

NEWSLINK

FEDERAL LABORATORY CONSORTIUM FOR TECHNOLOGY TRANSFER

APRIL/MAY 2001 VOL. 17, NO. 4

NIH/DOE Global Genome Project Heralds New Scientific Era

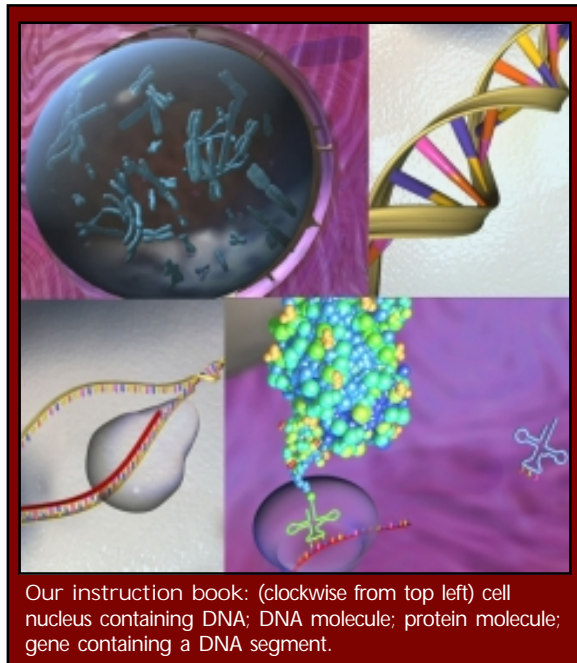
The breakthrough human genome sequence, the new Book of Life with the breakdown of all human genetic material, heralds a revolutionary approach in biology, and extraordinary new power and opportunities for scientists. A much more scientifically ambitious, exciting, promising and “braver new world” is here!

The sequence may provide the best way to thoroughly understand the roles of nature and nurture and our uniqueness—an individual’s susceptibility to and protection from all kinds of diseases, age of onset, severity of illness, and the ways our bodies respond to treatment. During the next 10 to 20 years, for example, the complete DNA sequence of each person’s genome may become a standard part of our health records, much like today’s baseline information of clinical tests and family medical history. Customized medicines may also be possible.

Public/Private Info

The Human Genome Project (HGP) is the international public effort to determine the complete sequence of DNA in the human genome. Established through a Memorandum of Understanding between the **Department of Energy (DOE)** and the **National Institutes of Health (NIH)**, the HGP’s ultimate goal is to sequence and identify the 30,000 to 40,000 human genes and make them accessible for further biological study.

Five major publicly funded genome sequencing centers,



or G-5 labs, worldwide—NIH-funded **Washington University, Whitehead Institute, Baylor College of Medicine**, the DOE’s **Joint Genome Institute (JGI)**, and Wellcome Trust-funded **Sanger Centre** of the UK—have carried out extensive technology development and generated the bulk of the sequencing work. With substantial input from 13 smaller labs in France, Germany, Japan and China, the DNA decoding project is truly a global effort. The

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INEEL’s Rydalch Elected to Succeed Brand as FLC Chair

NSWC-CSS’s Linsenmeyer Follows Appler as Vice-Chair

Ann Rydalch, Idaho **National Engineering and Environmental Laboratory (INEEL)**, was elected FLC Chair May 3 at the group’s national meeting in Burlington, Vermont. She will assume the leadership role effective June 1, when outgoing Chair **C. Dan Brand’s** term expires.

Rydalch was surprised when outgoing FLC Vice-Chair **Dave Appler** announced her victory.

“You know, when the Academy Awards happen and they get up there and say ‘I didn’t expect...,’ Rydalch said, “I didn’t expect this!”

“It’s not my desire to disrupt,” Rydalch continued, “but to only add to the stability of FLC because I believe strongly in (it), and what it stands for. That’s what my goal will be.”

Ed Linsenmeyer of the **Naval Surface Warfare Center-Coastal**

System Station (NSWC-CSS) ran uncontested to succeed Appler, who is retiring.

In addition, four Members-at-Large were elected: **Larry Dickens**, Oak Ridge National Laboratory; **Sue Ibrahim**, Army Yuma Proving Ground; **Carolyn McMillan**, NASA Marshall Space Flight Center; and **Mary Weiss**, Defense Technical Information Center. **NL**



FED LABS FLASH

Technology transfer news, notes, and events within the federal lab community

MPEGs Go to NIST

After a five-year tenure with IBM, the web site for the **Moving Picture Experts Group (MPEG)** is now hosted by the **National Institute of Standards and Technology (NIST)**.

MPEG develops the most widely used international standards for multimedia, video, music, and audio. Established in 1988, the group has produced MPEG-1 (the basis for MP3 sound files), and MPEG-2 (the basis for DVD).

Plans for the NIST MPEG web site include a search and retrieve capability for the online document archive, an automated document upload and registry process, and virus checking on incoming files.

The site, password protected and

open to technical experts only, is at <http://mpeg.nist.gov>.

For more info: Phillip Bulman, 301-975-5661, philip.bulman@nist.gov. To obtain a user name and password, send an e-mail to mpeg@nist.gov.

Life Science Computers Score a Trifecta

Sandia National Laboratories and **Celera Genomics** have signed a Cooperative Research and Development Agreement (CRADA) to develop software and hardware solutions specifically designed for the demands of computational biology as well as a full range of life sciences applications. **Compaq Computer Corporation** will provide the project technology.

Celera, Sandia, and Compaq will work together to increase computing

capability with the goal of achieving 100 trillion operations per second (100 TereOPS). By sharing some computing technology developed by Sandia, Celera and Compaq may ultimately reach the "petacruncher" (1,000 TereOPS) level.

This level of cooperation is necessary to meet the performance required for emerging genomics and proteomics (study of proteins in cell function, structure, and interaction) applications at affordable prices. It brings together these companies' capabilities in bioinformatics, high performance computing, and massively parallel systems.

For more info: Howard Kercheval (Sandia), 505-844-7842; Heather Kowalski (Celera), 240-453-3343; Dick Calandrella (Compaq), 508-467-2261

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successful development of cheaper and faster sequencing methods, combined with the ramping up of sequencing capacity at many labs, accelerated the timeline, and milestones were reached much earlier than originally expected. Working competitively but cooperatively with the private sector—primarily **Celera Genomics** of Rockville, Maryland—both the public and the private sector projects announced the completion of what is believed to be nearly equivalent working draft sequences at a joint press conference last summer.

NIH's NHGRI

Although the HGP is close to completion, "our work continues," said **Claire Driscoll**, Associate Director of the National Human Genome Research Institute's (NHGRI) Technology Transfer Office. "This is a public effort financed by taxpayers, and the research is being carried out for the benefit of all people. We're committed to finishing the project: sequencing nearly 100% of the human genome sequence with greater than 99.99% accuracy and ensuring that the

information is freely available and accessible to all."

About two years away, the final phase of the sequencing effort entails sequencing across any remaining gaps and difficult regions of the genome—mundane yet important and very technologically challenging work. As liaison with industry and NHGRI scientists, Driscoll manages the institute's intramural portfolio of discoveries and inventions, many of which may someday be developed into "brave new" products and services of use and importance to the American public. NHGRI also administers grant, contract, and related educational programs to address the ethical, legal, and social implications of the HGP.

DOE and National Lab Work

On the DOE side, **David Thomassen, Ph.D**, Program Coordinator, Office of Biological and Environmental Research in the Office of Science, coordinates the extramural centers' sequencing work on chromosomes 5, 16 and 19, any complementary overlaps with other labs, and current work in areas that need finishing and flushing out. The DOE does all outside work, mostly with

scientists at national laboratories (Los Alamos, Lawrence Berkeley, Lawrence Livermore and the virtual center of JGI) and universities. The HGP is now in the last of three five-year plans, begun in 1990 and jointly authored by program directors **Francis Collins** (NHGRI) and **Ari Patrinos** (DOE).

"Discovery Science"

Research at the NHGRI facilities has not focused on the actual sequencing of the genome. Instead, scientists are researching the genetics of human disease, and the development and application of innovative molecular biology techniques and related computational approaches to solve complex multi-gene diseases and accelerate genetic research. For example, one promising high throughput molecular profiling methodology is called tissue microarrays, or simply "tissue chips." Capable of being processed in an automated high throughput fashion, tissue chips are a useful tool for scientists to compare normal versus cancerous tissue on a large scale. They can also be used to analyze with

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Surgical Probe Joins Battle to Fight Breast Cancer

Bioluminate, Inc. of San Jose, California, has obtained a license to develop, produce, and market an innovative diagnostic device for early breast cancer detection that is based on technology originally developed by NASA.

The Smart Surgical Probe was developed at NASA's **Ames Research Center**, Moffett Field, California. A small disposable needle with multiple sensors, the probe has the potential to enable physicians to diagnose tumors without surgery, thereby reducing the need for a biopsy.

Further development of the device will focus on distinguishing cancer tissue types and obtaining real-time measurements.

For more info: Ann Hutchinson,
650-604-0176

Army Technology Benefits Commercial Businesses

The U.S. Army's **Edgewood Chemical Biological Center (ECBC)** has signed a licensing agreement with **Purified Microenvironments** of Miami, Florida, to market a transportable glovebox and filtration system to commercial customers.

The technology is used by the Army to safely analyze and classify unknown toxic or otherwise harmful materials. Its portability allows it to be used at incident or recovery sites of suspected hazardous materials.

The Army currently uses the glovebox in conjunction with its **Mobile Analytical Laboratory System (MALS)**, a self-contained, fully functional mobile laboratory.

For more info: Jim Allingham,
410-436-4347,
james.allingham@sbccom@apgea.army.mil

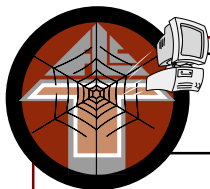
Argonne R&D Partner Sells New Weld to DaimlerChrysler

Spawr Industries, an Argonne **National Laboratory** Cooperative and Research Development Agreement (CRADA) partner, began its public offering of an infrared laser welding monitor by installing 13 units at the DaimlerChrysler plant in Kokomo, Indiana.

The monitor detects welds that do not form a strong bond and automatically signals the welding unit to correct system parameters.

This system replaces ultrasonic weld testing equipment and has decreased by 10 percent the plant's amount of scrap from bad welds, allowing U.S. auto manufacturers to produce better welded parts at a lower cost. **NL**

For more info: Technology Transfer office,
800-627-2596, partners@anl.gov



Technology Transfer on the World Wide Web

Federal Laboratory Consortium for Technology Transfer (FLC)

<http://www.federallabs.org>

A major overhaul of the FLC's own web site is now complete.

When accessing the site, you'll find an improved menu and selection system, and many other overall enhancements. More accurate search results, an expanded laboratory profile system, and an improved content presentation format are just a few of the new changes. You'll also notice a refined laboratory locator access system that allows the user to escape to the locator from any screen with just one click of the mouse.

This is the first major redesign of the site since 1998. New web design technologies not only allowed but warranted the new look.

The new site was launched May 1 by FLC Chair **C. Dan Brand** and Marketing Committee Chair **Jana Smith** at the FLC national meeting in Burlington, Vermont. **NL**



Caught in a web: The home page of the new FLC web site.



TECHNOLOGY WATCH

Federal laboratory technologies available for technology transfer



AGRICULTURE

New Edible, Food-Grade Fruit Coating Has It Covered

Edible shellac coatings preserve fruits and vegetables during their long trek from the farm to your local produce stand. To improve these coatings, **Agricultural Research Service (ARS)** scientists developed a new coating made of food-grade polyvinyl acetate that is cheaper to use and more effective than shellac at preventing postharvest fruit decay without discoloring the fruit. ARS has applied for a patent for this breakthrough.

The new coating—developed by researchers at the **ARS Citrus and Subtropical Products Laboratory** in Winter Haven, Florida—preserves and protects harvested fruit at considerable savings. The coating can be applied to fruits and vegetables by dipping, spraying, or brushing on.

Polyvinyl acetate is a synthetic polymer that is an ingredient in chewing gum. It has several advantages over shellac, which slows fruit respiration and keeps the fruit firm. Shellac tends to whiten or “blush” when exposed to moisture, which often occurs when apples are moved from cold storage to a humid environment. Another problem is that citrus fruits and some apple varieties develop “off” flavors when coated with shellac. And the fact that shellac coatings are primarily composed of insect exudate has made them objectionable to some consumers.

For more info: Robert D. Hagenmaier, 941-293-4133, bobhagmr@aol.com



ASSISTIVE TECHNOLOGIES

NASA Robotics May Soon Help Spinal Cord Patients Take First Steps

NASA engineers and **University of California, Los Angeles (UCLA)** neurophysiologists are creating a robot-like device that could help rehabilitate thousands of Americans with spinal cord injuries.

This robotic stepper device is one of several projects in the Neural Repair Program at the **UCLA Brain Research Institute** and **NASA's Jet Propulsion Laboratory (JPL)** in Pasadena, California. UCLA neurologists believe that by using this device in rehabilitation, some patients confined to wheelchairs may learn to walk again and those with limited movement could improve their level of walking.

The device will look like a treadmill with robotic arms and will be fitted with a harness to support a patient's weight. The arms resemble knee braces that attach to a patient's leg, guiding the legs properly on the moving treadmill.

Unlike therapists, who only observe and sense a patient's progress, the robotic device takes precise measurements of the person's force, speed, acceleration, and resistance. These precise measurements help therapists monitor the day-to-day progress of their patients and provide valuable information on the effectiveness of the therapy.

Still in the development phase, the device could be part of clinical trials at UCLA by early 2004.

For more info: Carolina Martinez, 818-354-9382 (JPL); Harlan Lebo, 310-206-0510 (UCLA)



AUTOMOTIVE

Multi-Fuel, Compact Fuel Processor for Fuel Cells

Vehicles powered by fuel cells require hydrogen, a very light gas with very low energy density. However, current technologies for hydrogen storage are heavy and bulky, which would limit the driving range of any car using them. **Argonne National Laboratory (ANL)**, with funding from the **U.S. Department of Energy's Office of Transportation Technologies**, has developed a compact, lightweight fuel processor, or “reformer,” that combines liquid fuel with oxygen from the air to produce a hydrogen-rich gas mixture that can be used in a fuel cell.

The ANL reformer is fuel-flexible, capable of rapid startup and shutdown, and dynamically responsive to load changes. Additionally, the device is compact and operates at much lower temperatures (advantageous for efficiency, startup/shutdown, and hardware cost) than any other fuel processor that can convert gasoline. Further, this technology offers other advantages:

- Energy-efficient
- Simple design
- No vaporizer required
- Made from inexpensive materials

For more info: Cynthia Wesolowski, 800-627-2596, partners@anl.gov



BIOTECHNOLOGY

Alternative to Traditional Chemotherapy Possible

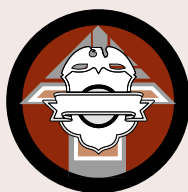
Current methods for treating nonremovable cancerous tumors involve whole-body doses of radiation or chemotherapy agents. The goal is to maximize the treatment of cancer cells while minimizing the effect on normal tissue. However, the patient often must undergo several treatments because a high dosage of radiation or chemotherapy could severely damage healthy tissue if given all at once. There also are undesirable side effects such as flu-like symptoms, nausea, and hair loss.

New stimuli-sensitive polymeric materials being developed by researchers at the **Pacific Northwest National Laboratory** would ensure that the therapeutic agent is located at the site of diseased tissue and leaves healthy tissue alone. If successful, it could greatly reduce the side effects caused by systemic whole-body treatments.

Solutions containing small amounts of the stimuli-sensitive polymers and the therapeutic agent would be injected either into the main artery feeding the tumor or directly into the tumor tissue. The polymer would harden near the injection site, thereby localizing the therapeutic agent at the tumor. This would maximize the efficacy of the therapeutic agent while minimizing the adverse effects on normal, healthy tissue.

The polymer solution forms a solid gel under various stimuli such as temperature, pH, ionic strength, etc. This gelation mechanism allows for the localized entrapment of various therapeutic agents. Directly targeting the tumor enables the physician to give the exact dosage required to treat the tumor without damaging healthy tissue. In addition, multiple treatments may be eliminated, as well as uncomfortable side effects.

For more info: Erik Stenehjelm, 509-372-4212, erik.stenehjelm@pnl.gov



LAW ENFORCEMENT

BritePrint™—A Portable Fingerprint Detection Device

Westinghouse Savannah River Company (WSRC) researchers have developed a small, lightweight, and inexpensive device that enables rapid onsite detection and analysis of fingerprints, footprints, or other latent markings. This hands-free device is designed to allow freedom of movement during use.

The BritePrint™ device comprises an array of light emitting diodes (LEDs), a power source, and a personal attachment device. It can be attached by conventional means such as belt pouches, pockets, or backpacks, though it is anticipated that most users will prefer to attach the device to a headband. The power source (a 6-volt battery or a four D-cell battery pack) also may be worn on any part of the body.

In addition to facilitating fingerprint detection in lighted indoor settings, the portable BritePrint™ enables latent prints to be detected in any remote or outdoor environment without the benefit of sunlight or other light sources.

The high intensity wavelength-specific light source provided by BritePrint™ causes a dye to fluoresce and allows fingerprints to be detected by the human eye when light-filtering goggles are worn. Illuminated prints also may be captured by a video camera or other optical scanning devices with a colored lens.

The LED illumination device allows the user to direct radiated light onto a particular surface area with latent fingerprints at the same time as applying dye to the surface area, steps that previously had to be performed separately. The lightweight light source may be detached and easily held at arms length to radiate light onto hard-to-reach surfaces, shortening the detection process and allowing a more thorough investigation.

For more info: Dale K. Haas, 803-725-4185 or 800-228-3843.



COMPUTERS

Scientists Lasso Computers to Help with Ranch Plans

To help keep the rugged grazing lands of the American Southwest—and ranchers' profits—in good shape, **Agricultural Research Service** scientists in Arizona and New Mexico and their colleagues in Mexico are collaborating on a unique new project. The scientists want to make two different decision-making aids easy and convenient for ranchers to use when they sit down at a computer to update and revise their ranch management plans.

When managed skillfully, ranges can support healthy herds of cattle, sheep and goats. The leathery shrubs and coarse grasses of the region also enable other animals, such as pronghorn antelope, whitetail deer, quail, jackrabbits, and small pigs called javelinas, to thrive. One of the aids is a computerized model called the Multi-Objective Decision Support System (MODSS), which helps ranchers look objectively at options for solving land-management problems.

In turn, specialists at the **U.S. Department of Agriculture's (USDA) Natural Resources Conservation Service** are working to computerize their resource planning model, SWAPA+H, which stands for "soil, water, air, plant, and animal resources plus humans."

Ideally, ranchers would use SWAPA+H find practical solutions to any conservation-related problems on their rangelands, such as erosion or decline of a plant species that is a favorite with livestock. They would then turn to MODSS to examine and weigh the possible impact of each potential solution on each of the natural resources covered in the SWAPA+H model.

MODSS is already computerized. Plans call for computerizing SWAPA+H, too, so that it can be downloaded from the Internet.

For more info: Jeffrey J. Stone, 520-670-6380, ext. 146, jeff@tucson.ars.ag.gov



ENVIRONMENT

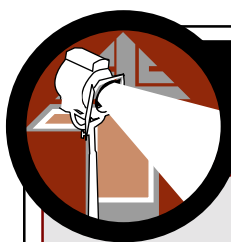
Argonne-Developed Cleanup Method May Save Oil and Gas Industry Millions

Oil and gas producers may save millions of dollars when cleaning up soils contaminated with naturally occurring radioactive materials thanks to an onsite soil sampling and testing method developed by **Argonne National Laboratory (ANL)** environmental scientists.

Naturally occurring radioactive material accumulates when the production of oil and natural gas from underground reservoirs carries small quantities of radium to the surface. Over time, the radium — usually radium-226

and, to a lesser extent, radium-228 — can concentrate in pipe scale and sludge deposits, which in turn can contaminate soil and equipment. The traditional approach to cleaning up such sites involves complicated soil sampling techniques and shipping these samples to offsite laboratories for analysis — a time consuming and costly process. But a recent demonstration has shown that using ANL's Adaptive Sampling and Analysis Program (ASAP) can dramatically cut the time and money needed to characterize and remediate sites contaminated by naturally radioactive materials. ASAP combines real-time data collection techniques with in-field decision, allowing faster and more precise site characterization.

For more info: <http://www.techtransfer.anl.gov/techtour/asap.html>



SPOTLIGHT ON SUCCESS

Success stories from the federal lab community

Cleaning Solvent Developed by DOE's Kansas City Plant Enjoying Commercial Success

High tech firms continually search for effective environmentally friendly products to clean electrical and mechanical components. Recently commercialized cleaning solvents, solutions, and blends have had partial success cleaning high reliability parts. Unfortunately, components must be rinsed after spraying or they leave surfactants trapped in wires or in nonhermetically sealed assemblies.

Synergy CCS (Critical Cleaning Solvent)—developed by researchers at the **U.S. Department of Energy's Kansas City Plant (KCP)** and **Agilent Technologies** in Santa Rosa, California—offers manufacturers an environmentally responsible cleaner without those drawbacks.

Kyzen Corporation, a Nashville, Tennessee, company that develops and markets environmentally responsible cleaning products for the electronic, semiconductor, optic and aerospace industries, recently included Synergy CCS among its portfolio of products.

According to Kyzen Vice President **Tom Forsythe**, satisfied customers of the product include Honeywell, Hewlett-Packard, and Agilent Technologies.

"Synergy CCS is a terrific cleaning material for specific uses in medical applications and microelectronics," Forsythe said. "Our focus at Kyzen has always been on the 'total cleaning' process. Synergy CCS does that and more."

The Synergy CCS story began in 1993 as a Technical Assistance Program assignment when a small Kansas manufacturer asked KCP researchers **George Bohnert** and **Tom Hand** to identify and develop a replacement for a chlorinated solvent.

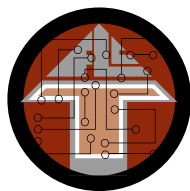
A year later the outcome captured the attention of the DOE and the technical community. In 1994, Synergy CCS won a Silicon Prairie Technology of the Year Award in Kansas City. Two years later, it received a DOE Pollution Prevention Award for Technology Transfer. In 1997,

the Synergy CCS team received an Award for Excellence in Technology Transfer from the Federal Laboratory Consortium for Technology Transfer.

"Synergy CCS's excellent solvency, mild odor, high purity, and the fact that it is recyclable makes it a strong environmentally friendly cleaner for today's high tech, global marketplace," said the KCP's Bohnert. **NL**



Just can it: The Synergy CCS package and some of the items it can clean.

**ELECTRONICS****New Transistor Offers Speed, Versatility**

Oak Ridge National Laboratory (ORNL) scientists are developing nano-transistors ten times smaller than conventional ones that could change the complexion of the electronics industry. Transistors, which can be used as amplifiers, detectors or switches, are integral parts of computers, telephones, and virtually all electronic components.

Traditional transistors are based on single energy barriers that electrons either tunnel through or attain sufficient energies to overcome. The electron device being developed at ORNL is based on multiple energy barriers, resulting in an effective energy barrier that can be either raised or lowered, thereby modulating electron flow. The device is also potentially much faster than a conventional transistor.

For more info: Ron Walli or Panos Datskos, 865-576-0226, wallira@ornl.gov

**SENSORS****Remote Sensors Monitor Nuclear Material from Afar**

The National Nuclear Security Administration's (NNSA) Kansas City Plant has taken steps to protect nuclear workers with a new remote sensor technology, the T1 material monitoring system. The Silicon Prairie Technology Association recently named it the 2000 Technology of the Year in the category of information technology.

The T1 material monitoring system is a radio frequency electronic/sensor system that monitors the state of health and security of stored nuclear material without endangering workers. The system uses a series of sensors to track everything from temperature to barrel seals, then sends the information to a computer from which it can be monitored through a secure Internet site. Temperature, motion, and other parameters can be remotely detected and monitored. Most interestingly, a D-sized battery can power the system for five years. **NL**

For more info: Dr. Chris Baumgart, 505-844-2585, cbaumgart@kcp.com

DISCOVERY *from p. 2*

greater accuracy in a clinical setting some of the data to understand what is going on in different cells at the gene or protein level.

Thomassen says that with so much contained information, DNA sequencing has led to a whole new "discovery science" for the next few years, wherein the hypothesis generating research contrasts to the more traditional hypothesis-driven research. In fact, the science of pharmacogenomics has evolved: why, for example, a drug may work well on some people and have no effect on others.

The recent unveiling of the human genome sequence in *Science* and *Nature* magazines included some analyses from the public and private groups on similar but not identical information in the working draft. Labs are still downloading the sequencing "work-in-progress" information every 24 hours on lab web sites (see sidebar for HGP web sites).

"We think the sequencing data is so very valuable," Driscoll said. "To have it complete is going to be the 'gold standard' in biology and medicine. This information will be used for decades, centuries, and perhaps millennia to come." **NL**

For more info: See below for resources or contact information.

GenBank and Other HGP Resources

Public data on the human DNA sequence information generated by the HGP is available (at no cost) via GenBank at the National Center for Biotechnology Information, National Institutes of Health (NIH). There are no intellectual property "strings," and some private data are available. For full access and use of the Celera Genomics data for commercial purposes, a subscription is required. Restricted/limited access for research purposes is available at no cost to academic/government users.

Human Genome Project Web Sites:

www.ncbi.nlm.nih.gov/ — GenBank: search literature data and patent databases

www.nhgri.nih.gov/ — National Human Genome Research Institute

www.biotech.about.com/industry/biotech/ — info on DNA patents

<http://ott.od.nih.gov/> — NIH central Office of Technology Transfer "supermarket" of licensable discoveries/inventions

www.uspto.gov — U.S. Patent and Trademark Office site

www.ornl.gov/hgmis/research/bermuda.html — definitions of DNA sequence quality

www.sc.doe.gov/production/grants/grants.html — DOE Office of Science grant info, calls for proposals (there are none currently)

www.doegenomestolive.org/ — future direction in genomics (Genomes to Life)

www.ornl.gov/TechResources/Human_Genome/home.html — complete info on HGP in the U.S. and abroad (award-winning site)

www.nhgri.nih.gov/educationkit/ — Education kit and video for schools and general use **NL**



COMING ATTRACTIONS

<p>June 12-13, 2001 Technology Showcase Aberdeen Proving Ground, MD</p> <p>A comprehensive exposition of the diverse technology resources available within the Aberdeen Proving Ground (APG) is planned. The two-day program will showcase the diverse testing, engineering, training, and research ongoing at APG.</p> <p>410-278-4639, ssanders@atc.army.mil</p>	<p>June 24-27, 2001 Biotechnology Industry Organization San Diego, CA</p> <p>More than 5,700 biotechnology leaders, executives, and researchers from around the globe will attend. Subject areas include biopharmaceuticals and vaccines, cancer research, genetic research and testing, chemistry advances, technology transfer, biotechnology R&D, and information technology. Visit the FLC in Booth 1133!</p> <p>www.bio.org/events/2001/ event2001home.html</p>	<p>June 24-28, 2001 Air & Waste Management Association 94th Annual Conference & Exhibition Orlando, FL</p> <p>Network with colleagues from around the world and find solutions to environmental problems at one of the largest environmental exhibitions anywhere. You can also choose from approximately 200 critical management and technical sessions. Register by May 15 and save.</p> <p>412-232-3444, www.awma.org</p>
<p>August 13-17, 2001 IBC's 6th Annual World Congress Drug Discovery Technology 2001 Boston, MA</p> <p>One of the largest annual gatherings and networking events for pharmaceutical and biotechnology drug discovery researchers and executives worldwide. Projected attendance of more than 4,000 people and 300 exhibit booths.</p> <p>www.drugdisc.com</p>	<p>September 10-13, 2001 Instrumental, Systems and Automation Conference and Exhibition (ISA) Houston, TX</p> <p>More than 30,000 visitors are expected to attend this exhibition on industrial measurement and control events. The technical conference is included at no extra cost.</p> <p>Carol Schafer, 919-549-8411, info@isa.org</p>	<p>November 4-7, 2001 Geological Society of America Annual Meeting and Exposition Boston, MA</p> <p>For geoscience professionals, this show has an anticipated attendance of over 7,000 geology professionals whose interests are dedicated to the earth, education, and environment. Meet face-to-face with influential and key decision makers.</p> <p>Brenda Martinez, 800-472-1988, bmartinez@geosociety.org</p>



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