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The Rockefeller University

news & notes

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Operations profile

RU saves $1 million annually in energy costs

A program to conserve energy saved the university over one million dollars in its annual budget last year, and savings of one and a half million dollars per year are projected by 1996.

"Saving money in energy is an outgrowth both of being smart about energy use and of keeping researchers' needs in mind," said Robert Francis, who was appointed director of Plant Operations in October. "Energy conservation got a bad name in the 1970s because it inflicted hardships on the average person. We aim to conserve energy without causing personal discomfort or impeding the research programs. It has been a relatively painless way to help balance the budget."

In a process that began in the summer of 1991 at the direction of Fred Bohen, executive vice president and chief operating officer, the university initiated a longer-term effort to significantly reduce energy costs across the campus. (Energy costs at Rockefeller, principally for electricity, are about five percent of the university's annual budget for operations.) Over the last two years the university's consumption of energy has been cut by more than 20 percent and the $1 million in budgeted savings that have been realized have fully offset the energy and other operating costs of the new Rockefeller Research Building.

New operating procedures and better trained staff have accounted for a large part of the savings so far. Brendan Bolger, chief engineer of the Power House, said: "We now know that it is cost efficient to run the turbine generator together with the waste heat boiler, but not independently of each other. We have stopped buying Con Edison steam, as it costs $12 to $14 per 1,000 pounds versus $6 to $7 when we generate it ourselves. And we know when and where we were oversupplying energy to the campus." The upgrading and repair of equipment has also contributed to energy savings.

New initiatives to increase energy efficiency will involve improving the chilled water distribution system and streamlining the water and sewage systems. "The chilled water system is a large, complex series of projects that will improve service to almost every building on campus," said Francis. "It will enable us to provide year-round cooling to all laboratories so that stable temperatures will be possible in all critcal rooms. It also represents a great leap forward in savings opportunities." In addition, using financing provided by Con Edison, the Power House is currently converting to a system that can use

See ***Energy Efficiency****, page 2*

Faculty meeting addresses academic planning, searches

At a faculty meeting Monday, President Torsten Wiesel indicated that progress has been made in the academic planning process, but that the final report will not be completed until late spring. In the meantime, he said, we must continue our search for outstanding scientists at the junior and senior levels with the help of search committees.

Professor David Luck, chair of the Academic Senate, described five new faculty search committees, which have been added to three existing committees. He stated that the committees have been shaped by the planning process and more committees may be added as planning progresses. The new committees are:

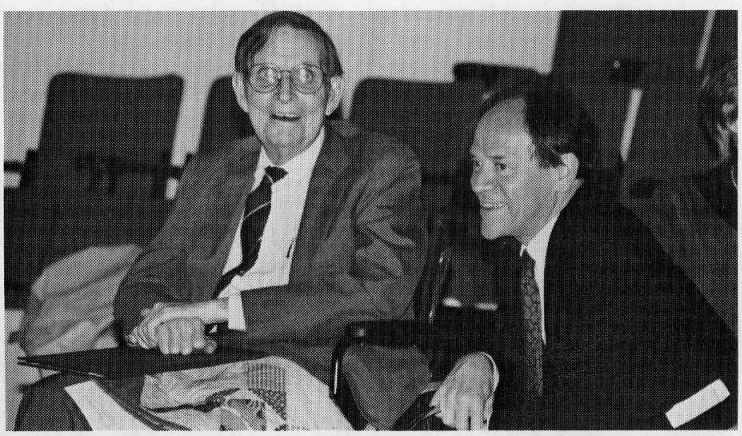
- Neurobiology (Cell and Development): Mary Elizabeth Hatten, chair; Robert Darnell; David Gadsby; Nathaniel Heintz.
- Immunology: George Cross, chair; Emil Gotschlich; Michel Nussenzweig; Ralph Steinman.
- Virology: James Darnell, chair; William Hall; Hidesaburo Hanafusa; Peter Model.
- Human Genetics: Michael Young, chair; Jan Breslow; Jeffrey Friedman; Norton Zinder.
- Cell and Molecular Biology: Günter Blobel, chair; Alan Aderem; Luck; Sanford Simon.

The existing committees are:

- Chemistry: Model, Robert

See ***Meeting****, page 2*

Scientist, essayist Lewis Thomas dies



Lewis Thomas, renowned essayist, physician and biologist who was a member of the university's adjunct faculty, died last Friday. He is shown here *(left)* with President Torsten Wiesel during an event in which the university presented Thomas with the first Lewis Thomas Prize. See story, page 4.

Friday lecture to feature molecular oncologist

Edward E. Harlow, Jr., professor of genetics at the Massachusetts General Hospital Cancer Center, will speak on "The Retinoblastoma Protein: Tumor Suppression by Transcriptional Inhibition" at the Friday lecture today (Dec. 10) at 3:45 P.M. in Caspary Auditorium.

A molecular oncologist interested in the mechanisms of cancer-causing agents, Harlow has studied various aspects of viral interference into normal cellular processes—specifically genetic transcription—which can lead to cell proliferation and tumor development. Small DNA tumor viruses, such as adenovirus, encode proteins that are potent transforming agents when bound to cellular protein targets, one of which is known as the retinoblastoma tumor suppressor gene (pRB). Under normal conditions, pRB prevents cell proliferation; when bound by adenovirus, however, pRB becomes inactivated. This process has been shown to be an important oncogenic, or cancer-causing, step in the development of many human cancers. Harlow's lab is currently trying to characterize how tumor suppressor gene products such as pRB can control specific transcriptional events and act as negative regulators of cell growth.

"Ed's elegant studies have been crucial in unravelling the molecular mechanisms underlying changes in cell growth and division," said Professor Nathaniel Heintz.

Harlow received a B.S. (1974) and M.S. (1978) from the University of Oklahoma and a Ph.D. from the University of London (1982). He went on to become an investigator at the Cold Spring Harbor Laboratory (1982-91) and adjunct assistant professor in at SUNY, Stony Brook (1986-1991). In 1990, he became affiliated with the Massachusetts General Hospital Cancer Center. He was named professor at Harvard Medical School in 1991 and American Cancer Society Research Professor of Molecular Genetics in 1992.

A member of the National Academy of Sciences, Harlow has received numerous honors.

RU actor educates students about AIDS

By Jennifer Horne King

Ken Leung, a part-time assistant in the Kreek lab, spends 20 hours a week lending a hand with administrative duties. The rest of his week is spent as a professional actor, rehearsing and putting on shows for two theater companies—the New Perspectives Theatre Company and Sinai Teen Arts Resources (S.T.A.R.), both dedicated to educating students.

"One has to feel very comfortable with oneself in educational theater," said the 23 year-old Leung, who recently graduated from New York University with concentrations in educational theater and psychology. "Answering students' questions requires a certain amount of self-confidence and sensitivity to the needs of each age group. In this respect, I find educational theater more challenging than more traditional drama, in which the curtain falls and then the actors go home."

A two-time winner of the Hennessy Cognac Performing Arts Scholarship for Chinese Americans in drama, Leung performed in Shakespeare's *The Taming of the Shrew* at the Hudson Valley Shakespeare Festival and played the lead in *Deungsinbul*, a play based on a Korean folk tale, at Manhattan's La Mama Experimental Theater Club.

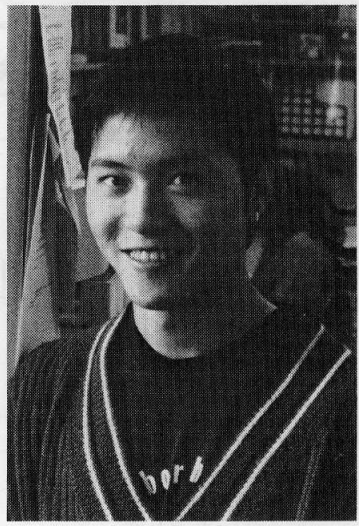
For the New Perspectives Theater Company, Leung helps to develop junior high and high school students' interest in Shakespeare, through thematic excerpts from many of the playwright's classic works.

For S.T.A.R., a program developed by Cydelle Berlin of the Adolescent Health Center, Mount Sinai Medical Center, Leung helps the group further its aims—in Leung's words, "to educate students of all ages, including college age, about HIV and AIDS, and to change behaviors and perceptions concerning many related—and frequently taboo—issues."

Leung and the eight-member S.T.A.R. troupe, led by artistic director Ken Hornbeck, travel to schools in the tri-state area, tailoring their show to meet the needs of each school. The program was designed to reach these age groups through early and direct intervention, and through the use of peer educators—actors of roughly the same age as the students. In addition to touring, S.T.A.R. makes regular appearances on Friday afternoon cable television.

How did Leung end up working in the Kreek lab—a laboratory that studies the biology of addictive diseases and factors that may alter the susceptibility of drug-using populations to contracting HIV? "It was a coincidence," he admitted. "I was looking for a part-time job and heard about Rockefeller through New York University's Student Annex. How appropriate, though, that I should be dealing on stage with many of the same social issues addressed in this lab."

S.T.A.R. will hold its annual holiday program and reception (appropriate for ages nine and up), Thurs., Dec. 16, from 6:00 to 9:30 P.M., in Mount Sinai Hospital's Stern Auditorium at 100th St. and Madison Ave. Admission is free and all are welcome.



Ken Leung, assistant in the Kreek lab, will be one of the actors in a free performance emphasizing AIDS education next Thursday at Mount Sinai Hospital.

Meeting introduces search committees

(continued from page 1)

Roeder, co-chairs; William Agosta; Stephen Burley; Brian Chait; David Cowburn; John Kuriyan; Bruce Merrifield; Thomas Sakmar.

• Neuroscience: Charles Gilbert, chair; Mitchell Feigenbaum; Gadsby; Paul Greengard; Hatten; Heintz; Fernando Nottebohm; Young.

• Medical Sciences: Breslow, chair; Aderem, Burley, Friedman, Hatten, Sakmar.

Luck noted that the search committees will continue the process of consulting with their colleagues for suggestions and advice.

In other business at the faculty meeting, Professor Hidesaburo Hanafusa reported on the work of the Committee on Appointment of Heads of Laboratory from the Faculty; Professor Norton Zinder presented a brief review of the graduate program; and Fred Bohen, executive vice president and chief operating officer, described the current status of the budget and discussed issues relating to housing and food service. Wiesel summarized the planning process and emphasized the importance of faculty participation in shaping the future of the university.

Energy efficiency measures to save university millions

(continued from page 1)

either gas or oil, depending on which fuel is cheaper.

According to Francis, the energy conservation program at Rockefeller can be divided into six parts:

• Information. Plant Operations has increased its surveillance of how many units of electrical power the university uses, how many gallons of fuel it needs and what kind of energy is consumed where.

• Procurement. Plant Operations now shops for energy more carefully. For example, the department has found that maintaining its own transformer is much cheaper than buying "post-transformer" electricity from Con Edison. The department has also taken advantage of a large rebate for controlling energy use in periods of stress on the Con Edison system.

• Generation. The department has found ways to generate energy more efficiently. "We had the main boilers, which were made in 1955, cleaned and updated," said Jim Doyle, associate chief engineer in the Power Plant. "The changes to the boilers made a tremendous difference, lowering the stack temperature over 200 degrees and increasing its efficiency 5 percent. This change alone amounts to savings of $131,000 per year."

• Distribution. Distribution has been improved. Steam pressure supplied to the northern area of campus in the winter has been cut dramatically—from 110 to 55 pounds. "Services were totally unaffected, but we reduced the consumption of oil significantly," said Doyle.

• How energy gets used at the end point. Plant Operations is attempting to match environmental service more precisely to labs' and departments' needs, reducing waste. This has meant replacing old valves so that room temperature can be more accurately controlled, and automating the heating system so that it shuts off when the temperature reaches 55° F. outside.

• The human dimension. Finally, Plant Operations strives to stay in touch with people on campus to solve problems in the physical environment and address the needs of labs and departments.

"We will strive constantly to improve environmental conditions in the laboratories," said Francis. "All we ask is that people be open to new concepts as they unfold, and that they articulate their needs. So far, everyone has been extremely cooperative."

Power House staff trained in new energy conservation procedures include *(left to right)*: Watch Engineer Frank Bockowski, Firemen Patrick Ford and Mike McNamara, Chief Engineer Brendan Bolger and Associate Chief Engineer James Doyle.

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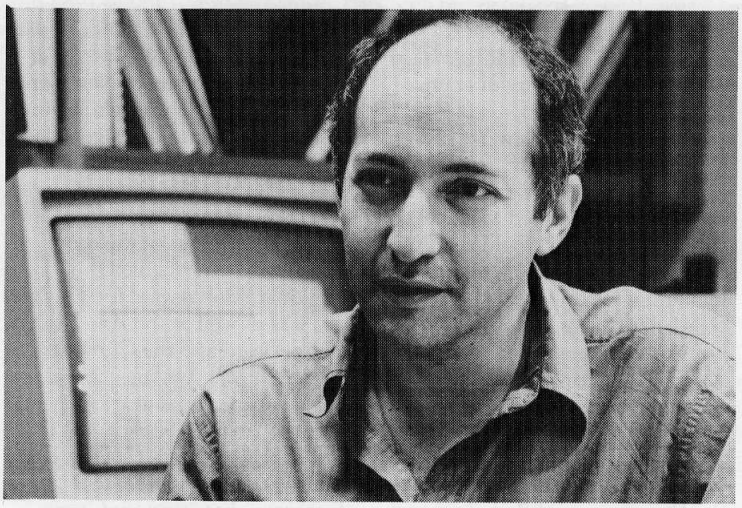
Studies at Rockefeller target changes in dynamic brain

By Susan Blum

The brains of developing embryos and newborns are continually undergoing dynamic change. But until recently, it was believed that such plasticity ceased soon after birth. Now, however, a wealth of new studies are providing dramatic evidence of the adult brain's dynamism—the ability of its cells to change their functional properties in response to changing input from the outside world. Such plasticity has been found throughout the cerebral cortex, the part of the brain responsible for the complex integration of stimuli provided by the various senses, but it is so far best understood in the primary visual cortex, the brain region that analyzes and interprets visual stimuli. This is the region under study in the lab of Professor Charles Gilbert who, with Torsten Wiesel, Rockefeller University president, is a pioneer in the study of vision. The remarkable dynamism disclosed by the Rockefeller studies is shedding new light on a wide range of phenomena, from our ability to instantaneously "take in" a passing visual scene, to our capacity to remember and learn, to the potential for recovery of sight after injury.



Professor Charles Gilbert studies the primary visual cortex, the region of the brain that analyzes and interprets visual stimuli.

Horizontal connections are explored

Among the aims of Gilbert and his colleagues is to elucidate how the dynamic nature of a neuron's functional properties may be mediated by "horizontal connections" between neurons. In these connections, the axons of nerve cells course horizontally for great distances parallel to the surface of the visual cortex and link up with other cells.

The connections thus forged are not random. Rather, as Gilbert and Wiesel showed in 1989, they link together cells with the same "orientation preference"— cells, that is, that respond only to line edges oriented at a particular angle. (The discovery of orientation preference was part of the Nobel-Prize-winning work on visual cortex architecture and function conducted by Wiesel and David Hubel.)

The horizontal connections span some six to eight millimeters—a distance long enough to cross a number of cortical "hypercolumns." Contained within each hypercolumn are a number of "orientation columns," each full of cells endowed with just one orientation preference. Taken together, the various orientation columns grouped in each hypercolumn respond to a full 180 degrees of oriented lines—but only such lines as appear in a very small part of the total visual field, the area of visual space that the eyes take in at any given glance. Hypercolumns located next to one another in the visual cortex respond to neighboring parts of the visual field. In this way, the external world is mapped "topographically" on the visual cortex: light falling on the retina from a particular part of the visual field is transformed into an impulse that reaches a particular cell in a particular place in the visual cortex. "Each cell has just a tiny window on a minute part of the visual world," Gilbert explained.

But that window can open wider than previously thought. Recent discoveries about the hypercolumn-spanning horizontal connections are providing a strikingly new definition of the "receptive field"—that part of the visual field within which a particular stimulus can trigger a nerve cell's response.

Over the past few years, research in the Gilbert and Wiesel labs showed that horizontal connections can play modulatory roles. That is, the connections enable stimuli that lie outside a cell's normal receptive field to affect the cell's response to stimuli placed *within* its receptive field. Such modulation helps explain both optical illusions, where the contextual information can lead to dramatic visual misinterpretations, and normal vision, where complex contextual input allows us to perceive the ever-changing world around us.

The horizontal connections affect not only a cell's response to stimuli outside its receptive field, but the nature of the field itself, which is turning out to to be far more dynamic than was once believed. In 1992, Gilbert and Wiesel made permanent blind spots, or "scotomata," in the retinas of anesthetized adult animals, thereby effectively "silencing" a part of the visual cortex. Surprisingly, they found, within minutes after the lesion, was made the receptive fields of cells at the border of this silenced cortical area expanded greatly. Within months, cells in the entire silenced area responded to inputs from outside their original receptive fields. In other words, the cortical map was distorted, or reshaped, to accommodate the new circumstances. In this process of remapping, Gilbert explained, the horizontal connections appear to be not simply modulating, but rather driving, the response of the target cells.

These studies led Gilbert and former Graduate Fellow Mark Pettet in 1992 to investigate whether normal patterns of sensory stimulation could also elicit receptive field changes. They created reversible "artificial" scotomata, and found that the receptive fields of single cells could be prompted to expand or contract within seconds in response to changes in a scotoma.

Just this year, Gilbert, Guest Investigator Mitesh Kapadia and Adjunct Professor Gerald Westheimer studied the effects of such artificial scotomata on the perceptual capabilities of human subjects, including themselves. As they reported at the recent Society for Neurosciences meetings, the scotomata elicited distortions in the perception of an object's shape and size consistent with the changes in receptive field recorded in single cells. These distortions, which occurred within seconds, indicate that "the brain is constantly fine-tuning itself for optimal performance in response to recent visual experience," Gilbert said.

Nerve cells are modified

At the meetings, Gilbert and his colleagues also reported for the first time on the cellular modifications that underlie the changing response properties of neurons in the visual cortex. Postdoctoral Fellow Aniruddha Das reported that the short-term receptive field changes—those taking place within seconds or minutes—appear to be mediated by changes in the strength, or "weight," of already-existing synapses, or neuron-to-neuron connections, in the visual cortex. Though their first round of experiments could not determine whether these synapses were between cells making horizontal connections, Gilbert and his colleagues believe that this possibility is a strong one, and plan to begin testing it soon.

It is already clear that the horizontal connections are involved in cortical recovery from permanent lesions, reported Postdoctoral Associate Corinna Darian-Smith. Her research disclosed that neurons forming horizontal connections in "recovered" cortex had denser axonal fibers, and more axonal structures called "boutons," than similar neurons in normal visual cortex. These structural changes imply that the neurons in recovered cortex are actually generating additional synapses, Gilbert said.

"Axonal sprouting and synaptic proliferation is known to occur during development, but the idea that this might be an ongoing process throughout life is quite exciting," Gilbert said. Moreover, he continued, "I tend to think that such an elaborate mechanism didn't just evolve for recovery from strokes or other brain injuries, but was rather available for recovery because it was already being used for normal processes, such as learning." And, because cells in various cortical regions share similar properties—including their propensity to forge horizontal connections—this mechanism probably functions in all cortical areas, not just the visual cortex.

Though learning and recovery from injury might seem at first glance to be two very different processes, Gilbert explained, "you could say that the function of the cerebral cortex is to accommodate to the sensory stimuli to which we are exposed, and to avoid wasting cortical space on parts of the environment from which no input is being received. In such a view, enrichment of stimuli—that is, learning—would result in recruitment of more of the cortex for that function. On the other hand, depletion of stimuli—that is, injury—would lead to a decrease in the amount of cortex recruited for a task it is no longer required to perform." The end result in both cases is a reshaping of the cortical map to deal optimally with the world represented in, and ultimately shaped by, the brain.

Essayist, physician, biologist Lewis Thomas (1913-1993)

Lewis Thomas, widely acclaimed essayist, physician and biologist who was a member of the adjunct faculty at the university, died last Friday at the age of 80. The cause was Waldenstrom's disease, a condition resembling lymphoma, a cancer of the lymph system.

"Lewis Thomas's eloquent and insightful writings inspired countless scientists and introduced the larger public to the wonders of biology," said President Torsten Wiesel. "He also provided leadership to many institutions as an eminent teacher, investigator, administrator and advocate for basic research. He will be profoundly missed at Rockefeller and around the world."

Thomas had a 50-year association with the university—which he once called "one of our national treasures for basic biomedical science." He was a visiting investigator (1942-46), a trustee (1975-1988) and a visiting physician and member of the adjunct faculty (since 1975). In 1989, the university granted him an honorary degree of science. Last year, he was the first recipient of the Lewis Thomas Prize, a special award created by the university in his honor to recognize that rare individual in whom the two cultures of science and art are combined.

Born in 1913 in New York City, Thomas received a B.S. from Princeton University in 1933 and an M.D. from Harvard Medical School in 1937. He held appointments at five schools of medicine, including Boston City Hospital (1941-42), Johns Hopkins University Medical School (1946-48), Tulane University School of Medicine (1948-50) and the University of Minnesota Medical School (1950-54).

Thomas served as chairman of the Departments of Pathology and Medicine at New York University-Bellevue Medical Center (1954-58 and 1958-66, respectively), dean of New York University School of Medicine (1966-69), professor and chairman of the Department of Pathology at Yale-New Haven Medical Center (1969-73) and dean of the Yale University School of Medicine (1972-73). From 1973 to 1980 he was president of Memorial Sloan-Kettering Cancer Center and from 1980 to 1983 he served as chancellor. Later he was appointed university professor at the State University of New York, Stony Brook. He was scholar-in-residence at Cornell University Medical College from 1988 to 1992.

Thomas was acknowledged as one of the masters of the short essay form. He received the National Book Award for *The Lives of a Cell* as well as the American Book Award and the Christopher Award for *The Medusa and the Snail.* His personal medical memoir, *The Youngest Science*, was followed by *Late Night Thoughts on Listening to Mahler's Ninth Symphony, Et Cetera, Et Cetera: Notes of a Word-Watcher* and *The Fragile Species.*

Thomas published over 200 scientific papers on virology, immunology, experimental pathology and infectious disease. He received over 20 honorary degrees in science, law, letters and music. At the time of his death, he was a member of the National Academy of Sciences; a member of the American Academy and Institute of Arts and Letters; a fellow of the American Academy of Arts and Sciences; and a fellow of the American Philosophical Society. He was also a former member of the Harvard Board of Overseers.

Thomas is survived by his wife, Beryl; three daughters, Abigail Thomas, Judith Mira y Lopez and Eliza Thomas; five grandchildren; and two great-grandchildren.

Lewis Thomas was acknowledged as a master of the short essay form.

Potpourri

Bake and violet sale

A bake sale and violet sale to benefit The Rockefeller University Children's School will be held in the Tower lobby from 8:30 A.M. to 3:30 P.M., today (Dec. 10).

Tri-Institutional Noon Recital

The Saturday Brass Quintet and five guest artists will give a 10-piece brass performance at the Tri-Institutional Noon Recital today (Dec. 10). Winner of a Naumburg Chamber Music Award, the Saturday Brass Quintet has also won top prizes in the Fischoff, Mendez & Artist International Competitions as well as two Ensemble Commissioning Awards from Chamber Music America. The antiphonal program will include works by William Byrd, Giovanni Gabrieli, Arvo Pärt, Chummy MacGregor/Johnny Mercer and John Harbison. The concert, to be held in Caspary Auditorium at noon, is free and open to the public.

Toy and food drive

The Children's School is collecting new toys and non-perishable food items on behalf of Yorkville Common Pantry for distribution to the poor and homeless over the holiday season. Leave donations, unwrapped, at the school, on the ground floor of Graduate Students Residence, by Tues., Dec. 14.

Holiday hours

The Sweat Shirt Shop will be open for holiday shopping Tues., Dec. 14 and Wed., Dec. 15, from 11:30 A.M. to 1:30 P.M. A 1994 pocket calendar will be given out with all purchases over $15. All proceeds from the shop, located in Rockefeller Research 133, benefit the Children's School.

RU Concerts

The Aspen Wind Quintet, winner of the 1983 Artists International Distinguished Artists Award and 1984 Nauburg Chamber Music Award, will perform at the Rockefeller University Concerts Wed., Dec. 15 at 8:00 P.M. in Caspary Auditorium. The program will feature works by Darius Milhaud, Claude Debussy, John Harbison, Maurice Ravel and Paul Taffanel. Admission is $17 per person; $7 for students and postdocs of the Tri-Institutions. For more information or reservations, contact Cathy Rogers, x8971.

Holiday concert

In keeping with tradition, the Children's School will hold a Holiday Concert in Caspary Auditorium at 9:30 A.M., Fri., Dec. 17. All members of the Rockefeller community are invited to attend.

Christian Steiner

The Aspen Wind Quintet will perform at the Rockefeller University Concert, Wed., Dec. 15.

Abby Aldrich dining room prices to rise

The price for lunch in the Abby Aldrich Rockefeller Hall dining room will rise from $7.50 plus tax to $9.75 plus tax effective Mon., Dec. 13, announced Fred Bohen, executive vice president and chief executive officer, in a memo this week.

"Even with this adjustment in price to the customer, the university will be underwriting a portion of the cost of each meal in the Abby Aldrich Dining Hall at levels proportionate to the university subsidy of meals offered at the Tower Cafe," said Bohen. "We hope very much that members of the university community will continue their patronage of this facility."

(Note there is no tipping in the dining room.)