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HIV/AIDS
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T² EVENTS

Partners in Environmental
Technology Technical
Symposium
Washington, D.C.
November 28-30, 2006

•
SPIE Photonics West
San Jose, Calif.
January 20-25, 2007

•
Coastal Inlets
Research Program
8th Annual CIRP Technology
Transfer Workshop
January 22-24, 2007
Fort Lauderdale, Fla.

•
FLC National Meeting
Making the Connection
Arlington, Texas
May 15-18, 2007

•
World's Best Technologies
Arlington, Texas
May 15-16, 2007

T² FACT

Originally developed from the harpsichord around 1720, the piano was first known as the pianoforte. Invented by Bartolomeo Cristofori of Padua, Italy, the instrument was already over a hundred years old by the time Beethoven was writing his last sonatas, around the time when it ousted the harpsichord as the standard keyboard instrument.

- Mary Bellis, *About.com*

FLC NEWS LINK

October/November 2006

COMBUSTION TECH POISED FOR MARKETPLACE

Gasoline, diesel, and turbine engines could soon burn cleaner or be more fuel-efficient through the application of plasma-assisted combustion, a technology originated and developed at Los Alamos National Laboratory (LANL) that is now poised to enter the marketplace.

LANL has entered into a Cooperative Research and Development Agreement (CRADA) with PerriQuest Defense Research Enterprises, LLC, to advance the technology for commercial refinement and implementation.

PerriQuest, based in Meriden, Conn., LANL, and Idaho National Laboratory are collaborating on the research and development of plasma-assisted combustion, under a licensing agreement with Los Alamos, for turbine and internal combustion engine applications.

LANL scientist Louis Rosocha and his team have been working on the technology for about four years, with the goal of making fuel-efficient or cleaner burning engines through more complete combustion. The technology consists of an electronic device that can be attached to an existing fuel injector that applies electrical voltage to the atomized fuel stream prior to combustion—generating a plasma in the fuel.

See Combustion Tech, page 8

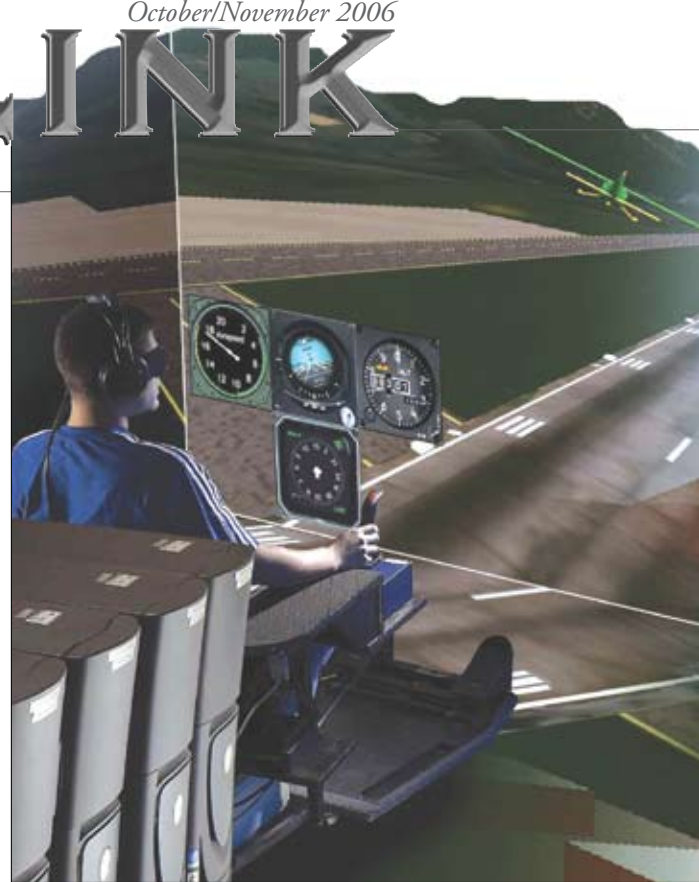
AVIATION SAFETY THRU 3-D AUDIO

*by John Schutte
Air Force Research Laboratory*

Scientists at the Air Force Research Laboratory (AFRL) are working to improve general aviation safety with three-dimensional (3-D) sound cues that can help air traffic controllers monitor aircraft and help pilots fly straight and level.

Normally, humans hear sound from all around. The human auditory system can discern, to a certain degree, both the location of a sound and its distance from a listener.

In some situations, however—such as when pilots and air traffic controllers are wearing monaural communications headphones—lack of natural audio cues can cause confusing and potentially hazardous situations when multiple talkers “stack up” in a listener’s head.



Wright State University and the Air Force Research Laboratory's Human Effectiveness Directorate are collaborating to transfer 3-D audio technology developed for fighter aircraft to general aviation cockpits. The technology will help pilots keep track of the locations of other aircraft, maintain course while engaged in other tasks, and avoid disorientation. As shown here, this project uses a flexible flight simulator that allows rapid and economical integrations of new instrumentation concepts, and safe replication of dangerous or unusual flight situations.

The basic concept of 3-D audio is to use stereo headphones to simulate spatially separated sounds when natural cues are not available. Aviation communications

See Aviation Safety, page 4

DC ON T²: DUDAS CONCERNED ABOUT PATENT PROCESS

by Gary Jones, FLC Washington, DC Representative



Greetings from DC. There has been growing concern over the past several years regarding the ability of the U.S. patent system to keep up with changes in the evolving intellectual property protection environment, from the rapidly expanding number of applications to concerns over litigation issues. Regard-

ing the patent application and examination process, Under Secretary of Commerce John Dudas noted in the U.S. Patent and Trademark Office's (USPTO) 2005 annual report that “[T]he volume and complexity of patent applications continues to outpace current capacity to examine them. The result is a pending – and growing – application backlog of historic proportions.”

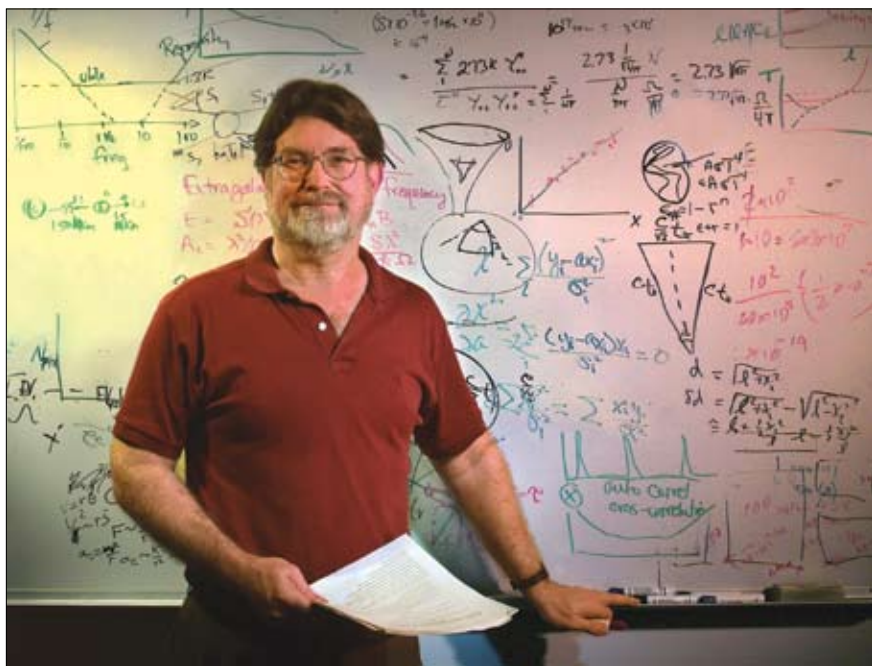
Concern over the patent examination process has generated a number of interesting

responses, both in agency policy and legislation. This column highlights one unique effort underway at the USPTO, with the help of industry, to address patent examination issues, and a recent legislative proposal introduced in the Senate addressing patent quality and other issues.

In its new Five Year Strategic Plan (<http://www.uspto.gov/web/offices/com/strat2007/stratplan2007-2012v6.doc>), the USPTO identified “Develop[ing] a peer

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GEORGE SMOOT OF LBNL WINS NOBEL PRIZE IN PHYSICS



George Smoot of Lawrence Berkeley National Laboratory

by Lynn Yarris, LBNL

George F. Smoot, 61, leader of a research team that was able to image the infant universe, revealing a pattern of miniscule temperature variations that evolved into the universe we see today, has been awarded the 2006 Nobel Prize in physics. He shares the award with John C. Mather of NASA Goddard Space Flight Center. The citation reads “for their discovery of the blackbody form and anisotropy of the cosmic microwave background radiation.”

Smoot has been an astrophysicist at Lawrence Berkeley National Laboratory (LBNL) since 1974 and a University of California at Berkeley physics professor since 1994. He is LBNL’s 11th Nobel laureate.

“A member of the Nobel Committee called me at around 2:45 am. He had a Swedish accent, and told me that John Mather and I were sharing the Nobel Prize in physics,” said Smoot. “I soon talked to someone I knew personally and, by the time the phone call had ended, I was convinced it was legitimate. The ceremony is December 10, which is when I have scheduled a final exam for my students, so I will have to do some rescheduling. The upside, though, is that

maybe now my students will pay more attention to me.”

On May 1, 1992, at a meeting of the American Physical Society (APS), Smoot made an announcement that essentially silenced all the scientific critics of the Big Bang theory and helped change the course of future investigations into the origin and evolution of the universe. Smoot and his research team, after analyzing hundreds of millions of precision measurements in the data they’d gathered from an experiment aboard NASA’s Cosmic Background Explorer (COBE) satellite, had produced maps of the entire sky, which showed “hot” and “cold” regions with temperature differences of a hundred-thousandth of a degree. These temperature fluctuations, produced when the universe was smaller than a single proton, were consistent with Big Bang predictions and are believed to be the primordial seeds from which our present universe grew.

“At the time captured in our images, the currently observable universe was smaller than the smallest dot on your TV screen,” Smoot said, “and less time had passed than it takes for light to cross that dot.”

Theorists had been predicting temper-

ature variations in the ancient universe since the Big Bang theory was first developed in the 1940s. However, until Smoot and his team announced their discovery, the cosmic background radiation, microwaves left over from the Big Bang that have taken some 15 billion years to reach Earth, had appeared to be persistently uniform.

Without temperature variations there would be no ripples in the fabric of space that gravity, working over the great expanse of time, could magnify into the universe we observe today.

Since Smoot’s announcement in 1992, subsequent cosmic microwave background experiments, including data from the MAXIMA and BOOMERANG balloon flights and the WMAP satellite, have confirmed and refined the original maps. With the results of his team’s discovery, based on measurements made using differential microwave radiometers (DMRs) that they designed and built, Smoot provided the strongest evidence yet that the Big Bang theory is correct.

As Smoot explained, “The tiny temperature variations we discovered are the imprints of tiny ripples in the fabric of space-time put there by the primeval explosion process. Over billions of years, the smaller of these ripples have grown into galaxies, clusters of galaxies, and the great voids in space.”

Smoot was one of the first astrophysicists to devise ways of conducting experiments that produce data and information about the early universe.

“People have contemplated the origin and evolution of the universe since before the time of Aristotle,” he said. “Although cosmology has been around since the time of the ancients, historically it has been dominated by theory and speculation. Very recently, the era of speculation has given way to a time of science. The advance of knowledge and of scientific ingenuity means that at long last, we can actually test our theories.”

To understand how our universe was created, Smoot focused on clues hidden in the extremely faint heat left over from the Big Bang. This relic radiant energy, or cosmic microwave background radiation

(CMB), has been called a “message from the beginning of time.”

According to theory, all space began to expand at the moment of the Big Bang and was pervaded with the physical contents produced by the leviathan explosion, including the relic CMB radiation.

In 1976, Smoot was a key member of the team that found startling evidence in the CMB that contradicted the prevailing scientific view that galaxies are spread uniformly throughout the universe. Instead, the data revealed that vast regions of space are virtually devoid of galaxies, while elsewhere billions of galaxies are clustered together.

The new view of the universe created by this discovery required scientists to rethink the origin of the universe.

At the May 1, 1992, APS meeting in Washington, D.C., Smoot made his historic announcement of the discovery of the hot and cold regions of differing densities in the infant universe. A map developed by the COBE team was called a “baby photo” of the universe. The map showed the universe as it looked when it was about one-ten-thousandth of its current age, or about 300,000 years after its birth.

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TECH WATCH | LABORATORY TECHS READY FOR TRANSFER

ANTIBODY MATURATION

Drs. Ira Pastan and Mitchell Ho of the National Cancer Institute have developed a new method of cell surface display of single-chain antibodies for affinity maturation in a mammalian system.

Cells expressing a rare mutant antibody with higher affinity were enriched about 240-fold by a single-pass cell sorting from a large excess of cells expressing wild-type antibodies with slightly lower affinity. Additionally, a highly enriched mutant with increased binding affinity for CD22 after a single selection of a combinatorial library randomizing an intrinsic antibody hotspot was successfully obtained.

The system is compatible with other mammalian expression systems, and it is a rapid, simple and robust procedure.

Applications include a new method of displaying Fvs on human cells and a new method useful for isolating new high affinity antibodies for cancer, AIDS and other diseases.

The technology is currently in the preclinical stage of development.

The National Cancer Institute Laboratory of Molecular Biology is seeking statements of capability or interest from parties interested in collaborative research to further develop, evaluate, or commercialize mammalian cell surface display of Fvs for rapid antibody maturation.

More info: Betty Tong, Ph.D., 301-496-0477, tongb@mail.nih.gov

IDAHO LAB'S WELDING TECH

Idaho National Laboratory (INL) has designed a GTAW torch that is solely air-cooled and capable of welding at 300 amps continuous duty.

The torch features a tungsten stick that can be remotely adjusted from the gas cup while maintaining the tip of the tungsten stationary with respect to the torch body. It also is possible to remotely change out the tungsten. In current commercial torches the tungsten is loosened in its collet and simply slid out further for a larger stick out or retracted for a smaller stick out. With this design, no free liquids are required, so welding can be done in any environment.

The fixed tungsten allows the torch to be operated with a camera system for any remote welding without the requirement of continually changing the view of the cameras, thereby allowing for continuous welding cycles.

More info: Ida Shum, 208-526-0744

LIVERMORE'S LARGE AREA IMAGER

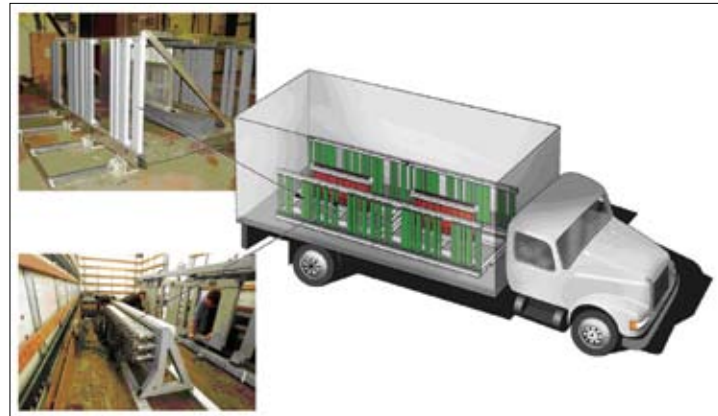
Lawrence Livermore National Laboratory (LLNL) is offering a partnership opportunity to further develop and deploy its large area imager (LAI) technology.

This technology addresses applications associated with the Department of Homeland Security (DHS), Department of Defense, and Department of Energy.

One of the major challenges faced by DHS is the remote detection of radioactive materials that could be used in a nuclear or radiological weapon of mass destruction.

Traditional technologies rely on large detectors and proximity imaging (i.e., associating the source location with the location at which count rates are highest). Such techniques are susceptible to local variations in background count rates, and thus have high false-alarm rates or low sensitivity.

The LAI technology uses a one-dimensional, coded-aperture imaging system to overcome this difficulty. The imaging allows background variations associated with distributed sources (e.g., building, geology, etc.) to be ignored, while allowing compact sources to be localized. In fact, such a source is located in two dimensions (location along direction of travel and range from imager) using parallax information in conjunction with the image processing. LLNL designed and tested a proof-of-principle



prototype that has been used to establish the potential for this technology. A second prototype is being constructed to demonstrate the ability to detect sources at long ranges on both sides of a vehicle with a single detector array.

Both prototypes use arrays of alkali-halide scintillation detectors behind a coded array of lead elements, providing a unique shadow pattern on the detectors for each possible source location.

LLNL is seeking industrial partners with a demonstrated ability to bring such inventions to the market. All licensing activities are conducted under policies relating to the strict nondisclosure of company proprietary information.

More info: Catherine Elizondo, 925-422-0801, elizondo1@llnl.gov

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*Contact the FLC Technology Locator,
Frank Koos, at 856-667-7727*

Aviation Safety, from page 1

typically provide flat, one-dimensional sound with no indication of direction or distance. But with 3-D audio, a person wearing stereo headphones hears sounds as he would normally, coming from varying directions and distances.

AFRL's 3-D "audio display" is also dynamic; if a listener hears a sound from the right and turns his head toward the sound, the sound then appears to be in front of the listener.

In multi-talker situations, 3-D audio improves speech intelligibility by spatially separating the sources, thus helping a listener track and understand multiple simultaneous conversations, according to Douglas S. Brungart, Ph.D., technical advisor for AFRL's Human Effectiveness Directorate, Warfighter Interface Division, Battlespace Acoustics Branch.

"Any communications situation with more than one talker is a potential application," Brungart said. "That could be as simple as a two-person teleconference or as complicated as air traffic control systems where an operator has to listen to nine or ten radios at once."

With 3-D audio, air traffic controllers could more easily distinguish between radio transmissions from multiple aircraft pilots, and tower controllers could keep track of the locations of aircraft taxiing to and from the runways of a busy airport.

This could increase their situational awareness and potentially help prevent accidents both on the ground and in the air. For pilots, AFRL researchers devel-

oped an artificial audio horizon to augment a pilot's visual horizon. In tests at NASA Langley Research Center, subject pilots wore opaque goggles for attitude recovery tests—literally flying blind, using only sound cues piped through the aircraft's communications system as a guide to recover from displaced orientations.

Sound—in this case the pilots' favorite music—is an artificial horizon to which pilots fly the aircraft. Software filters correlate the music with the aircraft's pitch and roll—for example, the sound moved left to indicate left-wing high—allowing pilots to determine the aircraft's attitude and make corrections.

AFRL partnered with commercial vendor Compunetix, Inc., to upgrade its commercial software and install it at the Nellis Air Force Base weapons test range in Nevada, where operators talk to multiple aircraft during training exercises.

Under a CRADA with Telephonics Corporation, AFRL demonstrated the feasibility of integrating 3-D audio into airborne secure digital intercommunication systems.

Other potential 3-D audio applications include providing sound cues to alert blind persons to the location of objects; improving situational awareness for foot soldiers in combat situations and firefighters in smoke-filled buildings; and integrating realistic audio into video/PC games and training simulators.



The Auditory Localization Facility (ALF) at the Air Force Research Laboratory's Human Effectiveness Directorate enables research in binaural and spatial hearing, measurement of head-related transfer functions, and development of 3-D audio systems. ALF is a 4.26-meter-diameter geodesic sphere inside an anechoic chamber. The sphere contains 277 loudspeakers and can present 16 sounds simultaneously from selected or all locations, simulating complex real-world auditory environments.



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FLC MID-CONTINENT REGION REWARDS ACHIEVEMENTS

by Ann Kerksieck

The Mid-Continent Region awards program was established in 1994, and to date over 100 regional awards have been given to 30 laboratories, facilities and partners, including 16 to economic and technology development related groups and entities at the state level.

This year, Regional Coordinator Patrick Rodriguez of the Air Force Research Laboratory elected to add an Overall Achievement Award. Based on past performance in the regional award program, ten laboratories were selected to receive the award at this year's regional meeting in Colorado Springs, Colo.

The Overall Achievement Award offers affirmation of past and present accomplishments in the technology transfer arena. The plaque lists the award name and year won for each laboratory.

The region plans to continue the award in the future. Winners included:

1. Air Force Research Laboratory, represented by Lab Representative Alternate Mary Archuleta – 4 past awards
2. Ames Laboratory and Lab Representative Deb Covey – 7 awards
3. NASA Johnson Space Center and Lab Representa-

tive Michelle Brekke – 6 awards

4. NNSA Kansas City Plant and Lab Representative Alan Updike – 8 awards

5. Los Alamos National Laboratory and Lab Representative Susan Sprake – 14 awards

6. National Renewable Energy Laboratory - Lab Representative Tom Williams – 10 awards

7. Rocky Mountain Oilfield Testing Center and Lab Representative Doug Tunison - 2 awards

8. Sandia National Laboratories and ORTA and VP David Goldheim -13 awards

9. USDA Northern Plains Area, representing Area Director Dr. Wayne Honeycutt – 8 awards

10. USDA Southern Plains Area, representing Area Director Dr. Bryan Kaphammer – 3 awards

Regional Awards: Outstanding Technology Development

1. Hands Off Sampler Gun, Los Alamos National Laboratory
2. Underground Radio, Los Alamos National Laboratory
3. Fiber Optics Hydrogen Sensor, DOE, NNSA Kansas City Plant
4. Ultra-thin Solid Film Lubricant for GBU-15 Units, DOE, NNSA Kansas City Plant

5. Athena Radar-Responsive Tag Sensor, Sandia National Laboratories

Excellence in Technology Transfer

1. Bioreactor for 3-D Tissue Culture, Jane I. Fox, NASA Johnson Space Center
2. Poultry Probiotic Technology, USDA, ARS Poultry Production & Product Safety Research Unit
3. Outstanding Laboratory, DOE, NNSA Kansas City Plant
4. Outstanding Laboratory Representative, Dr. Bryan Kaphammer, USDA, Agricultural Research Service

Outstanding Partnerships

1. Rocky Mountain Oilfield Testing Center and WellDog, LLC, "Methane Sniffer"
2. New Drillstring Radar to Benefit Mining Industry and U.S. Economy, DOE NNSA Kansas City Plant, Stolar Research Corporation, and Russia's Measuring Systems Research Institute
3. University Alliance (UA) Program, Sandia National Laboratories
4. Sandia Science & Technology Park

DC on T², from page 1

review mechanism in which public sector volunteer experts will review published applications and provide prior art" as a strategic initiative to "improve and enhance examination efficiency and effectiveness." To that end, the USPTO is considering a pilot project, to be launched as early as spring 2007, that will allow such a collaborative review of patent applications.

This new policy and pilot approach to patent review is based on an idea initially forwarded by New York Law School professor Beth Noveck (highlighted in articles in *Wired News* and *Fortune*). The pilot, entitled the Community Patent Review (CPR) Project, will allow outsiders to comment on patent applications during the review process, increasing (and in theory improving) the information patent examiners have available for making decisions. Although often referred to as a 'wiki-type' approach (i.e., where individuals have the opportunity to edit information on a website), the CPR is not an open editing forum per se, but will provide examiners with enhanced information on prior art. As stated in the CPR Project Summary (http://dotank.nyls.edu/communitypatent/p2p_exec_sum_sep_06.pdf), this pilot project "focuses on integrating an open peer review process with the USPTO, creating and amalgamating a vetted database of prior art references that, over time, produces better patent grants, and developing a deliberation methodology and technology to allow community

rating, ranking and processing of the data collected and feedback from patent examiners."

Phase I of the one-year CPR pilot is tentatively scheduled for launch in April 2007 and will initially include 250-400 software and technology patent applications, spread across large and small, public and private firms. Companies that have already agreed to participate include General Electric, HP, IBM, Oracle, Intel, Microsoft, International Characters, Out of the Box Computing and Red Hat.

IBM got onboard early and has worked with the USPTO and CPR personnel to develop the system. To underscore its commitment to this pilot project, IBM announced in September that all of its patent applications would be public after 18 months and, further, would allow employees to use company time to peer-review patent applications (reported in the *New York Times* and on National Public Radio's *Marketplace*).

Based on the success of the pilot, the next phase would involve scaling up the project to include more companies and greater patent area diversity, as well as a view toward piloting the system in other national patent offices. Ultimately, the CPR has even broader goals, as stated in its project summary: "Community Patent Review aims to create a blueprint for democratizing policymaking that can be applied not only to patents, but also to agency decision-making across government."

More information on the CPR can be found on the Peer to Patent Project web site (<http://dotank.nyls.edu/communitypatent/>). In a related effort to effect changes to the current patent system, Senators Hatch (R-Utah) and Leahy (D-Vt.), in August introduced the Patent Reform Act of 2006 (S. 3818) (joining earlier bills on patent reform). As noted in the press release, their bill focuses on three primary areas: 1) improving patent quality (by establishing a more robust post-grant review process so that suspect patents can be challenged administratively rather than through litigation), 2) international harmonization (by joining the rest of the world in using a first-to-file rule as opposed to the current first-to-invent), and 3) decreasing abusive patent litigation (by limiting the "willful infringement" and "inequitable conduct" elements of the litigation system). The press release can be found on Senator Hatch's web page (http://hatch.senate.gov/index.cfm?FuseAction=PressReleases.Detail&PressRelease_id=1642).

What will become of the current—and continuing—efforts to reform the patent system? Will legislative prescriptions, agency policy initiatives, and industry actions combine to redefine the U.S. patent system? It's too soon to tell possibly, but clearly this combination of efforts is moving the discussion forward; and, it certainly appears that changes are coming.

Gary can be reached at gkjones@flcdc.cnchost.com.

THE HISTORY MYSTERY OF HIV/AIDS AND GENETICS



Dr. Stephen J. O'Brien of the Laboratory of Genetic Diversity at NIH discusses the effects of genetic evolution on HIV/AIDS. O'Brien is referred to as the Indiana Jones of Genomes due to his world travels exploring the connections between virology, evolution, genetics, and history.

by Tom Grayson

If you want to control where you're going, you may want to review how you got where you are.

That was the primary message delivered by Dr. Stephen J. O'Brien of the National Institutes of Health (NIH) concerning the AIDS epidemic, a virus that has killed over 25 million people since its identification in 1981.

Often called the Indiana Jones of Genomes due to his worldwide travels investigating disease and evolution, O'Brien spoke to genetics students from various universities at New Jersey's Burlington County College.

O'Brien's life work is dedicated to the discovery and assessment of AIDS Restriction Genes (ARG). This work has led to a shift in the scientific reasoning associated with HIV/AIDS and therefore the development of new diagnostics, prevention, therapies, and vaccines.

"I had been living on the strength of my rhetoric, not data," said O'Brien. But science is now providing the data to support his team's belief that ARGs and AIDS-defining conditions are crucial elements in the fight against HIV/AIDS.

As chief of the Laboratory of Genetic Diversity at NIH, O'Brien led a team conducting a study on high-risk individuals in hopes that a common denominator would surface among those resistant to the HIV virus. Their research focused on a protein that sits on the surface of

immune cells. HIV docks at this protein to get into our cells.

For many resistant individuals, the common denominator was a genetic defect in this protein, known as $\Delta 32$. This defective protein blocks HIV entry into cells of resistant individuals.

Wrapped in all this science is a history lesson. Appearing on both PBS's "Nova" and the Discovery Channel, O'Brien set forth the idea that many of those who survived the Black Plague of Europe in the mid-14th century had such fortune because they carried $\Delta 32$ in their genomic sequence.

Having both harmful and beneficial effects, $\Delta 32$ is a defect that affects the human immune system. As for HIV, the carrying of $\Delta 32$ is believed to be a great benefit. It is hypothesized that natural selection allowed those with $\Delta 32$ to survive the Black Plague, an epidemic that killed between one-third and two-thirds of Europe's population. The survivors then passed on this genetic mutation to future generations. In theory, this same strength through natural selection is why so many people of European descent are resistant to HIV/AIDS.

The Plague attacked Europe but spared Asia and Africa the same level of devastation. While this was fortunate for Asians and Africans then, the same cannot be said for these populations today.

Since the agent of Black Death, *Yersinia pestis*, docks at the same protein as HIV,

Asians and Africans were not given the opportunity for natural selection to eliminate the non- $\Delta 32$ population in return for a more resistant population today. As a result, a high percentage of these populations do not carry $\Delta 32$. This genetic mutation, combined with risk factors resulting from social norms, has led to HIV/AIDS being more prevalent in Asian and African populations.

"O'Brien's work is most impressive because he utilizes evolutionary links between humans and wild life, such as cheetahs and pandas, to draw inferences regarding human disease and treatment," said Laura Grayson-Roselli of Grayson Scientific Consulting. "He

has also illustrated that previously disparate fields of study, such as virology, evolution, conservation genetics, and history can work in unison to help solve today's problems."

As O'Brien writes in his book, *Tears of a Cheetah*, predictions as to the value of this research are risky, but he believes "if one could forecast a payoff for our investment in AIDS restriction genes, it would be a translation of the gene's mechanism into innovative and effective therapies that would mimic natural stalls on HIV and AIDS." Furthermore, he states that the discovery of a gene that is necessary for a fatally infectious disease to progress is an ideal target for pharmaceutical research.

Armed with this ever-evolving knowledge of where we stand on the genetic timeline, where do we go from here? Researchers like O'Brien are working to ensure its quickly toward eradicating one of Mother Nature's most deadly diseases.

 A collage of three images. The top image shows a person in a white hard hat and safety vest working on a large white structure, possibly a wind turbine or aircraft component. The middle image shows a woman in a purple shirt sitting at a desk with a computer monitor displaying a colorful heatmap. The bottom image is a calendar for January 2007 from FLC.

FLC 2007 Calendar

Keep your schedule organized while learning about the cutting-edge efforts of the federal laboratory system. Each month highlights a technology or service developed by a federal laboratory that is now enhancing our everyday lives.

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THWARTING COCCIDIOSIS

Agricultural Research Service (ARS) researchers have developed a method for controlling avian coccidiosis, a major poultry disease caused by several species of the intestinal parasite *Eimeria*.

ARS's method is a pretreatment regimen that could be administered either orally to poultry or injected into embryonated eggs.

Coccidiosis is a leading disease that costs the poultry industry more than \$3 billion worldwide in total annual economic losses from treatment expenses, bird losses, and low bird weight (critical for marketing broilers). Current disease control strategies include drug-treatment regimens; however, the parasite is developing resistance to these treatments. The industry needs a combination of preventative and control strategies to control poultry coccidiosis.

More info: Tara T. Weaver-Missick, 301-504-6965, twm@ars.usda.gov

LANL FUEL CELL STACK

Los Alamos National Laboratory (LANL) scientists have created a novel and efficient direct methanol fuel cell (DMFC) stack. This new stack has a circular footprint, within which are a cathode and anode manifold, tie-bolt penetrations, and tie-bolts.

Each fuel cell uses two graphite-based plates. One plate includes a cathode active area that is defined by serpentine channels connecting the inlet and outlet cathode manifold. The other plate includes an anode active area defined by serpentine channels connecting the inlet and outlet of the anode manifold, where the serpentine channels of the anode are orthogonal to the serpentine channels of the cathode.

Application(s)

- Portable electronics
- Electric scooters
- Battery chargers
- Wearable power packs.

More info: Laura Barber, 505-667-9266, ljbb@lanl.gov

PROTEIN ANTIBIOTIC

Due to the increase in drug resistance among bacteria, continued progress in the development of new antibiotic treatments is needed. Available for licensing and commercial development is the small protein SrgT, its analogs and related peptides. SrgT is a 43-amino acid protein that effectively inhibits bacterial growth. This protein likely exerts its antibiotic action by inhibiting the metabolism of glucose in these microorganisms. The current technology provides a novel approach to the treatment and prevention of bacterial infections.

More info: Cristina Thalhammer-Reyero, thalhamc@mail.nih.gov

ANL'S FUEL SYSTEM

To reduce the nation's dependence on foreign oil, Argonne National Laboratory's (ANL) Dr. Michael Wang has created a transportation analysis tool that allows users to accurately evaluate the energy and environmental benefits of technologies and fuels.

The GREET (Greenhouse gases, Regulated Emissions, and Energy use in Transportation) software model addresses the need for truly comparative full fuel cycle (or well-to-wheel) analyses. Developed in a user-friendly Microsoft® Excel platform with a graphical user interface, the model is available to the public free of charge at <www.transportation.anl.gov/software/GREET/index.html>.

Already, more than 2,000 GREET users in both the public and private sectors are registered throughout North America, Europe, and Asia.

More info: Dr. Michael Wang, 630-252-2819, mqwang@anl.gov

POLLUTION CONTROL

Maintaining air quality is essential for human safety and environmental protection. Numerous industrial processes require airborne particulate monitoring, concentration and filtration.

Escalating fears of airborne toxic contaminants and biotoxins are driving the emergence of new monitoring and filtration requirements.

The Aerosonic acoustic concentrator technology, developed by scientists at Los Alamos National Laboratory (LANL), is a novel method of particle concentration that can be used in these critical areas.

Aerosonic devices are low-power, inexpensive, and have no moving parts. Employing a small piezoelectric tube to generate standing waves, the Aerosonic method uses sound pressure to locally concentrate many types of aerosols ranging from smog particulates to suspended microorganisms.

More info: Laura Barber, 505-667-9266, ljbb@lanl.gov; www.lanl.gov/partnerships/license/technologies

PNNL RF TAGS

Researchers at Pacific Northwest National Laboratory (PNNL) have developed miniature radio frequency (RF) tags that are ideal for rapid, remote inventory tracking and monitoring a wide variety of items. The PNNL technology provides long-range readings, simultaneous readings, the ability to monitor inputs and control outputs, and location tracking. RF tag systems offer an advantage over bar-coding inventory and monitoring systems because line-of-sight access to the tagged items is not necessary.

The PNNL RF tags exhibit superior performance in difficult environments.

More info: <http://availabletechnologies.pnl.gov/securityelectronics/rftags.stm>

IMMUNOTHERAPY

Abnormalities in immunoregulation are responsible for a wide variety of disorders such as autoimmune disease, chronic inflammatory diseases, and allergic diseases. These diseases include systemic lupus erythematosus and rheumatoid arthritis. The defining event for induction of an immune-mediated disorder is the loss of T cell tolerance to self-antigens, which is provided by regulatory T cells.

This latest invention, headed by the National Institutes of Health, provides methods for generating regulatory T cells by culturing CD4+CD25- T cells.

More info: Dr. Peter Lipsky, 301-594-0596, lipsky@mail.nih.gov.

NREL'S POWER

A method and apparatus for maximizing the electric power output of a photovoltaic array connected to a battery, where the voltage across the photovoltaic array is adjusted through a range of voltages to find the voltage across the photovoltaic array that maximizes the electric power generated by the photovoltaic array and then is held constant for a period of time, has been developed by Roger Taylor and Eduard Muljadi of the National Renewable Energy Laboratory (NREL). NREL is looking for an organization to develop and commercialize this innovative technology.

More info: Richard Bolin, 303-275-3028 for licensing, CRADA, and Work for Others opportunities

Combustion Tech, from page 1

This effect essentially breaks down the long chains of hydrocarbons in the fuel into smaller parts—allowing the fuel to be burned more completely, resulting in more miles per gallon, or reducing harmful emissions.

“The research was really driven by market needs,” said Rosocha. “In 2004, regulations were announced about air pollutants by all vehicles. In the future, air pollutants by vehicles, on- and off-road, are supposed to be more highly regulated. We knew that this was going to create a great opportunity to develop a technology that would supply the demand for cleaner burning vehicles. So, we decided to see if we could do something about it.”

With fuel prices at all-time highs, the need for better fuel efficiency is also market-driven, but the technology is limited. “The technology does produce cleaner emissions and can lead to better fuel efficiency, but probably not at the same time,” said Rosocha. “Maybe, if Mother Nature was super-kind, you might get both.”

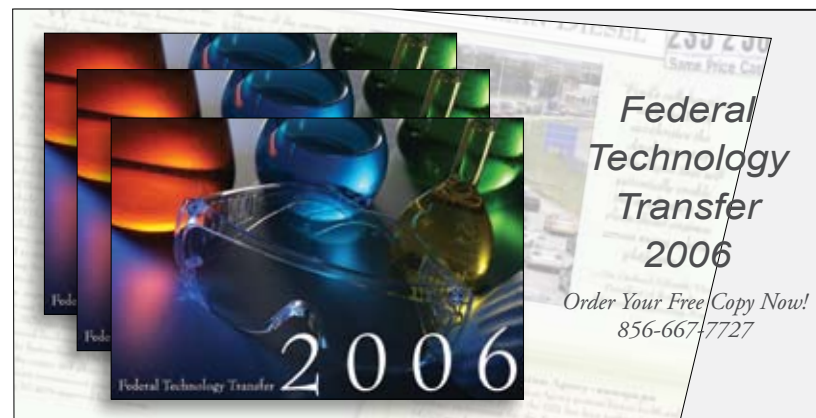
PerriQuest founder and CEO Nicholas V. Perricone said that his company, which routinely works with the U.S. government on defense technologies, is dedicated to turning the plasma

combustion technology into a commercial product that will improve turbine and internal combustion engines.

“We knew we wanted to work with LANL because, not only are their scientists world-renowned, they also have some of the best plasma technologies in the world. We already have and hope to commercialize the plasma combustion technology for fuel efficiency and reduced pollutants for the American public.”

PerriQuest is dedicated to the creation, development and timely deployment of advanced, cost-effective biological, chemical and electronic technologies that will protect and defend the American public and military forces from existing and emerging global threats. The company is focused on aerospace applications, as well as on specific technologies for the military to enhance its war-fighting capabilities and effectiveness.

For more information on PerriQuest, contact Brian Keller at briankeller@perriquest.com.



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