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The Rockefeller University

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Electronic mail order**Campus logs on to new software for purchasing**

All labs and departments can now submit orders for supplies and equipment by computer using the university's new software, On-Line Requisitioning (a module of the Financial Records System (FRS)).

"The new system will be faster, more accurate and convenient," said Sonia Reynes, director of Purchasing. "Anyone with authorization to requisition goods can send orders from their computers without leaving their office or lab, and can check the status of the purchase order, and their account commitments, just as easily. In addition, the new system will help Laboratory Safety compile the

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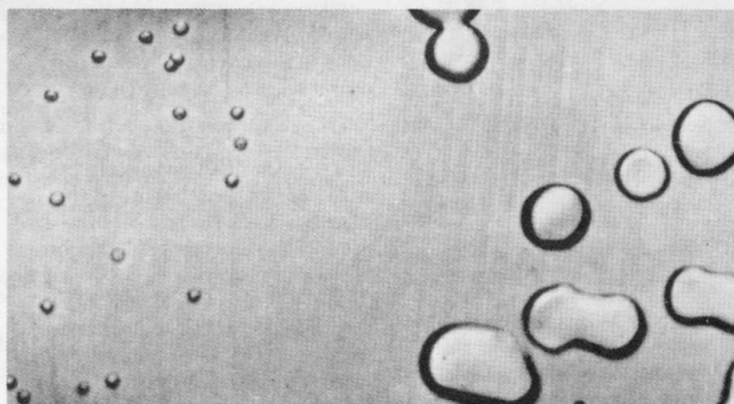


Fay Guatelli, assistant for research in the Hanafusa lab, helped test the new on-line requisitioning system.

**2 African-American history sources**

**2 Domestic partners receive benefits**

Joseph B. Haulbeck



This illustration of the transformation of pneumococcal types accompanied the 1944 paper by Rockefeller investigators Oswald Avery, Colin MacLeod and Maclyn McCarty indicating that genes are made of DNA. The impact of the paper was discussed at a historic roundtable this month.

**Scientists discuss historic research**

A roundtable discussion at The Rockefeller University recently brought together six pioneers active in the field of genetic research between the publication of the Avery paper and the discovery of the structure of DNA. Participants in the event, introduced by Professor Norton Zinder and chaired by Visiting Professor Robert Olby, were: Erwin Chargaff, Seymour Cohen, Alfred Hershey, Rollin Hotchkiss, Maclyn McCarty and Joshua Lederberg. Susan Blum of News&Notes presents some of its highlights below. Dr. Olby's questions are in *italic* followed by the participants' responses.

*Dr. Cohen, your contact with the nucleic acids antedated the publication of the Avery lab paper in 1944. What were the problems you tackled in those years?*

In 1941-42, in the Rockefeller lab of Wendell Stanley, I was studying nucleic acid to find out how it was linked to protein. Before we were finished, I knew that we had a very large molecule indeed, much larger than a tetranucleotide. [The then-popular "tetranucleotide hypothesis" held that nucleic acids were "stupid" molecules with no variation and, thus, no ability to convey information.]

After leaving Rockefeller, I worked for a year in the Columbia lab of Dr. Chargaff. There, as a result of studies with rickettsia, we were able to determine that half of the deoxyribose in DNA was purine and half pyrimidine...

In 1946, Delbrück and Hershey showed that one could make crosses

between bacteriophages. I thought that if the Avery paper (which had greatly impressed me) was correct, I ought to be able to isolate the DNA from one of these bacteriophages, mix it with an intact phage, and, after infecting bacteria with this mixture, get out a genetic cross. Attempts to cross these materials were negative, so I dropped this set of experiments and went on to my true love, that of the biochemical nature of virus multiplication.

It is a remarkable thing that no one undertook to determine whether the RNA of tobacco mosaic virus on its own was infectious [and thus transferred genetic information] until much later. We didn't plumb the full breadth of the Avery results until about 1963.

*Dr. Chargaff, looking at the list of your papers one can see that you made a very striking change in your agenda to concentrate upon the nucleic acids. Could you tell us about that?*

Avery, MacLeod and McCarty wrote an extremely cautious paper, but I was immediately highly impressed with the idea that it was proof of the specificity of nucleic acids [that is, that DNAs are not all alike]. I decided that the first thing to do was to work out quantitative methods in order to characterize DNA. We proceeded to isolate DNAs from different animal, plant and bacterial sources, and worked out methods for the characterization of all components. [These studies showed that while the base

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**Lecturer to speak on fly body-pattern formation**

Ruth Lehmann, a member of the Whitehead Institute for Biomedical Research and associate professor of biology at the Massachusetts Institute of Technology, will speak on "RNA Localization and the Establishment of Polarity in the *Drosophila* Embryo" at the Friday lecture today (Feb. 25).

A Howard Hughes associate investigator, Lehmann is studying the factors that regulate pattern formation along the anterior-posterior axis of the fruit fly *Drosophila* and factors regulating the formation of germ cells—the cells that generate eggs and sperm. Mutations in maternal genes have led to the identification of a small number of genes, including one called *nanos*, required for the establishment of body polarity in the *Drosophila* embryo. Lehmann and her colleagues found that the distribution of *nanos* RNA and Nanos protein is critical for normal development: embryos lacking *nanos* activity at the posterior pole fail to form an abdomen; embryos with *nanos* activity at both ends produce two abdomens in mirror image. Lehmann and her colleagues have identified 10 such maternal genes that set the basic pattern of the abdominal region in their offspring, and are determining whether similar regulatory mecha-

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Ruth Lehmann of MIT and the Whitehead Institute will speak at the Friday lecture today (Feb. 25).

Courtesy of Ruth Lehmann



This 1953 photo—of a seminar presented by William Andrews (right), a Commonwealth Fund Advanced Medical Fellow at the Washington University School of Medicine—is part of the collection of The Rockefeller Archive Center, which recently published a source guide to its materials relevant to the study of African-American history.

## Domestic partners receive benefits

The university is extending eligibility for benefits to employees' domestic partners, announced Virginia Huffman, director of Personnel, this month.

"While only a small number of people are affected by this new policy, I believe that it is important because it represents the fairness and equity of the university's benefits plan," said Virginia Huffman, director of Personnel. "Rockefeller is the only institution I know of to offer this type of coverage to both same- and opposite-sex domestic partners."

Benefits available to spouses include health and dental insurance, and the new optional accidental death and dismemberment insurance policy. The proposal to extend eligibility for these benefits to domestic partners was reviewed by a faculty-staff committee and approved unanimously at a recent meeting of the Executive Committee of the Board of Trustees.

Under the university's new guidelines, domestic partnership is defined as two individuals who live together in a long-term relationship, with an exclusive mutual commitment similar to that of marriage, in which the partners agree to be financially responsible for each other and each others' debts. To qualify for health benefits, the employee must show proof that the couple is registered in a domestic partnership, or, if the pair lives in a municipality that does not provide for such a process, show an Affidavit of Domestic Partnership and meet New York City's criteria for registration.

The deadline to enroll domestic partners in the Mass Mutual/Blue

Cross plan, for coverage effective Feb. 1, is Mon., Feb. 28. While coverage for domestic partners is not available in the health maintenance organization plans, employees may change to Mass Mutual/Blue Cross in order to enroll a domestic partner if they do so by Mon., Feb. 28. The next opportunity to make changes in health coverage will be during the open enrollment period in the fall.

For more information, contact Ginny Hansen, Kristin Gross, Eileen Holleran or Huffman, Personnel Office, Founder's Hall 103 or x8300.

## Campus logs on to purchasing software

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information required by government agencies on the use of hazardous chemicals at the university.

"I am particularly grateful to Toby Fishman (assistant controller for data processing), Rachael Kolb (assistant director of User Services) and Anne Duffy (computer programmer) for working closely with me on this project," she continued. "However, without the full cooperation of many members of Computing Services, Accounting and my own department, this project would never have gotten off the ground."

Instruction manuals, passwords for the Virtual Memory System (VMS) and FRS, and Access Request Forms have been sent out to all laboratories and departments. Training workshops, conducted by Computing Services, will thoroughly familiarize participants

## New Archive Center publication marks Black History Month

The Rockefeller Archive Center, part of The Rockefeller University, has just made it a little easier for scholars to study the history of African-Americans and race relations in this country. Staff at the center recently compiled a new book, *A Survey of Sources at the Rockefeller Archive Center for the Study of African-American History and Race Relations*, published this month—Black History Month—by the Indiana University Center on Philanthropy.

The survey is a 128-page inventory of folders that document personal and corporate philanthropic support for African-American individuals and institutions. Prepared by Archive Center staff members Ken Rose, Thomas Rosenbaum, Gretchen Koepel and Pecolia Allston-Rieder, it highlights an important concentration of material documenting grant support for African-American education, most of it from the General Education Board. The entries also identify extensive amounts of material relating to grants by the Laura Spelman Rockefeller Memorial, the Rockefeller Brothers Fund, the Rockefeller Foundation and members of the Rockefeller family (especially John D. Rockefeller, Jr.) for the study and improvement of race relations and for the strengthening of charitable institutions.

"A lot of people are surprised to hear of the Rockefeller family's support of African-American caus-

es," said Rose. "But the family did make an impact, especially in its long-running support of Spelman College. Many of the appeals were directed to Mrs. John D. Rockefeller because she was the daughter of abolitionists."

In addition to the more than 2,200 entries, the survey includes a 14-page introduction by Rose and Rosenbaum. The introduction reviews the general history of Rockefeller philanthropic support for African-American education and social welfare, beginning with the early giving of John D. Rockefeller, and briefly discusses the work of various corporate philanthropies established with Rockefeller money. The Laura Spelman Rockefeller Memorial, for example, cultivated the development of the social sciences in general and funded the work of such organizations as the Association for the Study of Negro Life and History, the Commission on Interracial Cooperation (later the Southern Regional Council) and such centers as the Social Science Department at Fisk University.

*A Survey of Sources at the Rockefeller Archive Center for the Study of African-American History and Race Relations* is available for \$12.00 at the Rockefeller Archive Center, 15 Dayton Ave., North Tarrytown, NY 10591-1598 (telephone: (914) 631-6017), and from the Indiana University Center on Philanthropy, 550 West North Street, Suite 301, Indianapolis, IN 46202-3162.

with the new requisitioning software.

Fay Guatelli, assistant for research in the Hanafusa lab who helped test On-Line Requisitioning, said: "The software takes a little getting used to, but it is basically very simple. It doesn't take long to learn."

Those interested in the training workshops, which begin Mon., Feb. 28 and will continue throughout the year, should call x7768 and leave a detailed voice mail message, stating their name, extension and lab or department. Participants should bring a signed authorization form and a computer disk to the session.

Other questions about On-Line Requisitioning can be directed to Byron Scatliffe, x7539, or Yvena Bouillon, x8066, in Purchasing; Fishman (for FRS passwords), x8305, in the Controller's Office; or the consultant, x8940, in Computing Services.

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Leif Carlsson

Participants in a recent historic roundtable discussion were (left to right): Robert Olby, visiting professor, The Rockefeller University (moderator); Joshua Lederberg, university professor, Rockefeller; Alfred Day Hershey, former director of the Carnegie Institute; Rollin Hotchkiss, professor emeritus, Rockefeller; Maclyn McCarty, professor emeritus, Rockefeller; Erwin Chargaff, professor emeritus, Columbia University; and Seymour Cohen, professor emeritus, SUNY, Stony Brook.

## Eminent scientists discuss impact of 1944 Avery lab paper

(continued from page 1)

composition of DNA varied among species, in the DNA of all species examined the amount of thymine equaled that of adenine, and the amount of cytosine that of guanine. These base ratios were crucial for the discovery of DNA's double-helical structure.]...

To comment on more recent history, I regret that in the course of the creation of molecular biology—which should be the union between biochemistry, biology and genetics—biochemistry has been pushed to the wall more and more. The tremendous number of references to the biological and genetic roles of nucleic acid are not matched by an increasing knowledge of the structure of DNA. For instance, the trace components that are an important part of plant DNA have been completely overlooked. If the compounds are there, there is a reason, and we ought to find it.

*Dr. McCarty, when you first met Avery you were given a choice of topics, but you had already made up your mind: the story of bacterial transformation had captured your imagination. Would you comment on this?*

Actually, I wasn't given choices of what to do, because Avery didn't do that. Instead, he gave very well organized talks about the lab's work to the young people coming into the lab, and also, of course, he had you read the background material.

Avery didn't get back from his holidays in Maine until about the middle of September, and I'd been in the lab doing some reading since the beginning of the month. In this way, I was quickly brought up to date on the lab's work on pneumococcal transformation, having heard of the phenomenon some years earlier in medical school.

One day, Avery was titrating some of the materials that he and MacLeod had made the spring before, and he asked me if I wanted to join him in the experiment. I was

glad to do it, and I was hooked immediately.

On another matter, ever since we had felt fairly confident that DNA was involved [in transformation], we set about trying to find purified DNase [an enzyme that digests DNA], but we didn't have it by the time we published the '44 paper. The references in the '44 paper to DNase were to a number of sources of crude enzymes—including tissue extracts, pneumococcus lysates and animal sera—which all had something that would destroy the transforming activity of our preparation. So what appeared in that paper was a demonstration that all of those substances, which were active in destroying the transforming substance, were also able to attack DNA. There was a correlation, but that's all we had.

By applying the techniques that had been developed in the Princeton laboratories of The Rockefeller Institute by Kunitz and Northrup, we finally got DNase, and had something to report in 1945. As I was writing that paper, I found a reference to a paper on purified DNase published in a German journal in 1941, and managed to get a copy of it from the Alien Property Custodian of the U.S. Government. If it had been available from the start, we would have had the enzyme to work with before the '44 paper was published. These events weren't a major effect of the war, but they certainly influenced the Avery story.

*Dr. Hotchkiss, you have urged this university to recognize with pride that it gave uninterrupted support to the next steps of integration of the Avery discovery into the fabric of classical genetics. Would you enlarge on that?*

In the 10 years following the '44 paper, there were two broad questions preoccupying biochemists and geneticists. The first question was: was it DNA, and only DNA, that changed bacteria? The second was: what do those changes in bacteria

have to do with genetics—in particular, the genetics of traits other than those of the cell surface, and the genetics of microorganisms other than bacteria?

Most of the approach to these broad questions was still centered at Rockefeller during the decade preceding Watson and Crick. By 1954, our research at Rockefeller had shown that pneumococcal DNA could be freed of protein and yet remain active. DNA was also shown to behave as a classical array of bacterial genes, including those for traits other than surface antigens.

*Dr. Hershey, what comments would you like to make about the work of Avery and his colleagues?*

Two things have struck me about the work of Avery, MacLeod and McCarty. First of all, it was wonderful, and still is wonderful. But second, it had so little influence. Why? As long as you're thinking [as a geneticist] about inheritance, who gives a damn what the substance is? It's irrelevant. And once you know that the genetic material is DNA, there's only one inference, that you should study DNA. Dr. Chargaff did, but few others did—until, of course, Watson and Crick.

Another reason for Avery and his colleagues' work not attracting as much attention as it might have is that they were just too modest; they refused to advertise.

There is a third factor, too, not really an explanation, but a curiosity. The pneumococcus was an extremely awkward system to work with. A close analogy is the tobacco mosaic virus, which was the first vehicle for demonstrating the role of nucleic acid in viral infection. These were the last systems you would have chosen if you had been looking for material to study from this point of view.

*Dr. Lederberg, what was the state of bacterial genetics at the time you moved into this field? And what was the influence of the Avery lab paper*

*on your work?*

My immediate reaction to the paper, as I wrote in a letter after reading it, was that it was "terrific and unlimited in its implications."

But what to make of it? I was less preoccupied with the chemical identity of the transforming principle than with its biological meaning. I was quite confident that the chemistry would be resolved by a clearly defined path of analytical testing. In retrospect, however, it is hard to recall how vague were our concepts of bacterial cells and bacterial genetics. There were many other competing hypotheses to account for transformation.

I felt that the simplest answer to these dilemmas of interpretation would be to transform *Neurospora* [a type of fungus] in the same paradigm as the pneumococcal studies. So I spent the spring of 1944 trying to transform *Neurospora*, in the lab of Francis Ryan at Columbia University [but this line of experimentation did not lead to transformation of *Neurospora* with DNA].

I concluded that we should turn the problem on its head, and instead look for a system of genetic crossing in bacteria, hitherto unknown, to provide a robust, theoretical framework for the transformation studies. The experimental design [worked out in 1946, while Lederberg was a Ph.D. student in the Yale lab of Edward Tatum] was one that would become quite routine in future years, and amazingly enough it worked—and rather promptly! [Lederberg had discovered a "sexual breeding" system whereby two bacteria conjugate and form a connecting bridge through which one passes a chromosomal strand to the other. Subsequent research with Norton Zinder would show that bacterial genetic material is exchanged not only by conjugation, when the entire complement of chromosomes is transferred from one bacterial cell to another, but also by transduction, when only fragments are transferred].

## Potpourri

### Tri-Institutional Noon Recital

Violinist Tomohiro Okumura and pianist Eri Kang will play works by Johann Sebastian Bach, Bela Bartók and Pablo de Sarasate at the Tri-Institutional Noon Recital today (Feb. 25). The first-prize winner of the 1993 Naumburg Violin Award, 24-year-old Okumura has made solo appearances with the New York Concert Orchestra for his Carnegie Hall debut, the Tokyo NHK Symphony Orchestra and the New Japan Philharmonic. The concert, to be held in Caspary Auditorium at noon, is free and open to the public.

### Sunday film

*L'Argent* (France, 1983, English subtitles), directed by Robert Bresson, will be shown in Caspary Auditorium at 7:30 P.M., Sun., Feb. 27. A counterfeit note initiates a chain reaction of corruption and moral error leading to a terrifying climax. Admission is free.

### Biotech show

A Winter BioTech Show, sponsored by Purchase and Supply, will be held Wed., Mar. 2, on the 17th floor of Tower from 10:00 A.M. to 3:00 P.M. The show will feature the latest molecular biology products, including reagents and equipment. Refreshments will be served. All are welcome.

### RU Concerts

Pianist Jean-Yves Thibaudet will perform at The Rockefeller University Concerts, Wed., Mar. 2, at 8:00 P.M. in Caspary Auditorium. The program will feature works by Maurice Ravel and Franz Liszt. A native of France, Thibaudet is a leading name on the international concert scene. Admission is \$17 per person; \$7 for students and postdocs from the Tri-Institutions. For more information or reservations, contact Cathy Rogers, x8971.

### Opera performance

The winners of the Eastern Regional Finals of the Metropolitan Opera National Council Auditions will perform at a benefit concert in Caspary Auditorium, Sun., Mar. 6, at 8:30 P.M. A black-tie reception (dark suits, acceptable) with the artists will follow. The auditions program, established in 1954, is designed to discover new talent for the Metropolitan Opera. Forty percent of the current Met roster were selected through these auditions. Discounted tickets to the concert and reception are available to the Rockefeller community for \$20. Checks should be made out to "MONC-Eastern Region" and sent



Violinist Tomohiro Okumura will perform at the Tri-Institutional Noon Recital today (Feb. 25).

to "Opera Tickets," Box 68. Rockefeller students, who may attend the concert and reception free of charge, must obtain tickets from the Deans' Office.

### Lecture

Professor Jan Breslow spoke on "Transgenic Mouse Models of Lipoprotein Disorders and Atherosclerosis" at the Miami Biotechnology Winter Symposium in Florida earlier this month.

### Lecture videotapes

The Science Outreach Program has donated four video tapes of Professor David Baltimore's 1993 Alfred E. Mirsky Christmas Lectures, "The World of Viruses," to The Rockefeller University

Library. Contact Book Circulation, x8904, to borrow the tapes.

### Doubles pool tournament

The Faculty and Students Club is sponsoring a Doubles Pool Tournament. Those interested in competing can register by signing up at the club or calling the Club Manager, Patrick Griffin, x8078 from 4:00 to 11:00 P.M.

### Music Room

Practice time is available in the university's Music Room on the first floor of Caspary. The room, equipped with a Steinway grand piano, music stands and chairs, may be reserved for one hour during the day or evening. Because the voice carries through the building, no singing rehearsal is allowed during office hours. Contact Kate Cameron, x7802, to sign up.

### New 9600 dial-in service

Computing Services is pleased to announce a major change in dial-in service. Facilities can now support 9600-baud modems (including V.32bis with MNP 5 protocols) which will provide data rates up to 14,400 bits per second. The new service will step down to any lower speed modem. The 1200-baud modem access at x7680 has been discontinued.

The new service can be reached at x7690. After you set your modem's speed and give dialing instructions, your modem will make the connection. There will be a short wait while the Computing Services modem determines your baud rate. Once this is complete, you will get the Connect message and see the following display on the

screen: "Connect 9600/Type open hostname (i.e., library, mail, rj, science,)/RU TS1>." You will get a prompt to "open" a session on the Computing Services machine you want to work on (i.e., science, rockyj). For example: "RU TS1> open science."

After logging out of the computer you have chosen, you will again see the RU TS1> prompt, which allows you to choose another machine. If you are finished with your work session, type "logout" and then exit your communications program to break the connection.

Questions should be directed to the consultant, x8940.

## Lecturer to talk on fly body pattern

(Continued from page 1)

nisms occur in other organisms.

"Ruth is manipulating the genes involved in the formation of germ cells and has identified the molecular determinants localized in these cells," said Associate Professor Claude Desplan, who will host the lecture. "This has allowed her to recreate conditions for generating functional ectopic pole cells (the cells that give rise to germ cells), for the first time. I think Ruth is a perfect example of someone who has successfully used genetics to address a problem of developmental biology at the cell biological level."

A graduate of the University of Tübingen, Germany (Vordiplom, 1976; Ph.D., 1985) and the University of Freiburg, Germany (M.Sc., 1981), Lehmann studied as a research associate at the University of Freiburg from 1981 to 1982 and at the Max Planck Institute for Developmental Biology in Tübingen from 1985 to 1987. Following a year as a post-doctoral associate at the Medical Research Council in Cambridge, England, Lehmann joined the Whitehead Institute as an associate member and The Massachusetts Institute of Technology as assistant professor in 1988. In 1992, she was appointed associate professor. In 1990, she was named assistant investigator with the Howard Hughes Medical Institute. Lehmann became a full member of the Whitehead Institute in 1993.

Lehmann has won numerous honors, including the Otto-Hahn medal of the Max Planck Society.

The lecture will be held in Caspary Auditorium at 3:45 P.M., and preceded by tea at 3:15 P.M.



Children from The Rockefeller University Children's School parade across campus as a dragon on the lunar New Year, Thurs., Feb. 10.