



Science on the Hill

The Community Newsletter of Berkeley Lab

Spring 2007

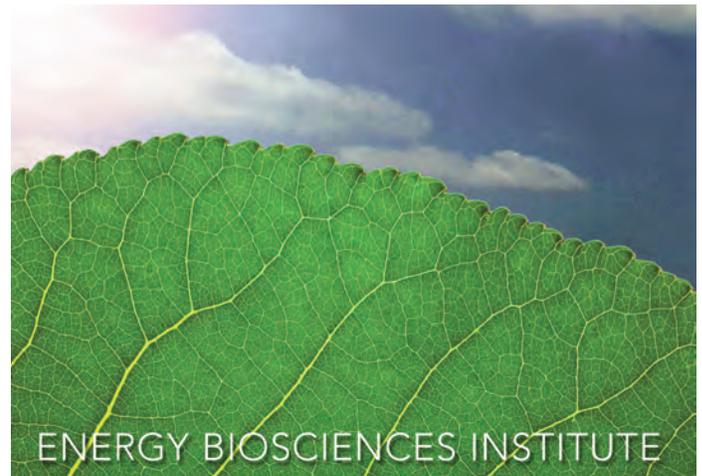
'Helios' Talks Will Discuss the Power of the Sun; Berkeley Becoming Center for Biofuels Research

"Helios" is the young Greek god of the sun. Berkeley Lab has taken that ancient symbol and applied it to a heroic modern quest – to exploit the sun's boundless energy in ways that could save the planet through the development of carbon-free sources of fuel.

Lab Director Steve Chu calls his Helios Project the single most important technological challenge the world faces today. With the recent news that global warming is threatening our lives in ways that will be unimaginable if fossil fuels continue to dominate our energy use, the Lab has mapped out a strategy to find transformational technologies that tap into solar energy in order to strengthen our economy and improve the environment in this century.

"In the last two and a half years at Berkeley Lab, a lot of people's imaginations have been excited by the idea that we can harness solar energy in various pathways," Chu said. "The effort is what we call the Helios project. And the Laboratory's multidisciplinary environment and 'team science' legacy will allow us to tackle this challenge in a major way."

Pathways to success may involve new more efficient solar cells that can be mass-produced, biofuels assembled from plant cellulose, and electrochemical fuel production and storage. The full arsenal of national lab facilities will be brought to bear on the problem, including the new Molecular Foundry nanotechnology facility.



Within the Helios umbrella, the new Energy Biosciences Institute will do its work. A partnership between BP Energy, Berkeley Lab, UC Berkeley and the University of Illinois, the 10-year, \$500 million EBI will focus its energies on biofuels through better crops and processing technologies. The local consortium won an international competition announced by BP in February.

The Berkeley community can learn more about Helios at three free public lectures in the Berkeley Repertory Theatre, beginning with Chu's introductory talk on **Monday, April 23**. The lecture will explore the scientific approach required to discover and develop alternative energy sources.

On **May 14**, Paul Alivisatos, Associate Laboratory Director for Physical Sciences, speaks on "Nanoscience at Work: Creating Energy from Sunlight"; and on **June 4** Jay Keasling, Physical Biosciences Division Director, discusses "Renewable Energy from Synthetic Biology." All talks begin at 5:30 p.m.

Co-sponsors of the series, "Science at the Theatre," include UC Berkeley, Chabot Space and Science Center, The Exploratorium, and the science departments at Berkeley, Oakland and Albany High Schools.



Steve Chu, left, speaks at Berkeley Rep on Monday, April 23, Paul Alivisatos, center, on May 14, and Jay Keasling on June 4.

New Grant to Bring More Science to Local Schools

In an effort to bring “real science, real science tools, and real scientists” to K-12 students and teachers, Stephen D. Bechtel Jr. has donated \$150,000 to establish the Berkeley Lab Academy for Science Teaching and Learning. The grant will enable the Lab to extend even further its educational outreach to local schools and to build collaborations with other science education organizations.

The Academy will provide, among other things, year-round workshops for science and math teachers, science lessons for grades 5-12, and online classes on “frontier science,” including one on cosmology, taught by Berkeley Lab physicist and 2006 Nobel Prize winner George Smoot.

“A recent report submitted to Congress, ‘Gathering Storm,’ has called attention to the foundational role K-12 science education has in developing successful innovation and job creation, and the urgent need to improve instruction in this sector,” says Academy organizer Rollie Otto. “This grant will help Berkeley Lab better meet this challenge by bolstering the curriculum and instruction within our local schools.”

Last year, the Lab’s Center for Science and



Nobel Prize winner and Berkeley Lab physicist George Smoot helps local teacher Laurie Kerrigan learn more about the cosmos

Engineering Education, which will oversee the Academy, taught lessons to virtually every fifth-grader in the district. Another 700 students received a science lesson workshop and tour at the Lab. And dozens of teachers brushed up their skills at summer workshops.

More information about the Academy can be found at www.lbl.gov/Education/CSEE/BLASTL.html

The Science of Giving: Lab Staff Help Improve the Lives of Others



Employee Heather Pinto helps organize bloodmobile visits to the Lab

Berkeley Lab’s educational outreach to students and teachers is well known. But Lab staff share more than just science expertise. Many are also trying to improve the lives of others by volunteering time and money for charitable causes.

Among the programs employees help organize for the Lab are American Red

Cross blood drives. Spearheaded by Heather Pinto (with the Lab’s Facilities Division) and other colleagues, a bloodmobile visits the Lab every two months to help boost supplies for hospital and emergency services.

Seeking even more of an impact on the local community, Pinto and others formed a “Philanthropy Club” at the Lab. Their first activity, a One-Warm-Coat drive, collected

over 100 garments from Lab employees. A charitable organization then distributed them to the needy.

And come April 28, low-income seniors and people with disabilities living in Albany, Berkeley, and Emeryville will benefit from the efforts of Berkeley Lab “Energy Teams,” who will install simple energy and water efficiency measures. These include wrapping water heaters, installing weather stripping, and cleaning refrigerator coils. For more information about Rebuilding Together, call 644-8979 or visit www.rebuildingtogetherabe.org.

Every fall, the Lab sponsors a SHARES (Science for Health, Assistance, Resources, Education and Services) campaign, in which Lab staff can donate a portion of their paycheck to a charity that supports science education and energy conservation, or any 501(c)3 organization of their choosing.

As these efforts show, Lab employees impact society not only by conducting and supporting groundbreaking scientific discoveries, but also with their compassion.

Neanderthal DNA Sequenced; Nearly Identical to Humans



“While we are not going to be able to bring Neanderthals back to life, their DNA sequences can serve as a time machine enabling us to go back and learn about the biology of these extinct hominids in ways we haven’t been able to do in the 150 years since the first Neanderthal was unearthed.”

So said Berkeley Lab research geneticist and director of the Joint Genome Institute, Eddy Rubin, discussing the recent sequencing and analysis of genomic DNA from the fossilized femur of a middle-aged Neanderthal man who lived about 38,000 years ago.

To find the elusive genetic material, scientists teased the first “base pairs” — the chemical building blocks of DNA — from the fossilized thighbone of a Neanderthal man who had lived in a cave named Viindija near Vilna, in what is now Croatia.

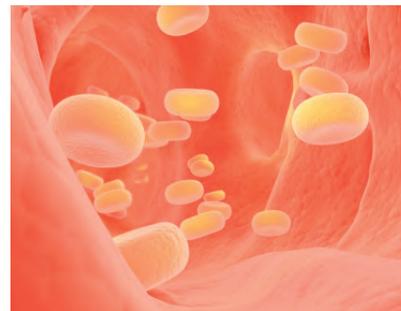
Rubin and his colleagues concluded that the genomes of modern humans and Neanderthals are at least 99.5-percent identical, and that the two species last shared a common ancestor approximately 700,000 years ago. Homo sapiens and Homo neanderthalensis split into two separate species about 400,000 years ago (by comparison, humans and chimpanzees diverged about 6 million years ago). More information is available at www.lbl.gov/Publications/Currents/Archive/Nov-17-2006.html

Mopping Up Cholesterol Using Nature as a Role Model

Hoping to take a page from nature’s playbook, Berkeley Lab biochemist John Bielicki has learned how a particle that sweeps cholesterol from the body forms in the arteries. His goal is to create a therapy that jumpstarts this process in people who suffer from atherosclerosis, a life-threatening disease in which the blood vessels that feed the heart become clogged.

“We want to devise a therapeutic that mimics how nature keeps the arteries clear of cholesterol,” says Bielicki of the Lab’s Life Sciences Division.

They’re not there yet. A successful drug is still years away. But Bielicki’s team has completed the necessary groundwork. In a pair of recently published studies, they reveal in unprecedented detail how the cholesterol-scouring particle, the so-called good cholesterol also known as high-density lipoprotein (HDL), is assembled. More information is available at <http://www.lbl.gov/Publications/Currents/archive/#2>



Closer to ‘Green Dream’ With Hydrogen Cell Development



The development of hydrogen fuel cells for vehicles, the ultimate green dream in transportation energy, is another step closer. Berkeley Lab researchers have identified a new variation of a familiar platinum-nickel alloy that is far and away the most active oxygen-reducing catalyst ever reported.

The slow rate of oxygen-reduction catalysis on the cathode – a fuel cell’s positively charged electrode – has been a primary factor hindering development of the polymer electrolyte membrane (PEM) fuel cells favored for use in vehicles powered by hydrogen.

“The existing limitations facing PEM fuel cell technology applications in the transportation sector could be eliminated with the development of stable cathode catalysts with several orders of magnitude increase in activity over today’s state-of-the-art catalysts, and that is what our discovery has the potential to provide,” said Lab materials scientist Vojislav Stamenkovic. More information is available at www.lbl.gov/Science-Articles/Archive/MSD-H-fuel-cells.html

City's Planning Commission Discusses Lab's LRDP

The City of Berkeley's Planning Commission discussed Berkeley Lab's draft 2006 Long Range Development Plan (LRDP) and its accompanying draft Environmental Impact Report (EIR) at a March 14 meeting.

The meeting, held at the North Berkeley Senior Center, was open to the public and also included members of Berkeley's Transportation Commission, Landmarks Preservation Commission, and Health Commission. The Planning Commission drafted a resolution that raised concerns over several aspects of the LRDP, such as transportation management and emergency preparedness, which they will send to the Berkeley City Council.

Berkeley Lab's draft LRDP establishes a framework of land-use principles to guide Berkeley Lab growth and other physical development through 2025. The draft EIR provides an assessment of the LRDP and its potential effects on the environment. The EIR underwent a public review process that ended March 23.

At the March 14 meeting, Dan Marks, director of the City's Planning and Development Department, lauded the fact that the Lab met with city staff before the LRDP and accompanying EIR were issued on Jan. 22, and reduced the Lab's growth plans, as well as established a Transportation Demand Management Plan.

However, Marks added that there is room for improvement. Among them, he raised concerns over the level of

proposed development and population growth at the Lab's Berkeley hills site, the aesthetic impact of the proposed buildings, air quality impacts stemming from diesel emissions, impacts to the Strawberry Creek drainage, and the difficulties in responding to a large earthquake.

The Lab will respond to all concerns and comments received during the public comment period in its final report to the University of California Regents, which is expected to be submitted for approval in the summer or early fall. More information is available at www.lbl.gov/LRDP.



Visit www.lbl.gov for more information on Berkeley Lab *Science on the Hill* is produced by the Berkeley Lab Public Affairs Department
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