7-1977

NEWS AND NOTES 1977, VOL.8, NO.10

The Rockefeller University

THE ROCKEFELLER UNIVERSITY

JULY 1977
VOLUME 8 NUMBER 10

news and notes

Fifteen Receive Degrees at Nineteenth Convocation

Fifteen graduate fellows received the Ph.D. degree on Wednesday afternoon, June 8, at the University's 19th annual convocation. The University also bestowed honorary doctor of science degrees on three eminent men of science: Alan R. Battersby, elucidator of how living systems build molecules, pioneer immunologist Michael Heidelberger, and Irvine H. Page, a physician and researcher whose work established a rational basis for the treatment and understanding of hypertension. All three were coming home to an institution where each had spent some part of his early career.

Among the graduate students who received their degrees, Ronald J. Koenig is the first participant in the joint Rockefeller-Cornell Medical College M.D.-Ph.D. program to complete the Ph.D. requirements. Professor Anthony Cerami, in his presentation, pointed out that "Ronald also has the distinction of being the first graduate to be a student of a graduate—myself—who was a student of a graduate—Professor Reich—who, in turn, was a student of the late Professor Edward Tatum."

The diplomas were presented by President Seitz in ceremonies held in Caspary Auditorium before an audience of family, friends, and colleagues. Among the participants was Patrick E. Haggerty, chairman of the board of trustees. As is the University's custom, the proceedings were limited to talks by presenters, who explained the significance of the degree recipients' work.

Alan R. Battersby is professor of organic chemistry at the University of Cambridge, England, and a fellow of the Royal Society. His early research revealed the biosynthetic pathways of the morphine alkaloids and other natural products, including quinine and the ipecac bases. He introduced several techniques, among them multiple isotope labeling, which have become standard laboratory procedures. In recent years, he has concentrated on the biosynthesis of heme, cholorophyll, the cytochromes, and vitamin B_{12}. Dr. Battersby was presented for his degree by Professor Edward H. Ahrens, Jr., with whom he worked here in the 1950s, in the laboratory of the late Lyman C. Craig. In 1975, Dr. Ahrens spent a year in Dr. Battersby's laboratory in Cambridge.

Front row, left to right: Professor Vincent P. Dole, Dr. Alan R. Battersby, Dr. Irvine H. Page, Dr. Michael Heidelberger, President Seitz, Board Chairman Patrick E. Haggerty, Dean James G. Hirsch, Professor Albert Claude, Professor Edward H. Ahrens, Jr., Vice President Maclyn McCarty, and Vice President Carl Pfaffmann. Standing behind them on the steps of Founder's Hall are the Ph.D. degree recipients and their faculty presenters.

Michael Heidelberger, currently adjunct professor of pathology at the New York University School of Medicine, has been affiliated with Mt. Sinai Hospital, the College of Physicians and Surgeons of Columbia University, and the Institute of Microbiology at Rutgers. His career began 65 years ago at Rockefeller, where an early triumph was the synthesis with Walter Jacobs of tryparsamide, the first effective drug for the treatment of African sleeping sickness. Subsequent work with Oswald T. Avery helped establish that the antigenic substances of one of the pneumonia organisms were polysaccharides. Dr. Heidelberger is the acknowledged founder of the science of quantitative immunochemistry, which has led to the development of precise analytical means for the measurement of antigens and antibodies and their interactions. In 1967, shortly before his 80th birthday, he received the National Medal of Science, the country's highest science award. He was presented for his honorary degree by Vice President Maclyn McCarty.

The work of Irvine H. Page, in the words of his presenter, Professor Vincent P. Dole, "has opened the modern era of neurochemistry, led to effective treatment for hypertension, and included the discovery of serotonin (a blood vessel-constricting substance)." Through research that began in the 1930s at the Rockefeller University Hospital in the laboratory of Donald D. Van Slyke, Dr. Page established that hypertension was not an inevitable event of aging, but a variable, complex disease capable of analysis and treatment. He achieved the first reversal of malignant hypertension with drugs and has made important contributions to the study of diet as related to high blood pressure. For many years director of the Lilly Laboratory for Clinical Research of the Indianapolis City Hospital, he became director of the Research Division of the Cleveland Clinic Foundation in 1945, where he is now director emeritus.

The evening before convocation, these three "alumni" were honored by

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the senior Hospital faculty at a black-tie dinner at the University Club.

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

STEPHEN GWYN BALLARD

David C. Mauzerall

When Gwyn joined us, he was already well trained in photophysics and had previous research experience at the Johnson Foundation. His awe-inspiring knowledge of and skill in electronics rapidly revolutionized our laboratory. He developed a conductance apparatus which measures changes of 10^{-9} M of univalent ions in a fraction of a microsecond. The trial run of the apparatus showed a variety of proton transfer reactions never before seen in flavin photochemistry. As an approach to the central problem of photosynthesis, Gwyn studied the photo-induced formation of porphyrin ions as a function of the dielectric constant in a large number of solvents. The sensitivity of his apparatus allowed several kinds of excited-state reactions to be studied: triplet with ground, triplet-triplet, and excited-triplet state ionizations. The striking changes in yields and rates of these reactions provide strong evidence for the importance of electron spin and electron tunneling. These effects are quantum mechanical in origin and it appears that these primary photoreactions, analogous to those in photosynthesis, cannot be explained in classical terms.

GEORGE BARANY

Bruce Merrifield

George Barany was accepted as a graduate fellow of Rockefeller University directly after graduation from Stuyvesant High School. This proved to be an unusual but highly successful experiment. He soon showed himself to be a bright and eager learner and quickly completed a study of the ATP binding site of actomyosin. He went on to devise and conduct a very fine research project in organosulfur chemistry that carried him not only into organic synthesis and peptide chemistry but also into extensive use of mass spectrometry and nuclear magnetic resonance techniques. The result was the introduction of the concept of orthogonal protection for peptide synthesis and the development of an important new class of amino protecting groups that are selectively removed by thiolysis. While pursuing his scientific training, George found time to develop his social life and his athletic skills and to help establish the very successful Rockefeller University Chess Club.

DANIEL F. BAYER, JR.

Donald A. Martin

One of the goals of the study of logic is to answer the question: when does one assertion follow logically from another? Modern logic provides an answer to this question: assertion A follows logically from assertion B if A can be deduced from B by the formal rules of what is called the first-order predicate calculus. This notion of logical consequence has gained general acceptance. Nevertheless, it is unclear whether such acceptance is more than a sociological fact. There is available at least one other account of the notion of logical consequence, second-order logic. Sandy Bayer has addressed himself to the problem of whether first- or second-order logic provides a better framework for the formalization of natural and mathematical discourse. After an illuminating discussion, he dismissed some of the standard objections to second-order logic. Nevertheless, he argued persuasively that second-order logic does possess serious deficiencies of a different kind, deficiencies that mark it as clearly inferior to first-order logic as an account of the notion of logical consequence. Bayer's work sheds considerable light on a fundamental issue.

WESLEY L. COSAND

(*Degree granted* in absentia)

The topic of Wesley L. Cosand's thesis was A Novel Synthetic Study of the Role of Arginine in the Bee Venom Neurotoxin, Apamin. His research advisor was Bruce Merrifield.

JEFFREY S. GERONIMO

Kenneth M. Case

When Jeff first came to the University, he was to work in the biological sciences. His request to transfer to the physics program was greeted with some trepidation because of his lack of preparation. However, by hard work and native intelligence he quickly remedied these deficiencies. Since then, he has been applying methods developed for studying the scattering of particles to the theory of orthogonal polynomials. He has developed an elegant formalism that permits a completely parallel discussion of polynomials defined on the unit circle or on a portion of the real line. Many new (and old) results were found by particularly simple and transparent means.

GARY J. HOFFMAN

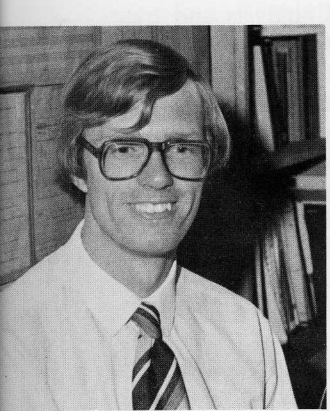
(*Degree granted* in absentia)

The topic of Gary J. Hoffman's thesis was Studies on the Complement Receptor of a Human Lymphoblastoid Cell Line. His research advisor was Samuel C. Silverstein.

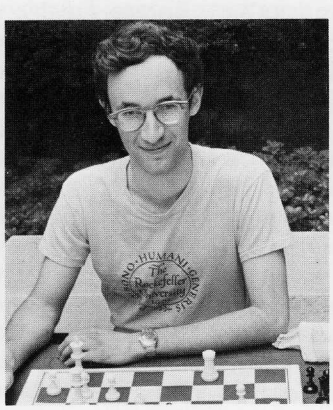
NORMAN E. KAGAN

David C. Mauzerall

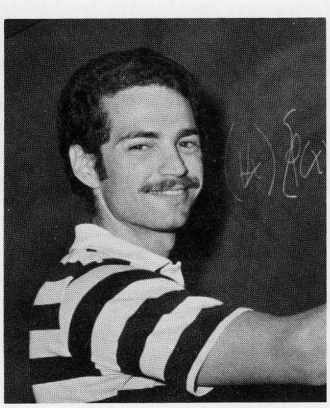
Norman began his research at The Rockefeller with Professor Merrifield. He synthesized an azulene amino acid as a substitute and molecular probe for tryptophan in proteins. Norman then used this experience and his expertise in



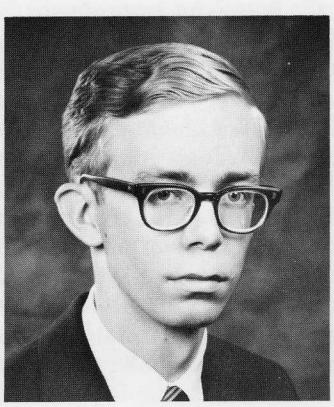
BALLARD



BARANY

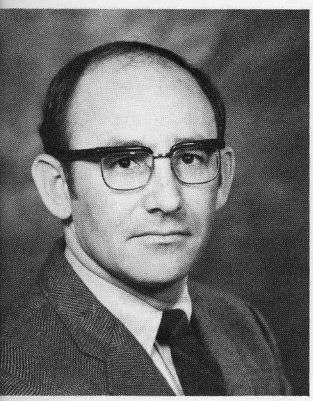


BAYER



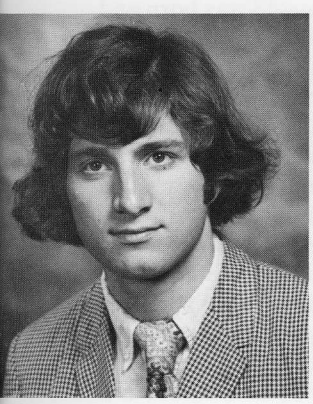
COSAND

GERONIMO



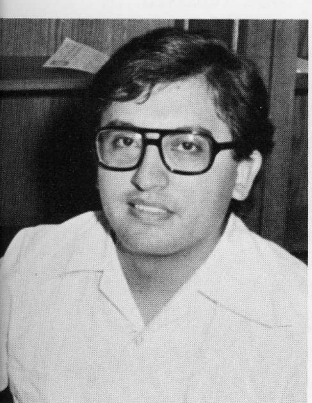
HOFFMAN

KAGAN

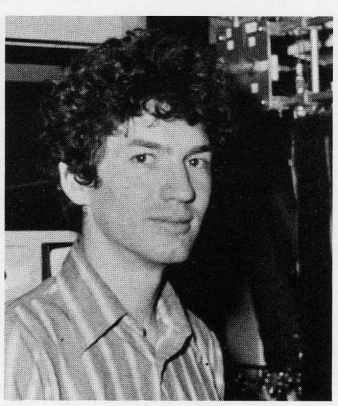


KOENIG

NOGUEIRA



PEREZ



PICCIONI

porphyrin chemistry to attempt the synthesis of a highly symmetrical, tetra-bridged, face-to-face dimer of a porphyrin. Since the primary electron donor in bacterial photosynthesis is a dimer of bacteriochlorophyll, the photochemical properties of Norman's dimer are of great interest. The proof of structure of this large molecule, molecular weight about 1,500, is quite classical. Cleavage of the dimer at ester bridge bonds releases two porphyrins, one of which has been formed *de novo* and exclusively by the final cyclization reaction in the dimer synthesis. It is the high symmetry of porphyrins and of the dimer that allows the synthesis of so large a molecule. The beautiful symmetry of this molecule belies the blood, sweat, and tears that went into its synthesis. This work continues a new direction in chemistry begun by Professor Merrifield: the synthesis of large molecules whose desired properties depend on their detailed structure in three-dimensional space.

RONALD J. KOENIG

Anthony Cerami

Ronald Koenig is the first Biomedical Fellow to obtain his Ph.D. (The M.D.-Ph.D. program was initiated five years ago in cooperation with Cornell Medical School. The objective was to train future biomedical scientists who would be equally at home in the laboratory and the clinic. Such students would receive their M.D. from Cornell and Ph.D. from The Rockefeller.) Ron chose as his research problem the study of the biochemical basis of the complications of diabetes mellitus. These complications, which occur even in patients treated with insulin, affect the eyes, kidneys, nerves, and heart, and now account for the morbidity and mortality associated with the disease. Diabetes is the third ranking cause of death in this country and the leading cause of new cases of blindness in adults. Since the complications of diabetes take many years to develop and since the tissues affected are not very accessible to study, Ron studied the glycosylation of hemoglobin as a biochemical model for the development of the lesions of diabetes. His studies revealed that diabetic mice glycosylate hemoglobin (nonenzymatically) three times faster than normal mice. This increased glycosylation is a function of the diabetic state and presumably occurs with other body proteins, and if so, could account for the lesions that develop in this disease. In addition to providing a unifying concept for the development of the sequelae of diabetes, an important practical application was achieved. This was the demonstration that the amount of the glycohemoglobin, hemoglobin A_{Ic}, found in the blood of a diabetic patient is a measure of the degree of carbohydrate control over the previous four to five weeks. Until this finding, it had not been possible for the physician or patient to assess the degree of diabetic control accurately. This objective measurement is of great value to diabetologists and is now being adopted by diabetes clinics around the world, and will probably be used routinely in the future for the management of diabetics.

NADIA NOGUEIRA

Zanvil A. Cohn

As the result of one parasite, *Trypanosoma cruzi*, more than 20 million people in Central and South America alone suffer from Chagas' disease, which in its chronic form is associated with debilitating heart disease. Nadia Nogueira is a native of one of those countries, Brazil, with a medical background and a deep interest in and empathy for both the medical and sociological aspects of this infection. When she began her studies some few years ago, little solid information existed on the pathogenesis of this infection and what mechanisms were responsible for either the resistance or susceptibility of the host. This is not the case today. Through a series of incisive and imaginative experiments she has characterized the important developmental forms of the parasite, which is able to survive within the host cell, the trypomastigote. In the process, she developed new procedures for the isolation of the infectious form and its separation from the more numerous avirulent epimastigotes. She then characterized the mechanism of parasite uptake, a process involving specific membrane receptors and the subsequent enclosure of the parasite within a host membrane-derived vacuole. After interiorization, the avirulent forms were rapidly destroyed, whereas the infectious forms were able to lyse the vacuole in which they resided and escape into the cytoplasm. These basic studies on normal animals were followed by an analysis of the host after infection. In this instance, she discovered that the white cells of the immune animal are now "activated"—able to destroy the virulent parasite—and express important morphological and chemical differences from their normal counterparts. These changes could be induced in the test tube by exposing white cells to the products of antigen-sensitized lymphocytes, an important form of cell-cell cooperation and solid evidence for the important role of cell-mediated immunity.

MIGUEL ANGEL PEREZ ANGON

M. A. B. Bég

Radiative neutron capture is an important reaction in nuclear physics. In a nuclear reactor, for example, it initiates the reaction chain whereby uranium-238 transmutes into plutonium-239. Miguel Pérez chose to investigate the possibility of using this type of reaction to glean information about the weak interactions of elementary particles—the interactions responsible for the phenomenon of beta radioactivity. To this end, he carried out a detailed theoretical analysis of the simplest capture reaction, to wit, neutron + proton → deuteron + gamma ray, and showed

that precise measurements of the angular distribution and the circular polarization of the gamma ray can help decide between various models of weak interactions. The work of Pérez will undoubtedly play a useful role in pinpointing the correct theory of weak interactions and thereby contribute to the quest for the Holy Grail of particle physics: the theory that unifies all elementary particle interactions.

RICHARD G. PICCIONI

David C. Mauzerall

Richard made the transition from a student of general biology to an investigator in biophysics with determination and good-humored patience. The latter quality was particularly needed in his work with the oxygen luminometer, an apparatus whose exquisite sensitivity is equaled only by its agonizing slowness. Richard began by following the lead of a previous student, Dr. Bruce Diner, in obtaining an oxygen-evolving cell-free preparation from the primitive blue-green alga *Phormidium luridum*. He hoped to fool Mother Nature by finding a substitute for manganese ions in the preparation. Then came his discovery, something neither predicted nor expected. By careful observation, Richard found a specific requirement for calcium ions to generate oxygen. Many possible mechanisms of the indirect action of calcium were ruled out by a well-executed series of experiments. The calcium seems to be directly and reversibly bound to the photochemical apparatus that makes oxygen. This discovery suggests that photosynthesis may be controlled by calcium in the cells.

PRAVINKUMAR B. SEHGAL

Igor Tamm

Interferons are highly active virus-inhibitory proteins that cells make after exposure to viruses or double-stranded RNA. The production of interferons is itself a tightly controlled process, in that, after stimulation, cells make interferon only for a matter of hours; then they turn further production off. In elegant experiments Pravinkumar Sehgal has obtained evidence that exposure of cells to double-stranded RNA not only sets off a burst of synthesis of stable interferon messenger RNA, but also initiates a prolonged synthesis of a repressor RNA. This RNA is responsible for the shutting down in a few hours of the translation of interferon messenger RNA into the interferon protein. In these studies Pravin made effective use of a chemical probe of RNA synthesis —a benzimidazole derivative—with which we have worked for over 20 years. In collaborative experiments with Dr. Darnell, the action of this chemical probe on messenger RNA synthesis has been defined for the first time. The benzimidazole derivative prevents the shutoff of interferon production, and thus Pravin has been able to prolong interferon production for many days, thereby laying the basis for a new procedure for obtaining large quantities of this important antiviral substance. Pravin has carried out his work within the broad conceptual framework of regulation of synthesis of specific cellular proteins. He has successfully interpreted the new evidence in the light of important ideas in the field and thereby contributed new understanding.

ROCKY TUAN

Zanvil A. Cohn

The regulation of calcium ion transport into the cell by means of hormones and other mediators is thought to play an important role in the function of both nucleus and cytoplasm. A more apparent role for calcium occurs in the formation of the skeleton. In this instance calcium must be carried from tissue depots via the vascular system to be deposited in bone. One of the most dramatic examples of this form of transport occurs in the hen's egg. Here all the calcium necessary for the development of the embryonic skeleton must come from the eggshell. Through the work of Rocky Tuan, we now have a better understanding of how this is accomplished. Let me recount some of the highlights of Rocky's discoveries in the context of a classical Chinese banquet. As an appetizer, he identified a calcium-binding protein in the chorioallantoic membrane whose concentration was age-dependent and correlated with the onset of both calcium transport and deposition in the embryo. Next, he served a main course in which he purified the protein to homogeneity by salt precipitation, gel filtration, and preparative isoelectric focusing. This was followed by its physicochemical characterization—a 100,000-dalton protein consisting of 4 identical subunits, an isoelectric point of 8, which contained 10 high-affinity and 100 low-affinity binding sites, some of which may be related to the presence of the novel amino acid, γ-carboxy glutamic acid. Switching to meatier pursuits, he prepared a monospecific antibody against the purified protein, which was then used to characterize the ontogeny of development as well as to localize the protein to the surface of ectodermal cells by means of immunocytochemistry. The soup course, which signaled the end of the meal, consisted of establishing the membrane in organ culture and finding that vitamin K induced the expression of the calcium-binding protein in vitro, an effect which could be inhibited by the K antagonist warfarin.

JEAN-DOMINIQUE VASSALLI

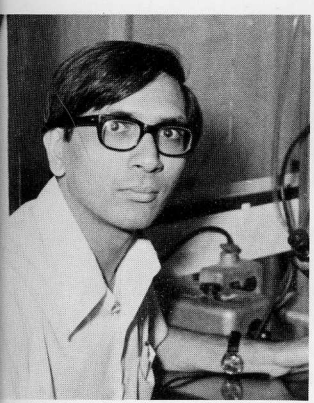
Edward Reich

Jean-Dominique Vassalli was born and grew up in Geneva, and, guided by a general interest in science, entered medical school there. He spent his last summer before graduation working at Rockefeller, and then decided to enter our graduate program. After a year in Professor Zanvil Cohn's laboratory, where he studied some properties of lymphocytes with Dr. Silverstein, he joined our group for training in biochemistry. He arrived just at the time that another graduate student, Jay Unkeless, in a collaboration with Dr. Cohn's laboratory, had discovered a new enzyme which was released by macrophages. The properties of this enzyme made it a convenient tool for studying macrophage function. Macrophages are involved in two linked defense responses of the body, namely, inflammation and immunity. To arrive at sites of inflammation, macrophages have to move for considerable distances through tissues, and Jean-Dominique showed that the cells used this enzyme for such migrations. He made the important discovery that hormones which reduce inflammation, such as cortisone, do so by blocking production of this enzyme and thereby paralyzing the cells. For macrophages to migrate, they have to be recruited by unknown chemical signals, and enzyme production is their response. One can use this response as an assay for isolating and identifying the signal, and in this way Vassalli has also been isolating a new hormone that probably recruits macrophages to the places where they are needed. It is too early to fit his results into a specific disease category, but they are likely to relate to chronic inflammations such as arthritis. Although these have been his major accomplishments, his enthusiasm has gotten him into a wide spectrum of interesting subjects; these range from blind mice to genetic diseases in man, and, together with Angela Piperno, he has recently identified an enzyme that is missing in a hereditary disorder common to mice, mink, cats, cattle, and man.

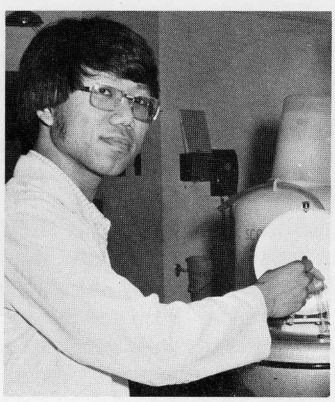
FULTON WONG

Bruce W. Knight, Jr.

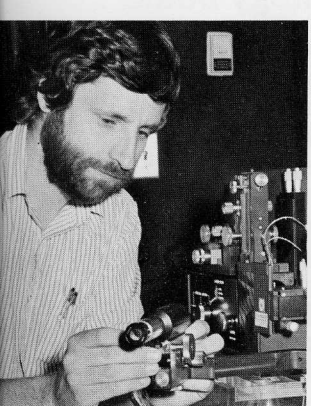
Our nervous systems apprehend the world around us by means of electrical events in our sensory cells. Visual cells, for example, respond to light with a chaos of voltage fluctuations, disorderly and unpredictable. To understand that chaotic sensory response was the goal of Fulton Wong's thesis research. Some of the carefully chosen visual cells he removed surgically from horseshoe crabs. Others were contributed by aristocratic fruit flies inbred to contain as many as three visual genetic mutations. Typically, Fulton would insert, under the microscope, two tiny microelectrodes within a single cell, and so force its living machinery to serve as an electronic circuit component in the feedback loop of a sensitive amplifier. He coped with the consequent outpouring of data by connecting the amplifier's output to the input of a digital computer. By thoughtful reasoning, which drew upon the modern theories of random processes, linear systems analysis, and functions of a complex variable, Fulton showed how the chaos of the sensory response may be reduced to a few crisp, orderly principles. He resolved the response into discrete unit membrane events, in some cases as many as a tenth of a million events per second in a single cell. These unit events Fulton further resolved into four measurable attributes, named height, duration, rate, and dispersal. Then he showed that these fundamental attributes respond separately to the cell's physical and chemical environment. He showed further that they reflect the actions of separate molecules, which stem from the expression of separate paragraphs in the organism's genetic encoding. Fulton's research defines a frontier in our understanding of the cellular and molecular basis of sense perception.



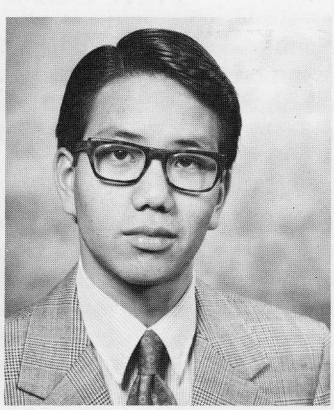
SEHGAL



TUAN



VASSALLI



WONG

HONORARY DEGREES

ALAN R. BATTERSBY

Edward H. Ahrens, Jr.

Each Spring the greening of this campus is a marvel to behold. Today we have occasion not only to enjoy the beauty of our trees and shrubs, but also to pay special tribute to the greenness itself. It is not an exaggeration to say that chlorophyll and its cousin, heme—the action center of hemoglobin—stand at the very center of life on this planet. And so it is highly appropriate that Alan Battersby is honored here today for having shed sunlight on the final stages in assembly of the ring system of these two related materials. The scientists here hold chlorophyll in very great respect. They have themselves contributed richly to our present understanding of the structure of this beautiful molecule and its key role in the energy metabolism of animals as well as of plants. Sam Granick, whose death last month deprived this faculty of one of its most original minds, spent many fruitful years describing the mechanisms that guide the early steps in synthesis of this compound in nature; David Mauzerall has explored how chlorophyll turns sunlight into chemical energy; Philip Siekevitz has enriched our understanding of the transport of electrons from one heme-protein to another, that is, through the cytochrome system; and Attallah Kappas has broadened our understanding of a human disorder of heme synthesis called porphyria by showing how the coupling of two entirely unrelated enzyme defects produces the devastating manifestations of this disease. I myself have had the privilege of working in the chemistry laboratory alongside Alan Battersby on two separate occasions: here at Rockefeller in 1950, when we two had the privilege of working with Lyman Craig, a great scientist, and then in 1975, when I spent a chemical year in Battersby's laboratory at Cambridge University. His firm embrace of new techniques and his three-dimensional intuitions have solved many puzzles in the biosynthesis not only of chlorophyll but also of such medically important materials as morphine, colchicine, quinine, ipecac, and vitamin B_{12}. He has earned acclaim everywhere for his adeptness in coupling the organic chemist's talent for multiple isotope labeling of substrates with the biochemist's skill in manipulating the stereospecific capabilities of plant enzymes. He is a unique combination of organic chemist and biochemist.

MICHAEL HEIDELBERGER

Maclyn McCarty

Michael Heidelberger came to The Rockefeller Institute for Medical Research as a young man in 1912, when the Institute itself was in its youth. The building we now know as Founder's Hall, where he initially worked, was then but 6 years old. The other building of the Institute, the Hospital, where he spent the latter part of his 15 Rockefeller years, had opened its doors less than 2 years before his arrival. He found a favorable environment for the application of his chemical skills to problems of medicine. An early triumph was the synthesis with Walter Jacobs of the arsenical, tryparsamide, a drug that proved to be highly effective in the treatment of African sleeping sickness. He was later to share in an award from the Belgian government in recognition of the great benefits to its African colony of this achievement of Rockefeller scientists. While he made a number of other contributions in organic and biological chemistry in this early period, the event that shaped his subsequent career was his decision to accept the repeated invitations of O. T. Avery to join him in studying the nature of the specific soluble substances of pneumococci. They showed that these antigenic substances, so important in the disease-producing capacity of the pneumonia organism, were polysaccharides, opening a new path for the study of immunochemistry. Heidelberger has followed this path with its many ramifications since that time. In his determination to apply the rigorous techniques of chemistry to the biological phenomena of immunology, he became the founder of quantitative immunochemistry, overcoming, in his words,

"the tyranny of titer" and "the dictatorship of dilution." Through his own efforts and those of his many students and disciples, the precise science of immunochemistry has contributed to all fields of biology and medicine. Michael Heidelberger has successfully resisted the artificial finality of academic retirement. After his long, fruitful career at the College of Physicians and Surgeons of Columbia University, his first nine years of so-called retirement were spent at the Institute of Microbiology of Rutgers University. Since 1964 he has carried on his work at New York University, where he continues to mine new scientific nuggets from research on the pneumococcal polysaccharides, more than 50 years after their initial identification.

IRVINE H. PAGE

Vincent P. Dole

Irvine H. Page is a city boy who made good in the country. Forty years ago he left this Institution to go to the hinterlands. Despite this radical step, his work has opened the modern era of neurochemistry, led to effective treatments for hypertension, and included the discovery of serotonin. He has combined basic discoveries with a full life as a physician, teacher, administrator, writer, and editor. Without doubt, Page would have been a successful biochemist even if he had not come here. Indeed, he had already made his mark while still in his twenties. But the scope of his work clearly reflects his training at what then was called The Hospital of The Rockefeller Institute for Medical Research. Consider his associates: Donald Van Slyke, his chief, an eminent clinical chemist, was directing studies on nephritis, which at the time was the only known cause of hypertension. "Fess" Avery, in an adjoining department, was quietly asking fundamental questions about the chemistry of the pneumococcus. Rufus Cole, the abbot of the monastery, had attracted a constellation of brilliant young investigators. Many later held major chairs in medicine and medical science across the country. Some remained here to become the next generation of members and professors—René Dubos, Wally Goebel, Frank Horsfall, Rollin Hotchkiss, Rebecca Lancefield, Alfred Mirsky, Thomas Rivers. Admittedly, Page's prior training contributed something to his career—medical school at Cornell, internship at Presbyterian and Bellevue Hospitals, laboratory experience in the Kaiser Wilhelm Institute in Munich. But these institutions will have other occasions on which to state their claims. Today Irvine Page is the still-young investigator who has come home with his report card. But honesty compels me to reveal a small item in the candidate's past that might disturb some critics. He has been quoted on more than one occasion to the effect that one should "avoid excesses of all kinds, but don't miss anything." Since he is a notoriously hard worker, and according to reliable reports is up at his desk in the morning when normal people are asleep, the contradiction is obvious. He could not possibly have accomplished as much as he has without an excessive amount of work. He is a person who in his 50 years of scholarship has hardly missed anything.

The Next Step

What is the next step for the members of the class of 1977? **Gwyn Ballard** goes to the Max Planck Institute in Göttingen, W. Germany, on a Humboldt Fellowship, studying techniques of molecular monolayer assemblies. **George Barany** will continue peptide research in the laboratory of Professor Bruce Merrifield. **Wesley L. Cosand** is an assistant professor of chemistry at Lewis and Clark College, Portland, Oregon. **Gary J. Hoffman** is an assistant professor in the department of pathology of the Johns Hopkins University School of Medicine. **Norman E. Kagan** is an assistant professor in chemistry at Western Connecticut State College in Danbury. He also holds an appointment as an adjunct assistant professor at Rockefeller. **Ronald J. Koenig** is completing the M.D. requirements at the Cornell University Medical College as part of the Rockefeller-Cornell M.D.-Ph.D. program. **Nadia Nogueira** will remain at the University as an assistant professor in the laboratory of Professor Zanvil A. Cohn. **Miguel A. Pérez** has an appointment as an associate professor in the physics department of the Centro de Investigación del I.P.N., in Mexico City. **Richard G. Piccioni** will join the laboratory of Professor Philip Siekevitz, where he will work with Dr. Nam-Hai Chua on the membrane-bound components of photosynthesis. He holds a National Science Foundation National Needs Postdoctoral Research Fellowship. **Pravinkumar Sehgal** will remain in the virology laboratory of Professor Igor Tamm as a postdoctoral fellow under a grant from the National Cancer Institute. **Rocky Tuan** has received a Jane Coffin Childs Research Fellowship to pursue calcified tissue research at Children's Hospital, Harvard Medical School. **Jean-Dominique Vassalli** has been appointed an assistant professor in Professor Edward Reich's lab. **Fulton Wong** will go to Purdue University as a research associate in the Department of Biological Sciences. He has also been appointed an adjunct research associate in the biophysics laboratory of Professor Floyd Ratliff.

BRIEFS

President Seitz gave an invited general colloquium on June 14 at Los Alamos Scientific Laboratory on the topic, A Physicist's View of Living Systems.

Margaret Broadbent, manager, Journals Office, presented a paper on the Economics of Copyediting at an all-day symposium on scientific journals conducted by the Council of Biology Editors at its annual conference, held in Philadelphia, May 16–18. She also spoke at a symposium on the Life Cycle of Journals at the 1977 IEEE Conference on Scientific Journals, sponsored by the Professional Communication Group of the Institute of Electrical and Electronics Engineers, held May 2–4 in Reston, Virginia.

Professor **Felix T. Hong,** Biophysics, spoke at the Wayne State University School of Medicine on April 8, on Diamagnetic Anisotropy in Ordered Biological Structures. He was also invited to speak at the Harvard Biological Laboratories and at the University of California, Berkeley, in March and April, respectively, on Photoelectric Effects in Pigment-Containing Membranes: Artificial and Natural Systems.

Elfy Gray Koffman, who joined the University in 1964 as supervisor of Abby Aldrich dining room and has been serving recently with C.P.P.A., is now associated with the Rockefeller Archive Center.

New Cell Biology Book

A new 700-page volume, *International Cell Biology 1976–1977*, edited by B. R. Brinkley and Keith R. Porter, has been published by The Rockefeller University Press. It contains 22 of the symposia presented at the First International Congress on Cell Biology, held in Boston in September 1976 under the sponsorship of the International Federation for Cell Biology. The book was published in cooperation with the American Society for Cell Biology and *The Journal of Cell Biology*. This $30 book is available to Rockefeller personnel at a 20 percent discount, or $24.

HONORS AND AWARDS

Professor **Merrill W. Chase,** Immunology and Hypersensitivity, was awarded an honorary doctor of science degree by Brown University, his alma mater, on the occasion of his 50th reunion, on June 6.

Professor **Henry G. Kunkel,** Immunology, received the 1977 Academy Medal of the New York Academy of Medicine at the annual meeting held April 14.

Vice President **Maclyn McCarty** received an honorary doctor of science degree from the University of Florida, Gainesville, on June 11, for outstanding contributions in the field of medical research.

Professor **Bruce Merrifield,** Biochemistry, received an honorary doctor of science degree from Colgate University on May 29.

Trustee **David Rockefeller** received an honorary doctor of laws degree from Polytechnic Institute of New York, in Brooklyn, on June 3.

Professor **Alexandre Rothen,** Physical Chemistry, who is now living and working in Switzerland, was awarded the Prix Jaubert of the University of Geneva on June 3.

Urs S. Rutishauser, assistant professor in the laboratory of Developmental and Molecular Biology, has been named as one of the first recipients of a McKnight Scholars Award in Neuroscience, effective July 1 for a three-year period, at an annual rate of $25,000. The awards were established recently by The McKnight Foundation of Minneapolis, to stimulate research in neuroscience by young investigators who have already embarked upon careers as either physician-scientists or biological scientists. Dr. Rutishauser's major research interest is the study of molecular mechanisms of cell recognition, such as the role of cell-to-cell adhesion in the development of neural tissues.

1961 Rockefeller Alumnus **Aaron Shatkin,** head of the molecular virology laboratory of the Roche Institute of Molecular Biology, is the recipient of the 1977 United States Steel Foundation Award in Molecular Biology, given by a committee of the National Academy of Sciences. Dr. Shatkin's research is concerned with understanding of eukaryotic viral and cellular messenger ribonucleic acids.

Council Hears Reports

An insider's view of the much-publicized issue of recombinant DNA research and a report on science and life in the People's Republic of China were among the topics presented to members of the Rockefeller University Council at an all-day meeting held on campus on June 9.

After a welcome by Council Chairman James A. Linen and by President Seitz, Professor Norton D. Zinder gave a talk titled Recombinant DNA: the Science and the Politics. Dr. Zinder has been closely associated with scientific committees working on this problem over the past three years. In recent months, in testimony before governmental committees, he has urged that any legislation instituted to regulate recombinant DNA research be scientifically balanced and nationally uniform.

Also on the morning's program was a panel discussion by six graduate fellows, moderated by Trustee Brooke Astor and Dean James G. Hirsch, examining graduate education at Rockefeller, career goals and opportunities, and the social responsibilities of scientists.

After the Council's afternoon business session, President Seitz and other members of a Rockefeller delegation recently returned from China summarized what they were able to learn in a short visit about the state of science, education, and daily life in that country.

The Rockefeller University Council is an advisory group of leaders in industry, public affairs, education, and the professions who assist the University in increasing public understanding of its programs and objectives. Newly elected to membership this year are: Pamela Harriman, Washington, D.C.; Alexander Heard, chancellor, Vanderbilt University; Louis J. Hector, partner, Hector and Davis, Miami, Florida; Henry Luce III, vice president, Time, Inc.; Dean A. McGee, chairman, Kerr-McGee Corporation, Oklahoma City; Gladys Perkin, New Canaan, Connecticut; and William T. Ylvisaker, chairman, Gould Inc., Rolling Meadows, Illinois.

news and notes is published from October through July. This is Volume 8, Number 10. Suggestions for articles are welcome and may be sent to *news and notes*, Box 194, phone extensions 1420 and 1051. Photographs: pages 1, 2, 3, and 5, Graphic Services; page 8, Rodney W. Nichols.

PERSONALS

Florence H. Oetjen, an assistant for research in the laboratory of Professor Jules Hirsch, was married on June 4 to Dr. David R. Hearn, an X-ray astronomer at the Massachusetts Institute of Technology.

Born, May 8, to Research Associate **Teruhiko Hagiwara,** Theoretical Physics, and his wife, Haruko, a son, Eugene, their second child.

DEATH

Nora Connelly, 91, on March 31, a laboratory helper from 1934 to 1947.

IN PRINT

Chapters in My Life, the autobiography of Frederick Taylor Gates, philanthropic advisor to John D. Rockefeller and the man most responsible for the founding of The Rockefeller Institute for Medical Research, has been published by The Free Press, a division of Macmillan Publishing Company, Inc. The manuscript of the autobiography was presented to the University of Rochester, of which Gates was an alumnus, after the inauguration of the Frederick Taylor Gates Lectures at Rochester in 1974.

FEDERAL REGULATIONS

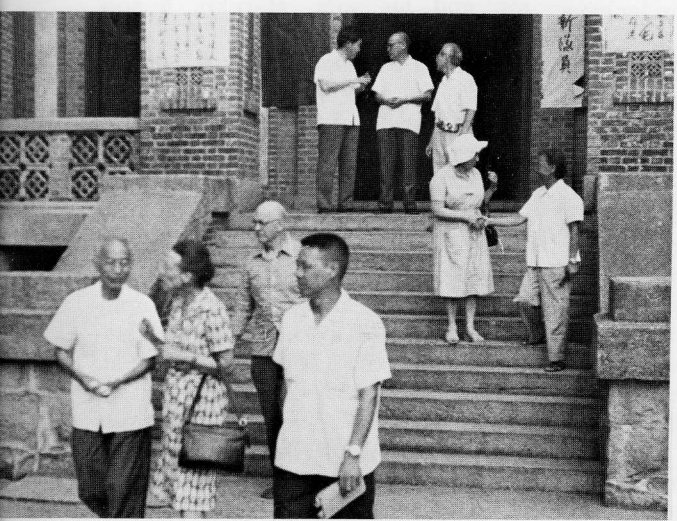
Antonia M. Siddiqi, assistant to the president, has been designated to coordinate and monitor activities for compliance with "Title IX" regulations on campus. Her office is Room 3C, Caspary Hall, and she can be reached on extension 1160.

Pursuant to Revenue Procedure 75-50 dated December 8, 1975, and Title IX of the Education Amendments of 1972 ("Title IX"), and Part 86 of the Department of Health, Education, and Welfare regulations promulgated to effectuate Title IX, and pursuant to other applicable federal and state statutes, The Rockefeller University hereby reiterates its commitment to a policy of nondiscrimination on the basis of race, sex, handicap, color, national and ethnic origin in the administration of its admission, employment, and educational policies and programs. (Inquiries concerning the application of the Revenue Procedure or of Title IX and Part 86 of the implementing regulations to any policy, program, or other activity at the University may also be referred to the director of the Office of Civil Rights, Department of Health, Education, and Welfare, Washington, D.C. 20201.)

China Report

Quoting an old Chinese proverb, a member of the University's delegation to the People's Republic of China likened their recent journey to "looking at flowers while galloping on horseback."

During 18 often breathless days in May, the group traveled to Peking, Nanking, Soochow, Shanghai, and Canton, and visited 17 major scientific, medical, and educational centers, including hospitals and universities and institutes of research in physics, zoology, microbiology, parasitology, organic chemistry, experimental biology, biochemistry, and physiology.



In Canton: Mrs. Seitz, center, President Seitz, behind right, and Dr. and Mrs. William Trager, on the steps, with hosts from Chung Shan University.

The trip resulted from negotiations begun during a number of visits made by Chinese scientists to the University. The participants were Professor and Mrs. Purnell Choppin, Professor and Mrs. Zanvil Cohn, Dean and Mrs. James G. Hirsch, Vice President and Mrs. Maclyn McCarty, Professor and Mrs. Bruce Merrifield, Vice President Rodney W. Nichols, Professor and Mrs. Floyd Ratliff, President and Mrs. Frederick Seitz, Professor and Mrs. William Trager, and Professor and Mrs. Norton Zinder.

The upheavals during the Cultural Revolution caused severe disruption of academic and intellectual activity in China. A real effort is now being made by the present regime to strengthen science, although, the Rockefeller observers agree, the emphasis remains primarily on applied rather than basic research. In general, Chinese scientists in most fields are behind and dependent upon research in more industrialized nations.

The traditional Chinese areas of acupuncture and herbal medicine are subjects of considerable study aimed at integrating Western and Chinese medical treatment. One of the foremost investigators in the mechanisms of acupuncture as an anesthetic is Dr. Hsiang-Tung Chang, director of the Institute of Physiology in Shanghai. Since Dr. Chang worked at Rockefeller for several years in the 1950s, the visit to his laboratory was a reunion of old friends. Another member of Dr. Chang's institute is retinal physiologist Chen-yu Yang, sister of C. N. Yang, Einstein Professor of Physics at the State University of New York at Stony Brook and a former Rockefeller University trustee.

For one member of the group, the trip to China was a journey back to familiar and well-loved surroundings after an absence of nearly half a century. Elizabeth Seitz was born and reared in China, mainly in the southeastern province of Kwangtung, where her parents were missionaries, teachers, and hospital administrators. Before making the trip, Mrs. Seitz wondered whether the glowing reports she had heard from previous visitors to the "new China" might have been exaggerated. She found they had not been. She saw a place where "a miracle had been achieved." Gone were the starvation and disease that had been the daily sights of her childhood. Gone were the beggars and the thieves' market, where her father sometimes went to buy back his fountain pens. Gone were the colorful but desperately poor "boat people," whose craft choked the shorelines of Shanghai and Canton. "Everywhere we traveled the people appeared to be contented and well-fed, and were neatly dressed. The children, who usually wore bright colors, were especially outgoing and bubbling. We were objects of curiosity but our reception was friendly."

In Canton, one of the highlights for Mrs. Seitz was to see again the hospital of which her father had been the administrator for a number of years. It is now a major medical school.

On the Canton to Hong Kong train, she "kept trying to look out of the windows on both sides at once." Missing from the countryside were the huge numbers of random graves which for so long had hampered land reclamation efforts. "They resolved the problem of the graves by moving them or by digging them deeper, an extraordinary feat." One of the other "miracles" she noted with pleasure and amazement was the vast amount of reforestation in all the areas visited. In the old French Concession of Shanghai, the signs had changed and familiar buildings wore unfamiliar red stars, but her old school was still standing. In the renamed streets, children were playing games that she remembered playing.

APPOINTMENTS

David Koffler, professor of pathology and director of laboratory medicine, Hahnemann Medical College and Hospital, Philadelphia, as adjunct professor, effective July 1.

Carl Nathan, Cellular Physiology and Immunology, as assistant professor, effective July 1.

PROMOTIONS

Nam-Hai Chua, Cell Biology, **Bruce W. Erickson,** Biochemistry, **Norton Gilula,** Cell Biology, **Mahin Maines,** Metabolism-Pharmacology, **Hugh Robertson,** Genetics, and **William Scott,** Cellular Physiology and Immunology, to associate professors, effective July 1. (Partial list.)

Nicholas Chiorazzi, Immunology, **Robert Dooling,** Animal Behavior, **Hans-Peter Hoffmann,** Cell Biology, **Michal Jazwinski,** Developmental and Molecular Biology, **Robert Jones,** Medical Biochemistry, **Ehud Kaplan,** Biophysics, **Stephen Kent,** Biochemistry, **Ruth Miskin,** Chemical Biology, **Joan I. Morrell,** Physiological Psychology, and **Alan Singer,** Organic Chemistry, to assistant professors, effective July 1. (Partial list.)

George Cotzias Dies

Adjunct Professor and Visiting Physician George C. Cotzias, one of the world's leading neurologists, best known for his work in developing L-dopa as a treatment for Parkinson's disease, died June 13 at Memorial Hospital at the age of 58. He was an attending physician at Memorial and a member of Sloan-Kettering Institute, and was professor of neurology at Cornell University Medical College and attending neurologist at the New York Hospital.

In 1948 he was invited by Professor Vincent P. Dole to join a new Rockefeller Hospital laboratory of physiology and metabolism, remaining until 1953. It was during this period that he began work on biogenic amines which ultimately led to the treatment of parkinsonism with L-dopa. He returned to Rockefeller in 1974 as adjunct professor and visiting physician, continuing his clinical studies of parkinsonism.