

NCBI Scientist Serves On World Trade Center Victim Identification Team

Dr. Stephen Sherry Collaborates on DNA Standards

On the morning of September 11, 2001, a horrific and coordinated series of terrorist attacks obliterated the twin towers of New York City's World Trade Center (WTC). The collapse of the buildings entombed thousands of victims and blanketed lower Manhattan with a thick film of debris. It is now the summer of 2002, and New York City's Office of the Chief Medical Examiner is still dealing with the difficult and time-consuming task of identifying the remains of the attack victims—the largest mass disaster identification effort ever undertaken.

Dr. Stephen Sherry, a staff scientist at the National Center for Biotechnology Information (NCBI), a division of NLM, is working with the victim identification team to develop standards for accurate DNA typing and kinship matching.

"I was chosen by [Dr.] David Lipman, Director of the NCBI, to serve as a representative to the National Institute of

Justice kinship and data analysis advisory panel—also known as KADAP—based on my training in population genetics and kinship analysis and my experience in complex data management gained from NCBI's role in the human genome project," Dr. Sherry explains. "As the KADAP plays crucial advisory and collaborative roles in identifying disaster victims and bringing much needed closure to their families and friends, I feel privileged to serve in this capacity."

Sherry joined NCBI as a staff scientist in 1998 and serves as the curator of NCBI's Single Nucleotide Polymorphism (dbSNP) database. A native of the Gulf Coast, he obtained his BA in anthropology from the University of South Alabama and subsequently his MA and PhD in anthropology from Pennsylvania State University. In recent years, Dr. Sherry's research interests have focused on associating genomic sequence

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Workers remove twisted steel and other debris from the World Trade Center site. (Photo by Shawn Moore, Occupational Safety & Health Administration, U.S. Department of Labor.)

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variations with heritable phenotypes, or the observable traits or characteristics of an organism. What follows is an account of his work with the WTC Victim Identification Team.

DNA Typing Technologies Being Used to Identify Victims

Traditionally, disaster victims are identified through methods such as dental records, fingerprints, or visual identification by a relative. Reports from the WTC indicate that very few bodies have been recovered intact, making identification impossible by traditional methods. Therefore, the city, in collaboration with state and private facilities, is using two different DNA typing methods to identify the victims. DNA typing focuses on identifying and isolating discrete segments of DNA from a sample. By studying several locations where sequence variation occurs within a DNA segment, a typing profile may be obtained. When comparing DNA samples, the more locations that demonstrate the same pattern, the stronger the indication that the two samples came from the same individual. If a sufficient number of identical sequences are found in both samples, they are then considered a “match.”

The first and most common typing method being used by the victim identification team is the STR-13 technique, which uses nuclear DNA. The STR-13 method attempts to match 13 locations on a portion of a victim’s chromosome with DNA obtained from either an immediate family member or from DNA isolated from an item belonging to the deceased. The 13 locations are biological markers called short tandem repeats (STR)—short sequences of DNA that are repeated numerous times within a region of DNA. In this method, DNA obtained from a close relative is referred to as an indirect reference as it will exhibit only similarity to the victim’s DNA profile. DNA obtained from a victim’s personal effects is referred to as a direct reference as this DNA should match the victim’s DNA profile exactly. Family members usually provide direct references by collecting items such as toothbrushes, drinking glasses, razors, or hairbrushes. Once isolated, the DNA is amplified, separated, and analyzed, generating a profile often referred to as a “fingerprint.” Using a process called kinship analysis or kinship matching, fingerprints help scientists determine the probability that two DNA samples are from the same person, related individuals, or non-related individuals.

The second method of DNA analysis used by the identification team (the mitochondrial technique) is based on mitochondrial DNA, which is separate from nuclear DNA



Dr. Stephen Sherry

and plays a critical role in generating energy within a cell. Mitochondrial DNA is not only sturdier than nuclear DNA, but exists in a cell in much higher copy numbers. Hence, it can be extracted from teeth and bone fragments--materials that have a greater chance of surviving the extreme conditions surrounding the disaster. Unfortunately, this type of DNA is sometimes considered less precise in the genetic information it carries. This is because mitochondrial DNA is maternally inherited and transmitted, meaning that a child inherits the same mitochondrial DNA as its mother in every generation. Therefore, this technique works to match a victim’s DNA with the mother’s DNA, or with that of a biological sibling or daughter, in a modified kinship analysis procedure that takes into account these different rules of inheritance.

Regardless of the technique used, each profile generated is entered into one of three reference databases of victim remains, personal effects, or family members. Profiles from the three databases can then be compared for possible matches. Unfortunately though, a victim’s DNA profile may not always match a profile stored in one of the other reference databases, or vice versa, for a variety of reasons. First, some bodies may have been destroyed completely, eliminating any chance of obtaining a DNA sample. Second, a DNA profile obtained from an item such as a toothbrush or hairbrush may not actually be the owner’s profile. Lastly, samples recovered from the site may be badly degraded, requiring that a sample be run two or three times before a profile is obtained. In these cases, there is a chance that the profile generated may be missing critical information and, if there is not a complete DNA match, one cannot say for certain that that the sample came from a particular individual.

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Data Analysis: The Need for a Common Framework

The NYC Office of the Chief Medical Examiner is working with state and private labs and experts from the Federal Bureau of Investigation, the National Institute of Justice, and the National Institutes of Health (NIH) to develop new protocols and minimum standards for accurate DNA typing and kinship matching. In addition to collaborating on the development of those standards, NCBI's Stephen Sherry has also helped to develop, and continues to refine, a master plan for processing, coordinating, and integrating the enormous data flow being generated from the analysis of the victim's samples as well as the genotype information being collected by participating laboratories.

The need for a common framework stemmed from several important considerations. First and foremost was the requirement for a system capable of supporting the management and quality assurance of the data collected from the multiple sites that are generating, storing and analyzing the profile data. Such a system protects the confidentiality of the victim and family members; ensures the integrity of data over the many months of sample excavation, processing and analysis; and allows investigators to manage and analyze data generated in their own laboratory while at the same time combining and comparing their data with a common pool of data, say from one or more of the reference databases.

Program Accomplishments and Goals

Validated software is now available: to import data from outside labs; to enter and import data from New York labs; to assure the quality of the data collected and generated from all labs; to perform direct matching and kinship analysis; and to develop "work lists" based on the kinship data analysis process.

By June 30th of this year, one month after the proposed completion date for the excavation process, members of the identification team planned to have reached a number of milestones. The team expected to have completed the analysis of all DNA samples provided by family members and to have attempted, at least once, a conventional STR identification on every recovered victim sample. This would include sample extraction, analysis, matching, and confirmation if a direct-match (a victim's DNA matches a direct reference) or kinship-match (a victim's DNA matches an indirect reference) was found to exist. Investigators will also have identified new samples requiring initial analysis

as well as previously processed samples that require further analysis.

By summer's end, team members expect to have developed three DNA typing technologies for generating DNA profiles, in addition to the conventional STR method: one for modified STR analyses, one for mitochondrial DNA analyses, and one for single nucleotide polymorphism (SNP) analyses. SNPs are another form of variation that occur within a person's DNA sequence and, if studied in sufficient numbers, can provide powerful information about the identification of an individual.

September 11, 2001 will be forever etched in our minds as a time of great loss and sorrow. The number of dead and missing has taken its toll on families, friends and society as a whole. In order to identify as many of the missing as possible, the Office of the Chief Medical Examiner, in collaboration with the victim identification team, will attempt to type every tissue recovered from the WTC site. Team members hope that positive identification of as many people as possible will bring closure to those families whose loved ones are still missing.

So what does NCBI's Dr. Stephen Sherry think about this harrowing but important endeavor?

"Like I said earlier, we are working for the victim's families--more than anything, they need closure in order to move on with their lives," he notes. "For me, personally, this experience has put a human face onto something that we, as population geneticists and forensic scientists, traditionally distance ourselves from in the course of our professional work."

"What we have learned thus far is that this disaster presented unique challenges of scale and complexity that exceeded all prior experience in mass disaster forensic identification," Dr. Sherry explains. "As a group, we will continue to develop theory and standards of practice that are appropriate to this unfortunate new class of critical event. Although the circumstances that brought the group together are truly regrettable, it has been a privilege to work with such a stellar team of scientists from the NIH, Department of Justice, and the broader forensic community."

Thanks to Colleen Guay-Broder, formerly with NCBI and now a Program Analyst with NIH's National Institute of Biomedical Imaging and Bioengineering, for contributing this story.

UCLA Biomedical Librarian Alison Bunting Elected Chair of NLM Board of Regents

Becomes Third Librarian to Hold that Prestigious Post

Alison Bunting, interim university librarian at the University of California, Los Angeles, has been elected chair of the NLM Board of Regents. She will serve a one-year term, from June 2002 to June 2003.

Bunting was appointed to the board in 1999 by Donna Shalala, then secretary of the Department of Health and Human Services.

She is only the third librarian to serve as chair of the Board of Regents, which serves as the advisory body to the HHS secretary, the director of the National Institutes of Health and the NLM director on all important aspects of policy regarding the NLM. The board is also the final review body for NLM's extramural grant programs.

At UCLA, Bunting is currently serving as co-director for the planning grant the UCLA Academic Health Science Center received from the NLM through its Integrated Advanced Information Management Systems (IAIMS) program. The two-year grant supports planning that will guide information systems investment at the schools of dentistry, medicine, nursing and public health, and at the Biomedical Library.

Alison Bunting has served as president of the Medical Library Group of Southern California and Arizona, on the board of directors of the Medical Library Association (MLA) and as president of the Association of Academic Health Sciences Library Directors. She received the MLA's highest honor, the Marcia C. Noyes Award, in 2001, along with numerous other accolades.

She began her career as a library school student assistant in the catalog department of the UCLA Biomedical Library. She became director of the library and assistant dean for library service in the UCLA School of Medicine in 1984 and associate university librarian for sciences in 1991.

Bunting graduated from the University of California, Irvine with a BA in French in 1969, and earned her MLS from UCLA in 1970.



Alison Bunting

Need Help Cracking the Genetic Code?

New NCBI Web Feature Explains Molecular Biology Basics, Resources

Do you have trouble distinguishing a base pair from a Bosc pear? A gene map from a road map?

If so, like many people, you're a candidate to visit the new, user-friendly "About NCBI" section of the National Center for Biotechnology Information's website. NCBI is a part of the National Library of Medicine. "About NCBI" is at www.ncbi.nlm.nih.gov/About/index.html.

Experienced students of genetics will find many helpful features, too. "About NCBI" introduces researchers, educators, students, and the public to NCBI's role in organizing, analyzing, and disseminating information in the rapidly growing fields of molecular biology and genetics. Along the way, the website provides helpful lessons about the science underlying NCBI's many resources.

"Users can go as far as their interest and expertise take them," said NCBI Director David Lipman, M.D. "There is a wealth of information there about NCBI's mission and organizational structure, research programs and activities, and online resources."

One popular section is "A Science Primer," which provides introductory material on various science topics and technologies employed in the development of NCBI resources. Subjects covered include bioinformatics, genome mapping, molecular modeling, SNPs, ESTs, microarray technologies, and molecular genetics. (If you're still concerned about the difference between a gene map and a road map, the "Genome Mapping" section makes that distinction with an interesting analogy.) Each primer is written in plain language and includes easy-to-read design features intended to support and extend the main text.

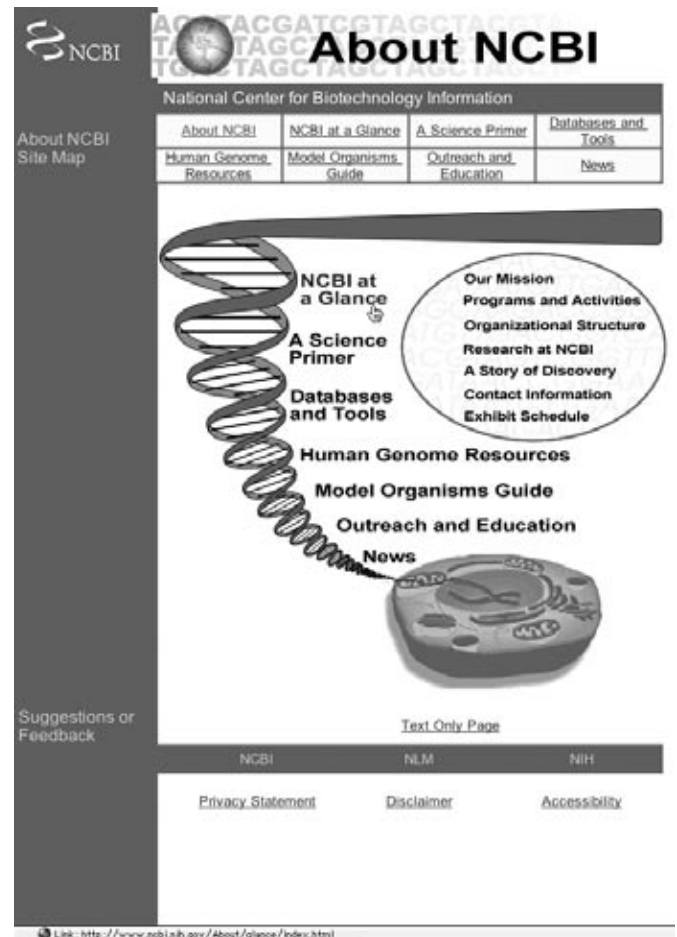
For example, highlight boxes summarize key issues, provide pointers to NCBI-related resources, and illustrate how recent scientific findings can impact human health and disease. Clear, simple figures are used throughout the section to explain complex scientific concepts and help summarize lengthy sections.

The "Model Organism Guide" explains key NCBI model organism resources, mammalian and non-mammalian, and provides access to information and activities designed to facilitate biomedical research.

"Outreach and Education" provides quick access to a complete listing of NCBI courses and tutorials, links to various glossaries defining the concepts and terms used in genomics and bioinformatics research, and recommended links to additional Web resources.

"Databases and Tools" offers a catalog of all publicly available NCBI resources. What makes this access point different from existing resource pages is that the user will find a brief description of what the database or data mining tool does, along with an example of how it may be used. "Databases and Tools" also provides a way of quickly accessing all NCBI FTP download sites as well as useful facts and figures depicting the growth and development of NCBI resources.

"News" provides short descriptions of recently released resources as well as enhancements to existing ones, press releases, and a listing of available NCBI print material.



NLM's "Virtual" Asthma Exhibit

Travels to Centers for Disease Control and Prevention for World Asthma Day Celebration

May 7, 2002 was the fourth annual World Asthma Day. Recognizing that asthma remains a prevalent disease and a major public health problem in the United States and throughout the world, the Centers for Disease Control and Prevention marked the day by debuting and demonstrating NLM's novel virtual DVD exhibit on asthma, "Breath of Life."

Faced with widespread public interest in its 6,000 square foot exhibition on asthma that closed recently on the National Institutes of Health campus, the National Library of Medicine (NLM) decided to take the exhibit on the road—with a high-tech twist. The complete exhibit was put on a DVD disk, using the latest technology pioneered by the NLM. Anyone with a DVD player and a computer equipped with a DVD-ROM drive can now view the exhibit. The disc contains more than two hours of full-screen, full-motion video, graphics, audio, and animations, as well as open captioning for the hearing impaired. Now everyone can "tour" the Breath of Life exhibit.

The contents of the Breath of Life DVD are lively and varied. We hear three-time Olympic gold medalist Jackie Joyner-Kersey describe her experiences with asthma. We delve into the history of asthma, learning how therapies

have evolved through the years. (Incredibly, tobacco, cocaine and opium were once popular asthma treatments.) We watch what happens to the lungs during an asthma attack and learn how to use an inhaler correctly. We follow the experiences of a young girl with asthma, and see its effects on her and her family. We learn about asthma research trends.

"Asthma can be managed properly only when the patient and his family understand the nature of this disease," notes Donald A.B. Lindberg, M.D., director of the National Library of Medicine. "Now everyone, including asthma patients, parents, health professionals, and teachers, can learn more about asthma in an entertaining and informal way, in the comfort of their own home, office or school."

The DVD exhibition made its debut at the CDC Museum Auditorium, Roybal Campus, in Atlanta, Georgia. Martha Katz, CDC's Deputy Director for Policy, and Richard J. Jackson, MD, Director of CDC's National Center for Environmental Health, demonstrated this unique technology at CDC's World Asthma Day ceremonies.



Dr. Richard Jackson, Director, National Center for Environmental Health, Centers for Disease Control, opens "World Asthma Day 2002" with a preview of NLM's "Breath of Life" DVD exhibit.

Dr. Barbara Rapp Named Associate Fellowship Program Coordinator

Versatile NLM Veteran was Associate Fellow Herself

Dr. Barbara A. Rapp assumed responsibility as the new coordinator for the Associate Fellows Program in June. She takes over from Dr. Mary Moore, who is now head of the NLM Reference and Customer Service Section. Dr. Rapp will also serve as research advisor for the Division of Library Operations, working on a wide range of research, evaluation and training projects.

For the past 12 years, Dr. Rapp was with the National Center for Biotechnology Information at NLM, where she directed the user services, outreach and training programs. Prior to that, from 1988 to 1990, she was with the Office of Planning and Evaluation at NLM.

During her tenure at NLM, Rapp has been an active participant in the Associate program, serving on selection and curriculum committees, directing projects, and acting as mentor to individual Associates. She also brings the experience of having been a Library Associate in the class of 1978-79, followed by an additional year of NLM experience as an indexer.

Dr. Rapp received her MS degree in Library and Information Science from the University of Illinois in 1978, and her PhD in Information Science from Drexel University in 1985. Upon completion of her doctorate, she served on the faculty of the School of Library and Information Science at the Catholic University of America before returning to NLM in 1988. At CUA she managed the program in health sciences librarianship, and taught courses in the areas of organization of information, reference, online searching, and information systems design and evaluation.

Her earlier experience in the field includes work in technical and public services units of academic and non-profit libraries, at specialized agricultural information centers, and in research and development at the Institute for Scientific Information.

“We are extremely pleased to welcome Barbara to this important position,” said Becky Lyon, Deputy Associate Director of Library Operations. “Her previous experience at NLM as a valued staff member as well as a former Associate, combined with her background in library school education, commercial databases, and information science research, makes her well qualified to coordinate this fellowship program.”



Dr. Barbara A. Rapp

About the Associate Fellowship Program

The NLM Associate Fellowship Program is a one-year internship, with an optional second year program component, for recent masters degree graduates in library and information science. Since its establishment in 1957, there have been nearly 200 participants in the program.

Designed to prepare librarians for future leadership roles in health sciences libraries and in health services research, the program introduces the Associate Fellows to a wide range of technologies and skills used in managing information at a national library. Fellows receive a comprehensive orientation to NLM programs and services during a structured five-month curriculum phase, and conduct individual projects over the remaining seven months. Projects are typically of a research, development, or evaluation nature. The training is augmented by site visits to area libraries as well as individual practicum experiences in other libraries throughout the country. In 1999, the optional second year was added to the program to provide an opportunity for a year of practical training in health sciences library outside NLM. Now in its fourth year, this field component of the Associates program continues to be popular among Fellows and the health sciences library community alike.

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It's Alive!

NLM's Popular Frankenstein Exhibition Reincarnated as Traveling Display

Frankenstein: Penetrating the Secrets of Nature is a new traveling exhibition that will visit 80 libraries in 38 states between October 2002 and December 2005.

Based on the lively exhibition of the same name created by the National Library of Medicine and displayed here 1997-8, the new show encourages audiences to examine the intent of Mary Shelley's 1818 novel, *Frankenstein*. Can they see parallels to hot-button topics like cloning and stem cell research in her classic tale? What are Shelley's and their own views about personal and societal responsibility as these relate to science and other areas of life?

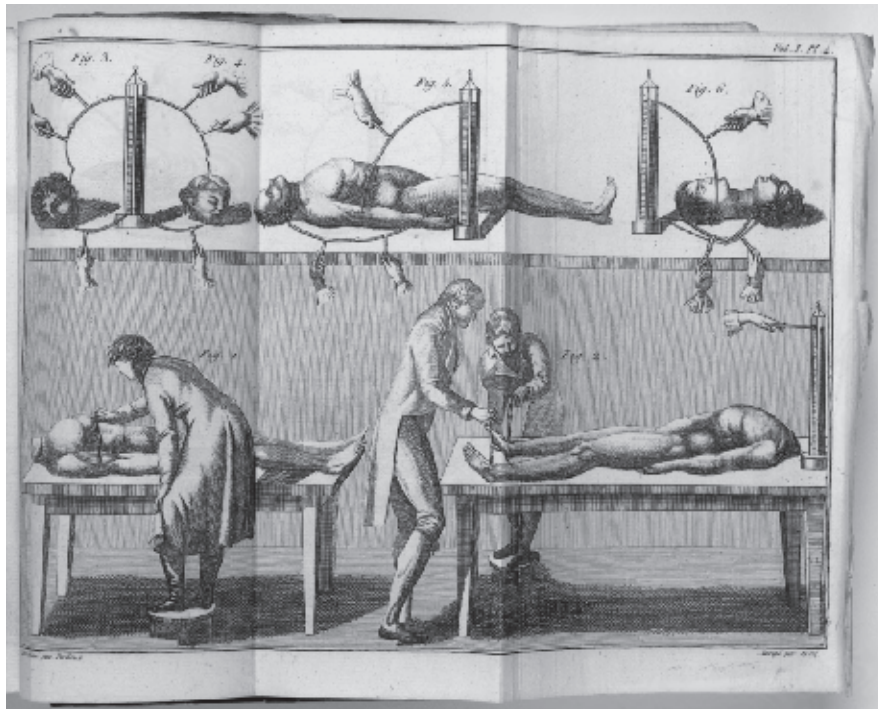
"*Frankenstein* is a delightful exhibition," said Dr. Elizabeth Fee, chief of NLM's History of Medicine Division. "It includes literary themes, the history of electricity and body snatching, eugenics and ethics, monsters and movies. I am confident that the estimated three million people who will participate around the country are going to have a lot of fun exploring the many rich ideas that *Frankenstein* provokes."

In addition to the exhibition, participating libraries will host interpretive and educational programs to help audiences discuss Shelley's novel and its use of scien-

tific experimentation as a metaphor for cultural values. Representatives of those institutions gathered at NLM in June for a workshop on the new exhibition. They gave high marks to a presentation by Susan E. Lederer, PhD, the exhibition curator, who spoke at length about science and Mary Shelley's novel, and offered a guided tour of the exhibition. The group also enjoyed a talk by Betty T. Bennet, PhD, a leading Mary Shelley scholar. The workshop included a nuts-and-bolts session on assembling and disassembling the traveling exhibition, and an evening reception at the National Library of Medicine, where everyone had the opportunity to see some of the Library's treasures included in the original Frankenstein show.

The traveling exhibition and related materials were developed by the NLM and the American Library Association, and funded by a major grant from the National Endowment for the Humanities.

To view the Frankenstein traveling exhibition homepage, which includes a list of participating libraries: <http://www.ala.org/publicprograms/frankenstein/>



This 19th century engraving depicts efforts to revive parts of the human body using electrical stimulation. Such endeavors were well known to *Frankenstein* author Mary Shelley.

Rapp Named Associate Fellowship Program Coordinator

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Echoing today's increased emphasis on recruitment for medical librarianship, an important goal is to broaden recruitment efforts into the Associate Fellows program, with a continued emphasis on diversity, leadership potential, and commitment to health sciences librarianship. NLM also aims to increase awareness of the program as a way of heightening interest medical librarianship as a career path.

The NLM would like to thank the health science libraries for their continuing support of the Fellowship program, as guest speakers as well as hosts for site visits or second-year Fellows. Your involvement in the program is an important way of helping the Fellows understand the relationship between NLM's programs and the libraries that make up the National Network of Libraries of Medicine.

For more information on any aspect of the program, see the web page (www.nlm.nih.gov/about/training/associate).

NLM Explores Advanced Health Networks

\$40 Million to Be Spent in Next Three Years

In keeping with its rich tradition of pushing the technology envelope, the NLM in March issued a request for proposals to build advanced networks that would enable physicians to access a patient's medical history—a capability that would allow health care professionals to treat victims of a disaster or other emergencies.

More specifically, NLM seeks to demonstrate the application of scalable, network-aware, wireless, GIS and identification technologies to a networked health related environment. Project proposals will focus on situations that will require or greatly benefit from the application of these technologies in health care, medical decision making, pub-

lic health, large-scale health emergencies, health education, and biomedical, clinical and health services research.

Although the proposal is not specifically a part of the homeland security initiative, officials say scalable networks could be used to deliver medical care in the wake of a terrorist attack, natural disaster or other crisis, when conventional communications are disabled.

For more information:

www.eps.gov/spg/HHS/NIH/OAM/MAA-RFP-MLM-02-103-VMS/SynopsisP.html

2002-2003 Associate Fellows Selected

Six new NLM Associates will begin their service at the National Library of Medicine in September. They are:

- Evangeline K. Alexander
MLIS, May 2002, University of Hawaii at Manoa
- Marcus Andrew Banks
MLIS, May 2002, Dominican University
- Molynda Ann Cahall
MSLS, May 2002, University of North Carolina-Chapel Hill
- Shannon D. Jones
MLS, May 2002, North Carolina Central University

- Natalie Joy Kamper
MLIS, June 2002, University of California, Los Angeles
- Michelle Hudson Ochillo
MLIS, December 2001, Louisiana State University

Once again, the Fellows were selected from an impressive pool of applicants. NLM would like to thank the library schools and medical libraries for their continued support of the program and encouragement of outstanding candidates to apply. Information on the Associate Fellows Program is available on NLM's website, at www.nlm.nih.gov/about/training/associate/.

National Network Office Welcomes New Staffers

Cogdill and Kutty Bring Wealth of Skills and Experience

Dr. Angela Ruffin, head of the National Network of Libraries of Medicine (NN/LM) National Network Office, announced that two new staff members have come on board.

Lalitha Kutty, the new Consumer Health Librarian, comes to NLM from Analytical Sciences Incorporated in Bethesda, Maryland, where she was a Senior Health Information Specialist. She worked on the PDQ database, a project of the National Cancer Institute.

From 1991 to 2001, Kutty worked for the MayaTech Corporation in Silver Spring as a senior health information specialist. In this position, she was responsible for maintaining the State Cancer Legislative Database for the National Cancer Institute. Also in 1991, she worked as a librarian for the National Institute of Alcohol Abuse and Alcoholism (NIAAA) library, a position that was contracted to CSR Incorporated in Arlington, Virginia. Kutty holds an MS degree in library and information science from the University of the District of Columbia and an MA in English literature from the University of Madras.

Keith Cogdill, PhD, the new Outreach Librarian, joins NLM from the University of Maryland, where he was Assistant Professor in the College of Information Studies. Before taking that post in 1999, he was a teaching assistant at the School of Information and Library Science at UNC-Chapel Hill. Dr. Cogdill also held several research assistant posts at UNC-Chapel Hill and worked for three years as a librarian at the Library of the Health Sciences, University of Illinois at Chicago.

Cogdill earned his PhD in information and library science from the University of North Carolina at Chapel Hill and his master's degree in library science from the School of Library and Information Science, University of Alabama. His BA degree, in medieval studies, is from the University of the South, Sewanee, Tennessee.



Lalitha Kutty



Dr. Keith Cogdill

“Smallpox: A Great and Terrible Scourge”

Exhibition Celebrates 25th Anniversary of Eradication of the Disease

NLM’s History of Medicine Division (HMD) has installed a new exhibition on the eradication of smallpox. The exhibition, “Smallpox: A Great and Terrible Scourge,” is on display outside the HMD Reading Room, in the main Library building (#38) until November 30, 2002. Its curator is Alexandra M. Lord, PhD, staff historian for the United States Public Health Service.

Not a reflection of recent public preoccupation with biological warfare, the exhibition was created to commemorate the 25th anniversary of the eradication of smallpox: Ali Maow Maalin of Somalia contracted the last naturally occurring case of smallpox in October 1977 .

Before its eradication, smallpox posed a constant and often deadly threat. The disease killed almost 30 percent of its victims, leaving those who recovered with face scarring, blindness and sterility. There was and still is no cure.

Medical practitioners did, however, develop several techniques to control the disease. The exhibition explores both the rise and fall of variolation, which provided immu-

nity from smallpox by deliberately infecting patients with the disease, as well as the ultimate triumph of vaccination, which provides a ten-year immunity by infecting patients with cowpox. Special attention is focused on the vaccination campaign launched by the World Health Organization and the Public Health Service in 1967. This campaign was responsible for the ultimate eradication of smallpox.

The exhibit can be viewed between 8:30 a.m. to 5:00 p.m. Mondays through Fridays, and Saturdays from 8:30 a.m. to 12:30 p.m. Beginning Labor Day (September 2nd), the Library and the exhibit will also be open Thursdays until 9:00 p.m. Because of heightened security, parking on the NIH campus is difficult. Go to www.nlm.nih.gov/about/visitor.html for directions and information about security measures. Metro service (Medical Center station on the Red Line) is also available.



In “Vaccination from the Calf,” a wood engraving by Charles Joseph Staniland (illustration from *The Graphic*, London, January 13, 1883), two mothers sit with their infants while a physician vaccinates another infant, held by a young woman, with cowpox.

NLM Director's Awards, Frank B. Rogers Award

Presented at May Board of Regents Meeting

NLM Director Dr. Donald A.B. Lindberg presented three NLM Director's Awards at the spring meeting of the NLM Board of Regents.

- Donald Poppe, until recently the Library's Associate Director for Administrative Management, in recognition of his "exemplary management and leadership of the National Library of Medicine's administrative programs and services that reflect the highest level of integrity and professionalism;"
- Joseph Hutchins of the Office of Computer and Communications Systems, for "exceptional vision, planning, and implementation of the National Library of Medicine's systems reinvention initiative;" and
- Naomi Miller of the Public Services Division, for "outstanding management of the selection and organization of MEDLINEplus content, including the definition and maintenance of its high standards for quality, authority, and accuracy."

The Frank B. Rogers Award recognizes an employee who has made a significant contribution to the Library's fundamental programs and services. Board Chairman Dr. Henry Foster presented the 2002 Award to Karen Kraly of the Office of Computer and Communications Systems in recognition of "10 years of innovative contributions to NLM's DOCLINE system."



Joe Hutchins receives his NLM Director's award from the man himself, Dr. Donald A.B. Lindberg.



Dr. Lindberg presents the NLM Director's award to Naomi Miller.



Karen Kraly receives the Frank B. Rogers Award from NLM Board of Regents Chair Dr. Henry Foster.

Oregon's Wallowa County Wins Public Library Association Prize

Librarian's Chance Meeting with NLM Director Yields High-Speed Internet Connections

A chance meeting in tiny Troy, Oregon in the summer of 2000 is now bringing big dividends for libraries in Wallowa County, the scenic area 350 miles from Portland, where Troy is located.

When Wallowa County librarian Conni Curry of the small, computerless library at the Troy school met Dr. Donald A.B. Lindberg, she had no idea he was director of the National Library of Medicine in Bethesda, Maryland, the world's largest medical library and an arm of the National Institutes of Health. Nor did she realize that he knew of grant monies available to bring the best in online health information to rural communities.

Dr. Lindberg had visited the Troy Library during a visit to Wallowa County. He had been struck by the need for good electronic health information in this remote area, and by the energy and enthusiasm of librarian Curry. He was so interested that he encouraged the county librarian, Claudia Jones, to assess her needs and present NLM with ideas for possible funding.

After careful thought, Jones submitted a funding proposal to NLM. It read, in part, "Online access is non-existent other than at headquarters, where I have an older 'hand-me-down' PC I use mostly for word processing...Neither branch library has a telephone."

Wallowa County must have made their case well. Special funding from NLM was awarded in January 2001, on the condition that the installation and training work be completed by April 30, 2001. Librarian Curry and several collaborators got to work right away to select equipment, negotiation with vendors, arrange for installation, and create a training plan. An estimated \$36,000 would be spent on computers, high-speed connections and Internet subscription programs.

Even on such tight timelines, the project came together beautifully. Now, the 7,000 residents of Wallowa County can walk into any of the four connected sites and experience instant connection with the most up-to-date health information in the world. And, for this feat, the Wallowa County project has received the "Excellence in Small and/or Rural Public Library Service Award" from the Public Library Association. The award honors a public library serving a population of 10,000 or less that demonstrates excellence of service to its community. A plaque and \$1,000 honorarium accompanied the award.



Wallowa County librarian Claudia Jones (l.) and Troy branch librarian Conni Curry, with one of the computers purchased with NLM funds. They're shown at the Wallowa County (Oregon) Public Library. Jones will tell her story at the September 2003 meeting of the NLM Board of Regents.

Conni Curry describes her unexpected meeting with NLM's Lindberg as "a stroke of luck." He was in this picturesque section of northeastern Oregon to see his son, who was seasonally employed with the Oregon Department of Fish and Wildlife.

The powerhouse players in the effort to bring high-speed Internet access to Wallowa County were: county librarian Claudia Jones who, after writing the grant proposal, oversaw the project; Troy librarian Conni Curry, who assisted in all phases of planning and execution; Delores Judkins of the Oregon Health Science University, Portland, who traveled to Wallowa to teach staff there how to take advantage of their new cyber capabilities; and Nancy Press, Consumer Health Coordinator at the Pacific Northwest Regional Medical Library at the University of Washington, one of NLM's eight national regional medical facilities.

Dr. Sheldon Cohen Donates Busts of Medical Luminaries to Library

Maimonides, Pasteur and Jenner Now Grace the History of Medicine Reading Room

Acknowledging his appreciation for the important ways in which it has furthered his work, Dr. Sheldon Cohen, a visiting scholar at the NLM and an acknowledged expert on allergy and infectious disease, commissioned bronze portrait busts of three medical luminaries and presented them to the Library's History of Medicine Division in a ceremony February 13, 2002. The event took place in the first floor lobby of the main National Library of Medicine building (#38).

The busts, of Moses Maimonides, Louis Pasteur, Edward Jenner, were created by sculptor Karen Leigh (her "art world" alias), who's known as Karen Leighty when she's working as a Visual Communications Specialist at NIAID.

The statues are the perfect embodiment of Dr. Cohen's own distinguished career as an educator, researcher and administrator, because his interdisciplinary pursuits have always combined the history of medical and contemporary science. Maimonides, a 12th century Talmudic commentator, philosopher, and physician to the court of the sultan Saladin, penned many influential medical treatises, especially on asthma. For his groundbreaking research, Pasteur is considered the father of bacteriology, while Jenner is revered as the father of immunology.

Dr. Cohen has a pattern of turning a short stay at an institution into a long, contented one. From what began as

a 120-day consultant appointment at NIH, he carved out a career of over 30 years. His lease on an NLM scholar room was supposed to have lasted six months, but that's going on 12 years.

NLM Director Dr. Donald A.B. Lindberg commended Cohen for his distinguished contributions to clinical research and academic medicine—and to many NLM endeavors. As science advisor to the Library's Exhibition Program, Dr. Cohen played key roles in creating the NLM exhibitions "Emotions and Disease" and "Breath of Life."

"More than anything, I view him as a user of the Library," noted Lindberg. And then, addressing, Dr. Cohen, the NLM Director continued, "Of course we're very grateful for all you've done for this institution."

Dr. Cohen said that the appreciation goes in both directions. He thanked Dr. Lindberg for his many years of support, and for providing him opportunities to tap NLM's unique archival and literary resources, thus enabling him to produce publications in the history of his field: allergy, asthma and immunology. He also saluted HMD Director Dr. Elizabeth Fee and Public Health Service Historian (and former HMD Director) Dr. John Parascandola for their boundless enthusiasm and assistance.

Two trios: NLM Director Dr. Donald A.B. Lindberg (l.), Dr. Sheldon Cohen and sculptor Karen Leigh stand near the bronze busts Leigh created, Dr. Cohen commissioned and Dr. Lindberg accepted, as a gift to the NLM.



THE BATHTUB COLLECTION

A Constellation of Fragments

Rarely indeed can a bibliographer point with gleeful pride to an item utterly unknown to his fellow-bibliographers. Where, then, is the joy of the chase for him?

—Dorothy M. Schullian,
“Here the Frailest Leaves”

Her bathtub activities were shocking.

One day in 1944, Dorothy Schullian gathered over a hundred rare bookbindings, removed them from the Army Medical Library, took them home, and dunked them in her bathtub.

Where she soaked them to pieces.

“This is not what we generally do today,” says Carol Clausen, head of conservation for NLM’s History of Medicine Division.

Indeed, conservation practices have progressed. “Who knows what type of water she was using?” asks NLM paper conservator Rachel-Ray Cleveland. “Now we use very purified water with the copper, iron, and manganese removed, because these are very damaging to paper artifacts.”

“She was doing something no one else would’ve done,” says Sandra Parker Provenzano, who processed the collection in 2000.

Schullian, a respected scholar in classics, knew what she wanted.

“To see what was inside,” Clausen explains as she lugs an archival box out into the light. “Schullian wanted the junk that was pasted together to form the bindings.”

And she got it. No longer compressed into covers and backstrips, freed from layers of glue, what rose to the surface of the water in Schullian’s tub was an abundance of historically valuable documents.

“All scraps,” says Clausen, “spanning seven to eight centuries, in at least eight languages and all subjects. NLM has made them accessible, and we wish somebody would study them.”

Welcome to the Bathtub Collection.

Bookbinding: a ten-second history

In 2002, when you buy a new book, you’ve got a neat package—printed and bound by the publisher.

Books were not always so briskly delivered.

Up until the nineteenth century, publishers didn’t bind books. The bookseller or the individual purchaser acquired books in disbound sheets, and then carried them to a binder.

The binder would fashion his own boards out of printers’ and booksellers’ waste: leftover odd bits pasted together to form covers and spines.

It was this way for centuries: scraps were used to make one’s own bindings. Paper was valuable; it wasn’t tossed. So valuable was it, in fact, that there was a market for scrap paper. Nothing went to waste—it was a case of historical recycling.

This practice lasted until the nineteenth century, when publishers took advantage of innovative machine printers to manufacture their own bindings.

Now fast forward to 2002, to your summer vacation as your beach book—a plump bestseller—gets soaked by the incoming tide. When a contemporary binding falls apart, what’s left?

Soggy cardboard. Nothing as jaunty as the thirteenth century relics Schullian uncovered.

“She was a pioneer,” says Rachel-Ray Cleveland. “A person of vision.”

Warped and split, broken, torn and crumbling

Here’s how Schullian got her scraps.

In 1942, NLM’s antecedent, the Army Medical Library, shipped its rare books for safekeeping to several different sites newly created during WWII. No one wanted these valuable works to remain near Washington, where they would be vulnerable to attack by foreign powers, and so thousands of volumes were evacuated to Cleveland.

In the process of unpacking and reshelving, the Cleveland staff discovered that several thousand 16th-, 17th-, and 18th- century volumes had been more than a little neglected.

At least three-fourths of the pre-1800 volumes would have to be restored to a viable condition. And because the library was meant to serve as a research institution, the public was expected to use the original volumes. For the library to fulfill its mission, the bindings had to be robust enough to be handled by patrons.

It became a huge project. The rare book collection became the focus of the Cleveland Branch, which soon became the Army Library’s History of Medicine Division.

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The Bathtub Collection

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The Library director brought in a master bookbinder from Switzerland, and in 1944 he was joined by Dorothy Schullian, a classics scholar from Albion College.

But Schullian was a scholar who was extremely interested in bindings. Schullian took them home.

After soaking them apart, Schullian put the salvaged fragments into envelopes, on which she recorded the respective title, author and year of the book—the book, that is, from which she gleaned the binding—not the provenance of the scraps themselves.

She was conserving thousands of items at a time.

“Today,” observes Sandra Provenzano, “such a regimen would be appalling. You’d do it one object at a time.”

“My strongest Lasting”

In 1953, nine years after she began her project, Schullian published a paper on the bathtub collection, and drew its title, “Here the Frailest Leaves,” from Whitman’s *Leaves of Grass*:

Here the frailest leaves of me, and yet my strongest-lasting:

Here I shade and hide my thoughts—I myself do not expose them,

And yet they expose me more than all my other poems.

Her essay argues in favor of fragments, of their intrinsic value, describes the lessons they teach, and heaps up examples of what she found—as if to inspire, if not tempt, the reader. Here’s a brief sample:

- an acrostic sonnet from a 1659 *Ars Medica*
- eight pages from the 1607 spring catalog of the great Book Fair at Frankfurt
- love letters
- unsold lottery tickets
- uncut playing cards
- 16th century religious music
- pieces from the Book of Job printed in tiny Roman type
- 35 folios of a 1526 Vulgate by Erasmus

- prayers to be delivered from the plague
- 13th century ecclesiastic texts cut into slender strips of vellum to reinforce a manuscript spine.

- a tiny fragment written in Hebrew

The scraps filled four file cabinet drawers, where they rested for almost 60 years.

It wasn’t until 1997 that Walton O. Schalick III, a physician and medievalist, sized up the bathtub collection. He tried to group them and reorder them; then, in an article submitted to the American Historical Association, recommended that the scraps be catalogued and re-housed.

Enter Sandra Parker Provenzano, a summer intern in preservation. She had a good command of Latin (from majoring in medieval studies) and a background in preservation, and so landed a four-month contract to process the collection.

“I loved it,” she says, “because it was all stuck in file cabinets for 60 years and it managed to survive. I felt connected to history through little pieces of it. It was something I could feel.”

She carefully examined the file drawers, took off the cellophane tape, paper clips and rubber bands. Schullian had put the specimens in envelopes and labeled them with the respective titles of the texts from which they arose—that is, from the bindings they once formed, not the texts they were torn from.

Books printed before 1600 were rebound in full leather; those printed before 1700 in half leather; and those before 1800 in quarter leather. After the war, they were safely returned to NLM in Bethesda, where they remain.

As do the fragments. There are over 500 groups of scraps, and sometimes 12-15 different pieces of a single book’s binding—enough to fill seven Hollinger boxes.

Provenzano notes that “someone interested in HMD’s collection might want to try and trace the history of the book—who owned it, etc.—by examining the scraps retrieved from the original binding.”

It’s a whole new area of historical research.

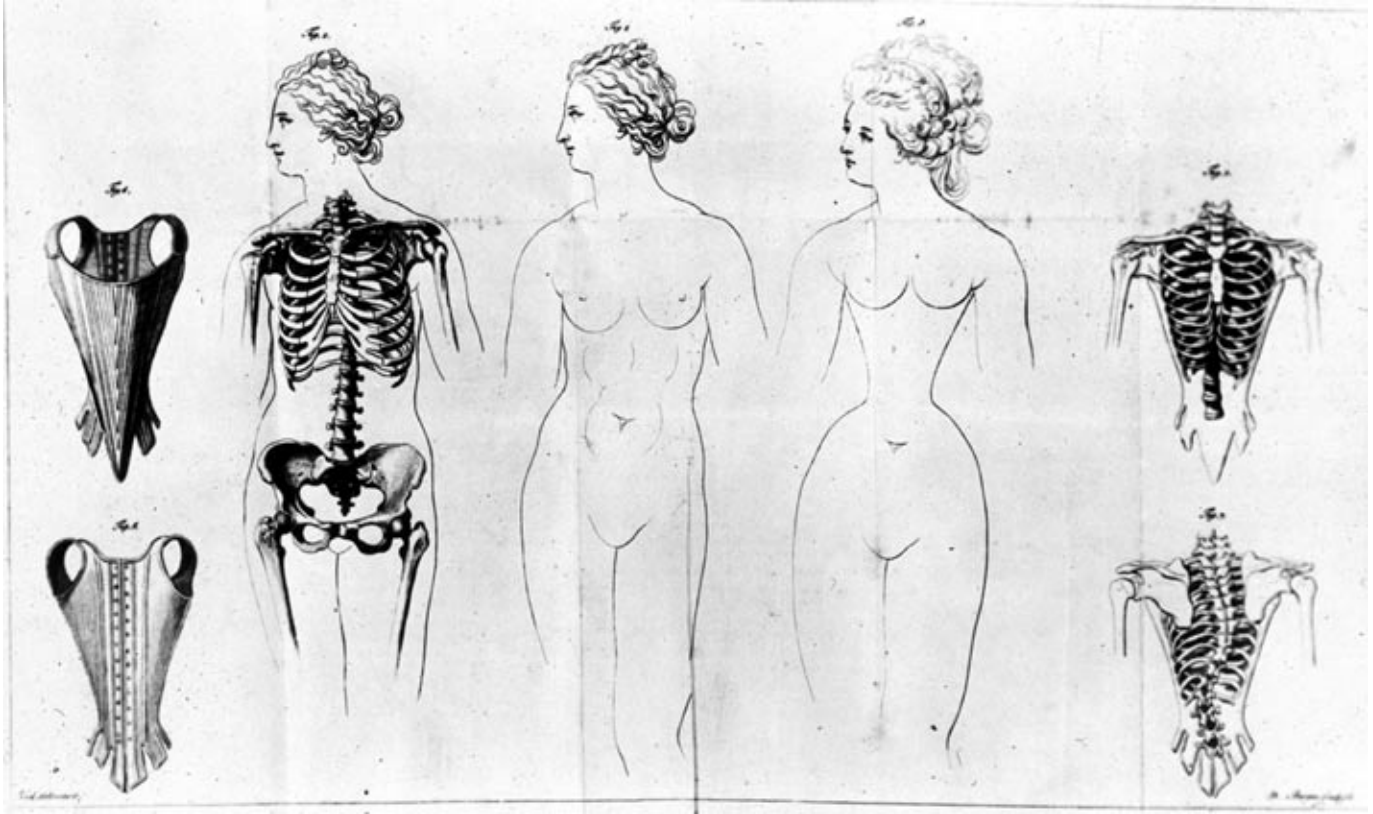
“There is heresy in this”

Schullian wrote much on the history of science and the history of medicine, and her papers are now at Cornell University Library. At the NLM she is perhaps best known for having co-written the bibliography of rare books and incunabula—known simply as “Schullian” and still in use today.

And what of the woman behind the scraps?

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The Effects of the Corset



This illustration appeared as a fold-out in a little book, *Über die Wirkungen der Schnürbrüste* (On the Effects of the Corset) written by Samuel Thomas von Sömmerring.(1) The essay was published in 1793 and republished in an expanded edition in 1803. Translated into several languages, it became a bestseller.(2)

Von Sömmerring, a physician and well-known anatomist, argued that the back-laced corset, as worn by fashionable ladies of the time, constituted a health hazard, by compressing the ribs and other internal organs, and leading—he claimed—to tuberculosis, cancer, and scoliosis, or curvature of the spine. His illustration contrasts the natural shape of the female body with the artificial hourglass shape produced by a tightly laced corset. In Germany, England and the United States, dress reformers advocated looser lacing, pantaloons or “bloomers,” and clothes that allowed more natural movement. Throughout the late nineteenth century, however, these reformers belonged to the radical fringe of the feminist movement and their arguments

led to much merriment in the popular press. Most middle and upper class women continued to compete for the tiniest waists, regardless of their impact on health. In more recent years, hiatus hernias caused by overly tight girdles or corsets have been termed “Sömmerring’s syndrome” in tribute to the first physician to warn of the dangers of tight lacing. (3)

1. Von Sömmerring ST. *Über die Wirkungen der Schnürbrüste*. Berlin: Neue Auflage; 1793.
2. Schwarz GS. Society, physicians, and the corset. *Bull NY Acad Med*, 55:1979;551-90.
3. Bell JA and Bell GC. Tight girdle or Sömmerring’s syndrome. *New Engl J Med*, 289:1973;689.

Illustration from the collection of the National Library of Medicine. Column reprinted with permission from the American Journal of Public Health.

The Bathtub Collection



Some of the treasures from NLM's Bathtub Collection.

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"She was a fussbudget," according to Dr. James Cassedy, NLM Historian. Dorothy Schullian was very bright, and equally demanding.

"A maverick," says Rachel-Ray Cleveland.

Schullian admitted that her methods were unconventional:

There is a heresy in this, [yet] important finds have been made over many centuries within the top and bottom covers and the backstrips of bindings[. . .] Slowly and ploddingly, I have soaked them apart. My knees, I assure you, have suffered.

Carol Clausen observes that "Schullian would never write that way now in a scholarly journal. You can feel the woman behind the text. Now to be published it would have to be a lot dryer."

Rachel-Ray Cleveland admires Schullian for realizing the value of these remnants and working to save them. In fact, she explains, "In 1944, there was no profession or science of conservation, no formal study of this at all until 1970—at least not in the U.S. There were bookbinders, curators, librarians, and they did things themselves as best they could without having studied formally."

The Frailest Leaves

Of her discovery, Schullian wrote: "I have entered a bibliographer's paradise."

Indeed, as Carol Clausen brought out the bathtub collection, I felt a peculiar thrill, as if looking through a peephole into other lives and times.

"Sometimes," says Clausen, "accidental looks at history are more interesting than deliberate ones."

And yet, its beauty and rarity notwithstanding, the Bathtub Collection provokes troublesome questions: What use are these scraps? What are they for? How are we to read history in pieces? As contested? As something whose meaning is unresolved?

Philosopher Walter Benjamin saw history as a constellation of fragments. This constellation could crystallize or be illuminated as new elements were introduced to it or as it flashed up in moments of danger.

Does anyone ask to see this collection?

"No," says Clausen ruefully. "But we wish they would. If they make the request, we'll retrieve it for them."

From scraps of Erasmus to lottery tickets: Welcome to Paradise.

Thanks to Belle Waring, Library Technician in the Digital Manuscripts Program, History of Medicine Division, for contributing this article.

Monograph Gaps

NLM regularly seeks the help of the medical library community in filling gaps in its monograph collections. If you are able to provide a copy of any of the monographs listed below, please send to:

National Library of Medicine
TSD-MONOGRAPHS Attn: L. Turnage
Bethesda, MD 20894

Adenoviruses: basic biology to gene therapy / [edited by] Prem Seth. Austin, Texas: R. G. Landes, 1999. (Medical intelligence unit).

Advances in growth hormone and growth factor research / edited by Eugenio E. Muller, Daniela Cocchi, Vittorio Locatelli. Roma: Pythagora Press: Berlin; New York: Springer-Verlag, c1989.

Blood pressure variability: proceedings of the International Workshop on Blood Pressure Variability held at the University Hospital, Gent, on June 15-16, 1978 / edited by D. L. Clement. Baltimore: University Park Press, c1979.

Bohinski, Robert C. Modern concepts in biochemistry. 2d ed. Boston, Allyn and Bacon, [c1976]. (Allyn and Bacon chemistry series).

Congenital anomalies of the urinary tract: an illustrated guide / edited by Robert H. Whitaker; watercolour illustrations by Robert H. Whitaker. Edinburgh; New York: Churchill Livingstone, 1990.

Hardy, Richard Neville. Temperature and animal life. Baltimore: University Park Press, 1979. (The Institute of Biology's studies in biology; no. 35).

Hospital management / edited by Charlotte A. Aikens. New York: Garland, 1985. (The History of American nursing).

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Neurological adverse reactions to anticancer drugs / J. Hildebrand (ed.). Berlin; New York: Springer-Verlag, 1991 (Monographs, European School of Oncology).

White, T. Hedley. A short English-Swahili medical dictionary; expanded and edited by C. E. Sorsbie, with the collaboration of Nathan Mbwele and Anne Ndubbi; with a foreword by Charles Njonjo. 1st ed. Edinburgh; New York: Churchill Livingstone; New York: distributed by Longman, 1979.

Pats on the Back

- Administrators of the YAHOO! search engine came up with a list of their seven most trusted health sites. Both NLM's MEDLINEplus (www.medlineplus.gov) and the National Institutes of Health website (www.nih.gov) were selected for that elite group.
- TIME magazine named NLM's ClinicalTrials.gov one of its 50 Best WebSites of 2002. The magazine hailed the site, which organizes and disseminates information on public and privately funded trials, as "one of the best examples of how the Web can do serious good." For the complete list of TIME's favorite sites: www.time.com/time/2002/tech/best/complete.html.
- The American Accreditation HealthCare Commission (URAC) has made MEDLINEplus its first government-accredited health care site. URAC, which cites the "stellar reputation" of MEDLINEplus, follows a painstaking and thorough review process before awarding accreditation. The announcement is at:

<http://webapps.urac.org/websiteaccreditation/portal/consumer/press.asp>.

- A medical librarian from Michigan recently sent this e-mail message, praising the interactive tutorial feature of MEDLINEplus, to NLM Customer Service:

I found this tutorial [on osteoporosis] while searching for information for a patient. I hadn't previously seen the X-plain [X-plain.com Patient Education Institute supplies the interactive tutorials to MEDLINEplus], but will look for them in the future. As a medical librarian I'm proud to see such a fine resource being done by NLM.

A complete list of interactive health tutorials on MEDLINEplus is available at www.nlm.nih.gov/medlineplus/tutorial.html. Using animated graphics, each tutorial explains a procedure or condition in easy-to-read language. You can also listen to the tutorial.

NAMES IN THE NEWS

RECOGNIZING
AND HONORING
THE NLM COMMUNITY



Don Poppke

NLM Associate Director for Administrative Management **Donald C. Poppke** left the Library in April to assume the position of Budget Officer for the National Institutes of Health. Poppke joined the NLM staff in 1995. During his tenure, he won several awards including the NLM and NIH Director's Awards, and demonstrably raised the quality of the Library's administrative services, which include NLM's office of human resource management, budget, and acquisitions.



NAMES IN THE NEWS...



Dave Nash

David L. Nash, Director of the Office of Equal Employment Opportunity at NLM, has received the national award from the Center of Excellence in Rural and Minority Health. The award commends Nash for his "outstanding service, dedication, and determination in assuring that rural and minority America is included as stakeholders in the dissemination of health information, and participation in the activities and services of the National Library of Medicine." The Center is a newly established, congressionally funded institution on the campus of Voorhees College, a Historically Black College in rural Denmark, South Carolina



Lori Klein

Lori Klein, Senior Electronic and Non-print Programs Coordinator in the Public Services Division, has been elected President of the Health Sciences Communications Association (HeSCA). Klein has been active with the organization since 1988 and will serve a one-year term commencing in June 2003.

NAMES IN THE NEWS....



Dr. Walter Hickel

Walter Hickel, PhD, Research Historian in the Digital Manuscripts Program, History of Medicine Division, has received the James Madison Prize for 2002, offered by the Society for History in the Federal Government. The citation states that his article, "War, Region, and Social Welfare: Federal Aid to Servicemen's Dependents in the South, 1917-1921," published in the *Journal of American History* (March 2001) was unanimously chosen "the most outstanding article or essay elucidating an important aspect of federal history." The award was presented at the Society's annual meeting, at the Library of Congress in April.



Crystal Smith (r.) receives her award from MLA President Carol Jenkins.

Crystal Smith, Collection Access Specialist in the History of Medicine Division, has won the Medical Library Association's 2002 MLA Scholarship for Minority Students. The award was presented at MLA's Awards Lunch, at the Association's annual meeting in Dallas, Texas in May.

NAMES IN THE NEWS...

Talk about someone who stays in circulation! Retired NLM reference librarian **Howard P. Drew, Jr.** will be listed in the 2003 Guinness World Records as holding the record for the "most blood donated by a single person." According to the March issue of NIH's *Clinical Center News*, Drew donated a documented 213 units, or roughly 28 gallons of blood, between 1950 and 2000. He continues to donate blood every two months, noting that "It's simple and it doesn't hurt."

James R. Riley, former Chief of the Technical Services Division and Deputy Associate Director for Library Operations and, died in February. During his tenure at NLM in the 1960s, he guided the creation of the Medical Literature Analysis and Retrieval System (MEDLARS), which grew into MEDLINE. He leaves behind his wife of 51 years, seven children and 12 grandchildren.

Dorothy T. "Dottie" Hanks, former librarian in the History of Medicine Division, died in January. Hanks retired from the Library in 1987 after 24 years of dedicated service to NLM and its patrons. That year, she received the NLM Director's Award, recognizing her invaluable and extensive reference assistance to hundreds of scholars. In presenting the award, NLM Director Dr. Donald Lindberg also commended her for her role in the remarkable growth of the Library's rare book collection during her nearly quarter of a century at HMD. She is survived by three children and four grandchildren.

John A.D. Cooper, MD, the first president of the American Association of Medical Colleges, died of complications from Alzheimer's disease in January. AAMC president from 1969-1986, Dr. Cooper was routinely included in U.S. News & World Report's listing of the most influential individuals in medical and health education. Dr. Cooper published over 300 articles in the scientific and professional literature, and received 12 honorary degrees from various institutions. He was also a frequent consultant to NLM, particularly in the area of the Integrated Advanced Information Management Systems (IAIMS) program. He is survived by his wife of 57 years, four children and eight grandchildren.

The following references cite works that discuss the products and services of the NLM. If you know of other appropriate citations for this column, please send reprints or references to Melanie Modlin, Editor, *NLM NEWSLINE*, Office of Communications and Public Liaison, NLM, Bethesda, MD 20894, or e-mail to: mm354i@nih.gov. (NOTE: Some of the articles listed may be outside the scope of the NLM collection and therefore are not available from the Library on interlibrary loan.)

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Thanks to Jacque-Lynne Schulman, Technical Information Specialist, Medical Subject Headings, and Karen Patrias, Senior Resource Specialist, Public Services Division, for invaluable help in compiling this list.



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