, **Barry W. Peterson,** Neurophysiology, **Shigeru Sassa,** Metabolism-Pharmacology, **Thomas Spencer,** Foundations of Quantum Field Theory, and **Robert J. Winchester,** Immunology, to associate professor.

Lidia C. Boffa, Cell Biology, **Marion E. Frank,** Physiological Psychology, **Robert W. Grady,** Medical Biochemistry, **Lee-Ming Kow,** Physiological Psychology, **Ronald P. Larkin,** Animal Behavior, **Alexander R. Mitchell,** Biochemistry, and **Anthony I. Sanda,** Theoretical Physics, to assistant professor.

BRIEFS

Professor **Victor J. Wilson,** Neurophysiology, is spending June and July as a visiting professor in the Department of Neurophysiology at the Brain Research Institute of the Tokyo University Medical School.

Trustee **Alexander G. Bearn,** chairman of the Department of Medicine of Cornell University Medical College and physician-in-chief of The New York Hospital, was one of three Foreign Associates elected to the Norwegian Academy of Science and Letters, which is the Norwegian equivalent of the National Academy of Sciences in this country. Professor Bearn was the only American scientist elected this year.

Professor **Donald Davidson,** Philosophy, presented the fourth series of John Dewey Lectures at the University of Minnesota, May 12, 14, 19, and 21. His topic was Speaking and Thinking.

Edith Skaar, a secretary in the mathematical psychology laboratory of Professor William K. Estes, received a B.A. in psychology from Hunter College this June.

Professor **Jules Hirsch,** Human Behavior and Metabolism, was visiting professor of medicine at the School of Medicine, University of Illinois in Chicago, March 20–21, and Joseph Goldberger Visiting Professor in Clinical Nutrition at St. Louis University, Missouri, May 22–23.

William O. Baker, vice chairman of the University's board of trustees and president of Bell Laboratories, was awarded the 1975 Gold Medal of the American Institute of Chemists, on May 21. On June 3, Dr. Baker received the 1975 Mellon Institute Award.

Professor **Gerald M. Edelman,** Biochemistry, has been elected to the board of trustees of The Salk Institute in San Diego, California, of which he is also a nonresident fellow. Dr. Edelman is one of five scientists featured in a new 27-minute color film, *Keyhole of Eternity*, produced and distributed by the National Science Foundation.

President Seitz, serving as National Speaker on Behalf of the Academic Community, addressed the 25th Anniversary dinner of the National Science Foundation, May 15, in Washington.

Tippett Paintings in Caspary Gallery

Ten paintings by Bruce Tippett—large, nonobjective works sprayed or dyed on loose fabric—are currently on view in Caspary Gallery. Mr. Tippett is a British painter who trained at the Leicester College of Art and the Slade School of Fine Art of the University of London and held a French government scholarship for study in Paris. He has also worked in Rome and in New York, where he now lives. He is represented in galleries and private collections in England and New York, including the Museum of Modern Art. The exhibition will remain in Caspary Gallery through September.

Professor **Stanley E. Read,** Bacteriology and Immunology, has received an Andrew W. Mellon Teacher-Scientist Award for 1975–76 from the Andrew W. Mellon Foundation.

Professor **Jonathan Winson,** Physiological Psychology, has been awarded a two-year Alfred P. Sloan Foundation Research Fellowship, effective September 1, to continue his studies in hippocampal function.

Professor **Bruce S. McEwen,** Physiological Psychology, assumed the chairmanship of the Neuropsychology Research Review Committee, a study section of the National Institute of Mental Health, on June 1.

Professor **Floyd Ratliff,** Biophysics, received an honorary doctor of science degree from Colorado College on June 2.

Professors **Purnell W. Choppin** and **Andreas Scheid,** Virology, participated in the Ninth Miles International Symposium, held June 4–6 at The Johns Hopkins Medical Institutions in Baltimore, under the sponsorship of Miles Laboratories, Inc. Dr. Choppin chaired a session on Virus Receptors at which Dr. Scheid presented a paper.

Professor **Joel A. Grinker,** Human Behavior and Metabolism, spoke on Taste Factors and Obesity at the annual meeting of the Institute of Food Technologists, in Chicago, June 8–11.

For the second consecutive year, **Reynard Biemiller,** assistant director of The Rockefeller University Press, received a graphic arts award from the Printing Industries of America, Inc., for design and production of the *Report of the President.*

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