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Prescriptions for Health, the Environmental Kind

By AMANDA SCHAFFER

In a bright studio at New York University, Natalie Jeremijenko welcomes visitors to her environmental health clinic. She wears a white lab coat with a rotated red cross on the pocket. A clipboard with intake forms hangs by the door.

Inside, circuit boards, respirators, light bulbs, bike helmets and books on green design clutter the high shelves. In front of a bamboo consultation desk sits a mock medicine cabinet, which turns out to be filled with power tools.

Dr. Jeremijenko, an Australian artist, designer and engineer, invites members of the public to the clinic to discuss personal environmental concerns like air and water quality. Sitting at the consultation desk, she also offers them concrete remedies or "prescriptions" for change, much as a medical clinic might offer prescriptions for drugs.

"It's a widely familiar script," said Dr. Jeremijenko, 41, who has a doctorate in engineering and is an assistant professor of visual art at N.Y.U. "People know how to ring up and make an appointment at their health clinic. But they don't really know what to do about toxins in the air and global warming, right?

"So the whole thing is how do we translate the tremendous amount of anxiety and interest in addressing major environmental issues into something concrete that people can do whose effect is measurable and significant?"

Visitors to the clinic talk about an array of concerns, including contaminated land, polluted indoor air and dirty storm-water runoff. Dr. Jeremijenko typically gives them a primer on local environmental issues, especially the top polluters in their neighborhoods. Then she offers prescriptions that include an eclectic mix of green design, engineering and art — window treatments, maybe, or sunflowers, tadpoles or succulents.

"People are frustrated by their inability to cope with environmental problems in their apartments and their neighborhoods," said George Thurston, a professor of environmental medicine at New York University School of Medicine. Dr. Jeremijenko, he continued, "provides a service that's needed, educating people about what they're up against and showing them that they can do something themselves while waiting for larger societal solutions."

Dr. Jeremijenko has worked with scores of individuals and community groups since starting the clinic last fall. "I call them impatients," she said — meaning that they don't want to wait for legislative action.

She holds daily office hours at N.Y.U., but also runs periodic off-site clinics at sites around the city — "like the M*A*S*H field offices," she said.

For instance, she met with "impatients" on the edge of the East River and took some of them out on a float made of two-liter soda bottles connected to a flexible polycarbonate sheet. Micah Roufa, who recently graduated from architectural school, was one of those present, though he said he chose to remain on solid ground.

Mr. Roufa owns a vacant lot in St. Louis that is contaminated with low levels of lead. He said he wanted to remedy that problem while using the space in a creative way and raising awareness about lead poisoning in the neighborhood.

Dr. Jeremijenko suggested planting a grid of sunflowers, along with a chemical agent called EDTA, to draw lead out of the soil. (EDTA is used to bind metals, making it easier for them to be taken up by plants; scientists caution that the approach requires technical care, because if too much of the chemical is added, a contaminant could migrate to neighboring property.)

Mr. Roufa planted the sunflowers this summer within an artistic grid of steel bars and glass orbs. "She has been a great guide and an inspiration," he said.

Of all the concerns Dr. Jeremijenko hears about at the clinic, she said indoor air quality tops the list. For common pollutants like formaldehyde, benzene and toluene she typically prescribes the copious use of houseplants, which have been shown to absorb some chemicals.

With the designers Will Kavesh and Amelia Amon, she has also developed a system that uses solar energy to power customized L.E.D. lights, which promote plant growth while providing a light intended for human use. The sun's energy is captured by a "solar awning," which is a stretch of glass, fabric or stainless steel that can be fitted to an apartment or office window.

And Dr. Jeremijenko has a prescription for storm-water runoff, which can cause sewers to flood and can increase pollution in rivers: putting small plots of greenery, including mosses and grasses, in no-parking zones around the city. One such temporary plot, on Stuyvesant Street in the East Village, was called a "butterfly truck stop," with plant life specifically designed to attract butterflies.

In past projects, Dr. Jeremijenko has coupled art and environmental activism. During the Republican National Convention in 2004, she organized a group of bicyclists to ride around New York wearing air-filtering masks, as an ironic comment on the government's Clear Skies Initiative.

In 2006, as part of the Whitney Biennial, she installed a series of bird perches in the museum's sculpture court. When birds landed on the perches, they set off computer sound files with comments on the interdependency of birds, other animals and people.

Dr. Jeremijenko's work occupies a niche "between popular culture and high art, between art, science and engineering," said Amanda McDonald Crowley, executive director of Eyebeam, an art and technology

center in Chelsea. “In a sense it’s performance, in a sense it’s awareness raising, and in a sense it empowers an audience to take action.”

In March, Dr. Jeremijenko had environmental clinic hours at Eyebeam, where she distributed tadpoles named after government officials whose decisions affect water quality.

“Tadpoles are exquisite sensors of water quality,” she said, adding that she had already named a tadpole after Commissioner Pete Grannis of the New York State Department of Environmental Conservation.

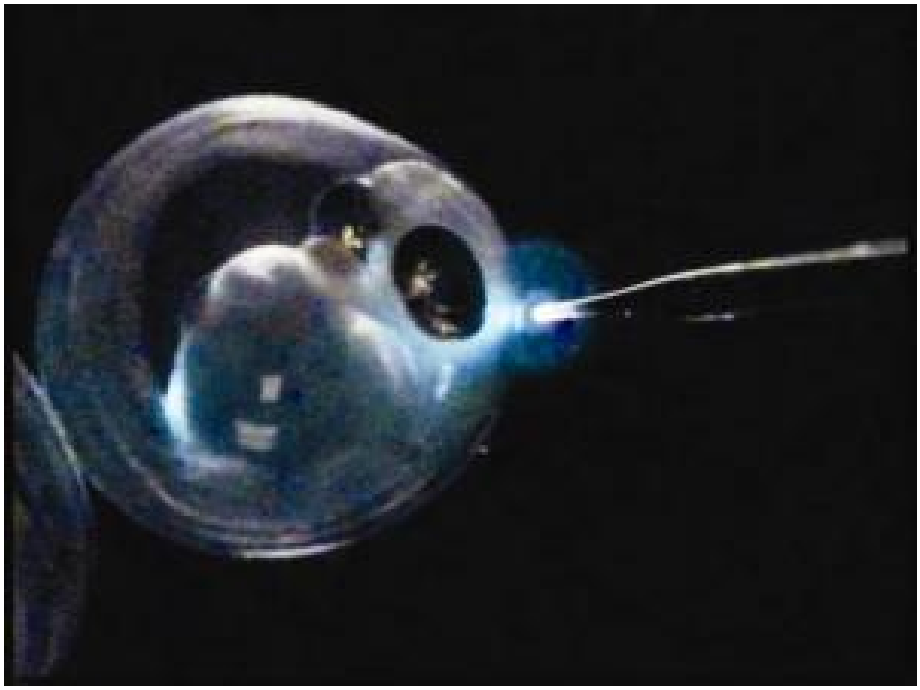
“I had it in a sample of water from the Bronx River and, unfortunately it died,” she said. “But we’re going to resurrect him.”

Charles M. Marcus, professor of physics and director of the Center for Nanoscale Systems at Harvard, is a longtime admirer of Dr. Jeremijenko’s work. “So much of what environmentalism involves is things you shouldn’t do, and that can be very unsatisfying,” he said. “She’s addressing that head-on.

“She seems to be saying: ‘If you’re like me and you consider action and anxiety to be poles between which we navigate, then I can help get your hands dirty and I can help get you involved in doing something that will help with your mind and will help with the world.’ ”

http://www.nytimes.com/2008/08/12/health/12clin.html?nl=8hlth&emc=hltha1

Using Live Fish, New Tool A Sentinel For Environmental Contamination



Purdue University researchers use an optical electrode, or optrode, right, to measure oxygen consumption in a two-day-old fathead minnow embryo, about half the width of the head of a pin. By watching for worrisome changes within these tiny fish eggs, the technology could be used as a monitoring tool against environmental contamination or even biological weapons. (Credit: Marshall Porterfield)

ScienceDaily (Aug. 13, 2008) — Researchers have harnessed the sensitivity of days-old fish embryos to create a tool capable of detecting a range of harmful chemicals.By measuring rates of oxygen use in developing fish, which are sensitive to contaminants and stressful conditions, the technology could reveal the presence of minute levels of toxic substances before they cause more obvious and substantial harm. It could be used as an early warning system against environmental contamination or even biological weapons, said Purdue University researcher Marshall Porterfield, an associate professor of agricultural and biological engineering.

Respiration, the process wherein animals and other organisms burn oxygen to produce energy, is often the first of a fish's bodily functions affected by contaminants. The technology uses fiber optics to quickly monitor this activity and produce results within minutes, Porterfield said.

"Say you are exposed to the common cold virus," he said. "Before symptoms develop and you become aware of the bug's presence, it has already begun to attack your cells. Similarly, fish and other organisms are affected by contaminants before behavioral changes appear. Our technology detects heretofore undetectable changes to act as an early warning system."

In a study published online last week in the journal Environmental Science and Technology, the system detected the presence of several common pollutants such as the widely-used herbicide atrazine – even at levels near or below those that the U.S. Environmental Protection Agency deems acceptable for drinking water.

"This means the technology could not only help monitor environmental quality but may be used to enforce important water quality standards," said Marisol Sepulveda, lead author and assistant professor of forestry and natural resources at Purdue.

Testing also registered noticeable changes in the respiratory activity of fish embryos when the heavy metal cadmium was present at levels 60 times lower than the EPA limit, she said.

Throughout the study, contaminants did not destroy the eggs of laboratory-raised fathead minnows, a commonly studied fish species. This further demonstrates the tool's ability to discern subtle changes before they become fatal, Sepulveda said.In the laboratory, researchers first manually positioned a tiny optical electrode, or optrode just outside individual embryos of two-day-old fathead minnows. At 1.5 millimeters in diameter, they were slightly smaller than the head of a pin, said primary author and Purdue doctoral student Brian Sanchez.

A fluorescent substance coated the electrode tip, its optical properties varying predictably with oxygen concentration. This allowed researchers to take quick measurements at locations only micrometers apart, moving the electrode via a computer-driven motor, Sanchez said. These readings then allowed researchers to calculate respiration rates within the eggs, he said. Using a self-referencing technique Porterfield developed over the last decade, he and the team measured each egg with and without contaminants present. This allowed each embryo to serve as its own control, he said, providing more reliable results.Porterfield said the technology could be used on other organisms. Study co-author and Purdue researcher Hugo Ochoa-Acuña has begun adjusting it to work with a type of crustacean.

A prototype could be ready to test in the field in four years if improvements continue, said Porterfield, a corresponding author. The technology currently tests immobilized eggs in a laboratory setting but there are plans to make the tool more versatile.Porterfield also said he thinks the technology could have diverse uses. He imagines it could be conjugated with tumor cells to screen potential cancer drugs or help find new therapeutic targets.

During the study the technology detected four of five common pollutants tested, all known to act upon organisms in different ways: atrazine, cadmium, pentachlorophenol – an antifungal – and cyanide. It didn't register low levels of the insecticide malathion, possibly because fathead minnow embryos require more time to elapse for effects to become evident, Sanchez said.

Toxins can slow respiration by directly impeding it or they may stress the organism and cause it to burn more oxygen to provide energy for fighting the stressor, he said.The most widely-used analogous technology monitors gill movements and other activities of bluegill fish with electrodes secured to the fish's bodies, Sepulveda said. The Purdue system could be advantageous as it records respiration in a sensitive life-stage and the optical equipment doesn't consume oxygen or require the same degree of calibration, Porterfield said.

The study, funded by Purdue's Center for the Environment and the U.S. Department of Education, was different from Sanchez's other research, which is primarily focused upon finding genes and proteins to serve as biomarkers for contaminant exposure in fish."This study was all the more exciting to be a part of due to its potential applications in protecting human health," he said.

Adapted from materials provided by Purdue University.

http://www.sciencedaily.com/releases/2008/08/080813114225.htm

Organic Food Has No More Nutritional Value Than Food Grown With Pesticides, Study Shows

ScienceDaily (Aug. 9, 2008) — New research in the latest issue of the Society of Chemical Industry's (SCI) Journal of the Science of Food and Agriculture shows there is no evidence to support the argument that organic food is better than food grown with the use of pesticides and chemicals.

Many people pay more than a third more for organic food in the belief that it has more nutritional content than food grown with pesticides and chemicals.But the research by Dr Susanne Bügel and colleagues from the Department of Human Nutrition, University of Copenhagen, shows there is no clear evidence to back this up.

In the first study ever to look at retention of minerals and trace elements, animals were fed a diet consisting of crops grown using three different cultivation methods in two seasons.The study looked at the following crops – carrots, kale, mature peas, apples and potatoes – staple ingredients that can be found in most families' shopping list.

The first cultivation method consisted of growing the vegetables on soil which had a low input of nutrients using animal manure and no pesticides except for one organically approved product on kale only.The second method involved applying a low input of nutrients using animal manure, combined with use of pesticides, as much as allowed by regulation.

Finally, the third method comprised a combination of a high input of nutrients through mineral fertilisers and pesticides as legally allowed.The crops were grown on the same or similar soil on adjacent fields at the same time and so experienced the same weather conditions. All were harvested and treated at the same time. In the case of the organically grown vegetables, all were grown on established organic soil.

After harvest, results showed that there were no differences in the levels of major and trace contents in the fruit and vegetables grown using the three different methods.Produce from the organically and conventionally grown crops were then fed to animals over a two year period and intake and excretion of various minerals and trace elements were measured. Once again, the results showed there was no difference in retention of the elements regardless of how the crops were grown.

Dr Bügel says: 'No systematic differences between cultivation systems representing organic and conventional production methods were found across the five crops so the study does not support the belief that organically grown foodstuffs generally contain more major and trace elements than conventionally grown foodstuffs.'

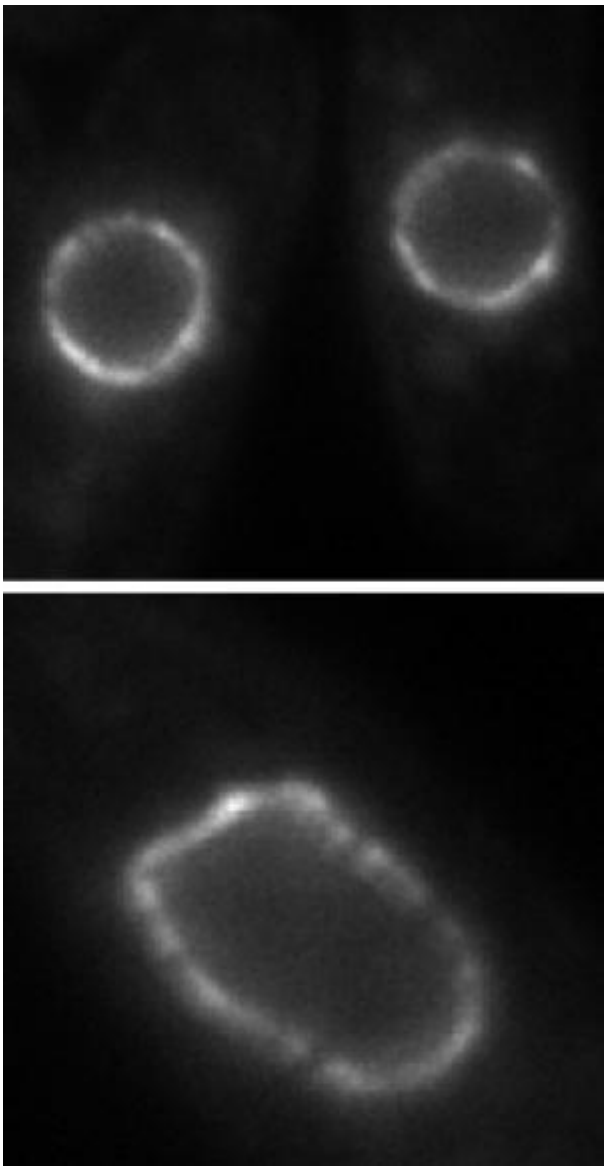
Dr Alan Baylis, honorary secretary of SCI's Bioresources Group, adds: 'Modern crop protection chemicals to control weeds, pests and diseases are extensively tested and stringently regulated, and once in the soil, mineral nutrients from natural or artificial fertilisers are chemically identical. Organic crops are often lower yielding and eating them is a lifestyle choice for those who can afford it.'

This research was supported by the International Centre for Research in Organic Food Systems (ICROFS), Denmark.

Adapted from materials provided by Society of Chemical Industry, via AlphaGalileo.

http://www.sciencedaily.com/releases/2008/08/080807082954.htm

Molecular Bridge Serves As A Tether For A Cell's Nucleus



Misshapen membrane. When cells lack the protein Ima1, their nuclei appear deformed (bottom) rather than spherical.

ScienceDaily (Aug. 13, 2008) — A cell's nucleus — home of it its most precious contents — is a delicate envelope that, without support, is barely able to withstand the forces that keep it in place. Now, researchers have discovered a network of molecules in the nuclear membrane that provide the nucleus with rigidity and also facilitate a previously undiscovered form of communication between the cell's nucleus and its cytoplasm.

Scientists, led by Nobel Prize winner Günter Blobel, say that this mechanism is different from the usual traffic of molecular signals that enter and exit the nucleus through pores in the nuclear envelope.

"This is a distinct kind of physical connection between two compartments in a cell — the cytoplasm and the nucleus," says the study's lead investigator, Megan King, of Blobel's Laboratory of Cell Biology. "It really opens up the possibility that there is a basic process going on that affects gene expression in ways that we had not understood before."

King describes the network as a bridge of molecules that extends from the interior of the nucleus — specifically, the chromatin, the complex of DNA and proteins that makes up chromosomes – into the cell cytoplasm and its network of microtubules that provides structure to the cell. Though some of the proteins had been previously identified, King, Blobel and researcher Theodore Drivas discovered one in particular, called Ima1, that serves as one of the bridge's pillars.

In fission yeast, the single-cell eukaryotes that the researchers used as a model organism, the nucleus has to stay centered within the cell before cell division is initiated. In other eukaryotes, microtubules push on the nucleus by interacting with nuclear membrane proteins from two previously discovered families: KASH domain proteins, which span the outer nuclear membrane, and SUN domain proteins, which reside in the inner nuclear membrane. However, King and the other researchers suspected that this bridge alone could not be strong enough to keep the nuclear structure stable against the forces applied by the cell's cytoskeleton.

The researchers now say that two additional proteins are part of the yeast nuclear bridge. One is Kms2, which is part of the KASH family, and the other is Sad1, a member of the SUN family. Kms2 forms the

outside pillar of the bridge and couples forces from microtubules to the protein bridge anchored on the inside by Sad1. But the scientists suspected there had to be an anchor for Sad1, or the bridge could not withstand such forces.

They then examined Ima1, which is found in many species, including humans. The protein binds to heterochromatin, which is a tightly packed form of DNA and is critically located in the inner membrane of the nucleus. Indeed, a series of experiments demonstrated that Ima1 forms the strong ground support for the side of the bridge that attaches inside the nucleus, and that other proteins, namely the Ndc80 complex, strengthen the connection, like a nut-and-bolt arrangement. Together, they proved able to absorb the forces transmitted through the centrosome on the outside of the nucleus. Whenever Ima1 or the Ndc80 complex was compromised, the bridges fell apart.

"The proteins act like players in a game of tug-of-war," says King. "They will move side to side in an ordered line, remaining standing as long as the teams are of similar strengths. However, once one team pulls with a force that cannot be countered by the second team, both teams fall to the ground in a jumble." When decoupled from chromatin, the nuclear envelope pays the price, becoming deformed and fragmented.

"This communication is physical, and it shows us how chromatin can support a cytoplasmic function, while, on the other hand, microtubules have the ability to affect nuclear functions," King says.

Journal reference:

1. King et al. **A Network of Nuclear Envelope Membrane Proteins Linking Centromeres to Microtubules**. *Cell*, 2008; 134 (3): 427 DOI: 10.1016/j.cell.2008.06.022

Adapted from materials provided by Rockefeller University.

A Car Ban Aimed at Carbon

As campuses across the country look for ways to reduce their own carbon footprint and the environmental impact of their staff and students, many have tried to add services (like offering loaner bicycles as an alternative to the use of gas guzzling vehicles) to change behavior. Few if any, however, are actually saying No. But Bowdoin College is, by banning cars for freshmen.

Starting in the fall of 2009, first-year students, who like second-year students are required to live on campus, will no longer be allowed to keep a car on the Maine college's grounds.

While some institutions have historically restricted freshmen from having cars to keep them involved in campus life or to minimize campus parking woes, Bowdoin's ban, first raised by a member of the president's Climate Commitment Advisory Committee, was specifically designed to make Bowdoin greener, says Tim Foster, dean of student affairs. "The driver for it, no pun intended, was really an environmental one," he says. Eighty-three first-year students had cars on the campus last year, Foster says, but most of those cars weren't used much during the year. Instead, the freshmen primarily used their cars as a way to get home, especially on breaks and at the end of the semester.

Foster says Bowdoin has a number of transportation services either in the works or already in place on the campus. The Bowdoin Communal Bike Club provides community bikes for those wanting to ride from place to place. The college recently entered into an agreement with Zipcar and two vehicles will be available to students starting this fall. The Bowdoin Shuttle, which starts September 4, the first day of classes, will be an "on demand" service that will give rides to students from campus into town. (The campus is within walking distance to most needed things in Brunswick.)

The college also updated its ride-share board to make it easier for students to connect with others who need rides, Foster said. This included making more students aware of it, which they hope to achieve by giving it a more prominent place on the Bowdoin Web site, as well as giving the Web page a new look. Bus stops such as Greyhound are also available in Brunswick and the college offers transportation to Portland transportation services such as the airport. In addition, Amtrak is expected to extend to Brunswick come 2010. The first students to be affected by the new policy will be entering in fall 2009. Although Zulmarie Bosques will be a sophomore at Bowdoin this fall, and therefore not affected by the ban, she wrote in an e-mail that she supports the decision. Bosques wrote she did not have a car her first year but also didn't need one. Bosques said the campus is located close enough to needed shops and when she did need a ride, she could find one from an upperclassman.

"I did not find I needed a car last year," Bosques wrote.

Bosques also said most of what you need is within walking distance of campus. Restaurants, shops, grocery stores are all within a reasonable distance. "The essentials are there," she says.

Bosques didn't think there would be any problems or backlash from the new policy. She has some friends at other schools who are not allowed to bring cars as freshmen and didn't think it would deter anyone from attending Bowdoin. "I don't think there will be any major drawbacks," she says.

While reducing the number of cars on the campus will also surely have a positive impact on that eternal campus issue — parking — Foster says the fact that the car ban will alleviate congestion a bit factored little into its decision, especially since the university will add more parking with a new hockey facility it is building.

"The decision was really driven as a green decision, not a parking decision," he says.

— James Heggen

The original story and user comments can be viewed online at
http://insidehighered.com/news/2008/08/14/carban.

High-Aptitude Minds: The Neurological Roots of Genius

Researchers are finding clues to the basis of brilliance in the brain

By Christian Hoppe and Jelena Stojanovic

Within hours of his demise in 1955, Albert Einstein's brain was salvaged, sliced into 240 pieces and stored in jars for safekeeping. Since then, researchers have weighed, measured and otherwise inspected these biological specimens of genius in hopes of uncovering clues to Einstein's spectacular intellect.

Their cerebral explorations are part of a century-long effort to uncover the neural basis of high intelligence or, in children, giftedness. Traditionally, 2 to 5 percent of kids qualify as gifted, with the top 2 percent scoring above 130 on an intelligence quotient (IQ) test. (The statistical average is 100. See the box on the opposite page.) A high IQ increases the probability of success in various academic areas. Children who are good at reading, writing or math also tend to be facile at the other two areas and to grow into adults who are skilled at diverse intellectual tasks [see "Solving the IQ Puzzle," by James R. Flynn; Scientific American Mind, October/November 2007].

Most studies show that smarter brains are typically bigger—at least in certain locations. Part of Einstein's parietal lobe (at the top of the head, behind the ears) was 15 percent wider than the same region was in 35 men of normal cognitive ability, according to a 1999 study by researchers at McMaster University in Ontario. This area is thought to be critical for visual and mathematical thinking. It is also within the constellation of brain regions fingered as important for superior cognition. These neural territories include parts of the parietal and frontal lobes as well as a structure called the anterior cingulate.

But the functional consequences of such enlargement are controversial. In 1883 English anthropologist and polymath Sir Francis Galton dubbed intelligence an inherited feature of an efficiently functioning central nervous system. Since then, neuroscientists have garnered support for this efficiency hypothesis using modern neuroimaging techniques. They found that the brains of brighter people use less energy to solve certain problems than those of people with lower aptitudes do.

In other cases, scientists have observed higher neuronal power consumption in individuals with superior mental capacities. Musical prodigies may also sport an unusually energetic brain [see box on page 67]. That flurry of activity may occur when a task is unusually challenging, some researchers speculate, whereas a gifted mind might be more efficient only when it is pondering a relatively painless puzzle.

Despite the quest to unravel the roots of high IQ, researchers say that people often overestimate the significance of intellectual ability [see "Coaching the Gifted Child," by Christian Fischer]. Studies show that practice and perseverance contribute more to accomplishment than being smart does.

Size Matters

In humans, brain size correlates, albeit somewhat weakly, with intelligence, at least when researchers control for a person's sex (male brains are bigger) and age (older brains are smaller). Many modern studies have linked a larger brain, as measured by magnetic resonance imaging, to higher intellect, with total brain volume accounting for about 16 percent of the variance in IQ. But, as Einstein's brain illustrates, the size of some brain areas may matter for intelligence much more than that of others does.

In 2004 psychologist Richard J. Haier of the University of California, Irvine, and his colleagues reported evidence to support the notion that discrete brain regions mediate scholarly aptitude. Studying the brains of 47 adults, Haier's team found an association between the amount of gray matter (tissue containing the cell bodies of neurons) and higher IQ in 10 discrete regions, including three in the frontal lobe and two in the parietal lobe just behind it. Other scientists have also seen more white matter, which is made up of

nerve axons (or fibers), in these same regions among people with higher IQs. The results point to a widely distributed—but discrete—neural basis of intelligence.

The neural hubs of general intelligence may change with age. Among the younger adults in Haier's study—his subjects ranged in age from 18 to 84—IQ correlated with the size of brain regions near a central structure called the cingulate, which participates in various cognitive and emotional tasks. That result jibed with the findings, published a year earlier, of pediatric neurologist Marko Wilke, then at Cincinnati Children's Hospital Medical Center, and his colleagues. In its survey of 146 children ages five to 18 with a range of IQs, the Cincinnati group discovered a strong connection between IQ and gray matter volume in the cingulate but not in any other brain structure the researchers examined.

Scientists have identified other shifting neural patterns that could signal high IQ. In a 2006 study child psychiatrist Philip Shaw of the National Institute of Mental Health and his colleagues scanned the brains of 307 children of varying intelligence multiple times to determine the thickness of their cerebral cortex, the brain's exterior part. They discovered that academic prodigies younger than eight had an unusually thin cerebral cortex, which then thickened rapidly so that by late childhood it was chunkier than that of less clever kids. Consistent with other studies, that pattern was particularly pronounced in the frontal brain regions that govern rational thought processes.

The brain structures responsible for high IQ may vary by sex as well as by age. A recent study by Haier, for example, suggests that men and women achieve similar results on IQ tests with the aid of different brain regions. Thus, more than one type of brain architecture may underlie high aptitude.

Low Effort Required

Meanwhile researchers are debating the functional consequences of these structural findings. Over the years brain scientists have garnered evidence supporting the idea that high intelligence stems from faster information processing in the brain. Underlying such speed, some psychologists argue, is unusually efficient neural circuitry in the brains of gifted individuals.

Experimental psychologist Werner Krause, formerly at the University of Jena in Germany, for example, has proposed that the highly gifted solve puzzles more elegantly than other people do: they rapidly identify the key information in them and the best way to solve them. Such people thereby make optimal use of the brain's limited working memory, the short-term buffer that holds items just long enough for the mind to process them.

Starting in the late 1980s, Haier and his colleagues have gathered data that buttress this so-called efficiency hypothesis. The researchers used positron-emission tomography, which measures glucose metabolism of cells, to scan the brains of eight young men while they performed a nonverbal abstract reasoning task for half an hour. They found that the better an individual's performance on the task, the lower the metabolic rate in widespread areas of the brain, supporting the notion that efficient neural processing may underlie brilliance. And in the 1990s the same group observed the flip side of this phenomenon: higher glucose metabolism in the brains of a small group of subjects who had below-average IQs, suggesting that slower minds operate less economically.

More recently, in 2004 psychologist Aljoscha Neubauer of the University of Graz in Austria and his colleagues linked aptitude to diminished cortical activity after learning. The researchers used electroencephalography (EEG), a technique that detects electrical brain activity at precise time points using an array of electrodes affixed to the scalp, to monitor the brains of 27 individuals while they took two reasoning tests, one of them given before test-related training and the other after it. During the second test, frontal brain regions—many of which are involved in higher-order cognitive skills—were less active in the more intelligent individuals than in the less astute subjects. In fact, the higher a subject's mental ability, the bigger the dip in cortical activation between the pretraining and posttraining tests, suggesting that the brains of brighter individuals streamline the processing of new information faster than those of their less intelligent counterparts do.

The cerebrums of smart kids may also be more efficient at rest, according to a 2006 study by psychologist Joel Alexander of Western Oregon University and his colleagues. Using EEG, Alexander's team found that resting eight- to 12-hertz alpha brain waves were significantly more powerful in 30 adolescents of average ability than they were in 30 gifted adolescents, whose alpha-wave signal resembled those of older, college-age students. The results suggest that gifted kids' brains use relatively little energy while idle and in this respect resemble more developmentally advanced human brains.

Some researchers speculate that greater energy efficiency in the brains of gifted individuals could arise from increased gray matter, which might provide more resources for data processing, lessening the strain on the brain. But others, such as economist Edward Miller, formerly of the University of New Orleans, have proposed that the efficiency boost could also result from thicker myelin, the substance that insulates nerves and ensures rapid conduction of nerve signals. No one knows if the brains of the quick-witted generally contain more myelin, although Einstein's might have. Scientists probing Einstein's brain in the 1980s discovered an unusual number of glia, the cells that make up myelin, relative to neurons in one area of his parietal cortex.

Hardworking Minds

And yet gifted brains are not always in a state of relative calm. In some situations, they appear to be *more* energetic, not less, than those of people of more ordinary intellect. What is more, the energy-gobbling brain areas roughly correspond to those boasting more gray matter, suggesting that the gifted may simply be endowed with more brainpower in this intelligence network.

In a 2003 trial psychologist Jeremy Gray, then at Washington University in St. Louis, and his colleagues scanned the brains of 48 individuals using functional MRI, which detects neural activity by tracking the flow of oxygenated blood in brain tissue, while the subjects completed hard tasks that taxed working memory. The researchers saw higher levels of activity in prefrontal and parietal brain regions in the participants who had received high scores on an intelligence test, as compared with low scorers.

In a 2005 study a team led by neuroscientist Michael O'Boyle of Texas Tech University found a similar brain activity pattern in young male math geniuses. The researchers used fMRI to map the brains of mathematically gifted adolescents while they mentally rotated objects to try to match them to a target item. Compared with adolescent boys of average math ability, the brains of the mathematically talented boys were more metabolically active—and that activity was concentrated in the parietal lobes, the frontal cortex and the anterior cingulate.

A year later biologist Kun Ho Lee of Seoul National University in Korea similarly linked elevated activity in a frontoparietal neural network to superior intellect. Lee and his co-workers measured brain activity in 18 gifted adolescents and 18 less intelligent young people while they performed difficult reasoning tasks. These tasks, once again, excited activity in areas of the frontal and parietal lobes, including the anterior cingulate, and this neural commotion was significantly more intense in the gifted individuals' brains.

No one is sure why some experiments indicate that a bright brain is a hardworking one, whereas others suggest it is one that can afford to relax. Some, such as Haier—who has found higher brain metabolic rates in more astute individuals in some of his studies but not in others—speculate one reason could relate to the difficulty of the tasks. When a problem is very complex, even a gifted person's brain has to work to solve it. The brain's relatively high metabolic rate in this instance might reflect greater engagement with the task. If that task was out of reach for someone of average intellect, that person's brain might be relatively inactive because of an inability to tackle the problem. And yet a bright individual's brain might nonetheless solve a less difficult problem efficiently and with little effort as compared with someone who has a lower IQ.

Perfection from Practice

Whatever the neurological roots of genius, being brilliant only increases the probability of success; it does

not ensure accomplishment in any endeavor. Even for academic achievement, IQ is not as important as self-discipline and a willingness to work hard.

University of Pennsylvania psychologists Angela Duckworth and Martin Seligman examined final grades of 164 eighth-grade students, along with their admission to (or rejection from) a prestigious high school. By such measures, the researchers determined that scholarly success was more than twice as dependent on assessments of self-discipline as on IQ. What is more, they reported in 2005, students with more self-discipline—a willingness to sacrifice short-term pleasure for long-term gain—were more likely than those lacking this skill to improve their grades during the school year. A high IQ, on the other hand, did not predict a climb in grades.

A 2007 study by Neubauer's team of 90 adult tournament chess players similarly shows that practice and experience are more important to expertise than general intelligence is, although the latter is related to chess-playing ability. Even Einstein's spectacular success as a mathematician and a physicist cannot be attributed to intellectual prowess alone. His education, dedication to the problem of relativity, willingness to take risks, and support from family and friends probably helped to push him ahead of any contemporaries with comparable cognitive gifts.

Note: This article was originally published with the title, "High-Aptitude Minds".

http://www.sciam.com/article.cfm?id=high-aptitude-minds&print=true

Mass Extinctions And 'Rise Of Slime' Predicted For Oceans

During a recent research expedition to Kiritimati, or Christmas Island, Jeremy Jackson and other researchers documented a coral reef overtaken by algae, featuring murky waters and few fish. The researchers say pollution, overfishing, warming waters or some combination of the three are to blame. (Credit: Jennifer E. Smith)

ScienceDaily (Aug. 13, 2008) — Human activities are cumulatively driving the health of the world's oceans down a rapid spiral, and only prompt and wholesale changes will slow or perhaps ultimately reverse the catastrophic problems they are facing.

Such is the prognosis of Jeremy Jackson, a professor of oceanography at Scripps Institution of Oceanography at UC San Diego, in a bold new assessment of the oceans and their ecological health. Jackson believes that human impacts are laying the groundwork for mass extinctions in the oceans on par with vast ecological upheavals of the past.

He cites the synergistic effects of habitat destruction, overfishing, ocean warming, increased acidification and massive nutrient runoff as culprits in a grand transformation of once complex ocean ecosystems. Areas that had featured intricate marine food webs with large animals are being converted into simplistic ecosystems dominated by microbes, toxic algal blooms, jellyfish and disease.

Jackson, director of the Scripps Center for Marine Biodiversity and Conservation, has tagged the ongoing transformation as "the rise of slime." The new paper, "Ecological extinction and evolution in the brave new ocean," is a result of Jackson's presentation last December at a biodiversity and extinction colloquium convened by the National Academy of Sciences.

"The purpose of the talk and the paper is to make clear just how dire the situation is and how rapidly things are getting worse," said Jackson. "It's a lot like the issue of climate change that we had ignored for so long. If anything, the situation in the oceans could be worse because we are so close to the precipice in many ways."

In the assessment, Jackson reviews and synthesizes a range of research studies on marine ecosystem health, and in particular key studies conducted since a seminal 2001 study he led analyzing the impacts of historical overfishing. The new study includes overfishing, but expands to include threats from areas such as nutrient runoff that lead to so-called "dead zones" of low oxygen. He also incorporates increases in ocean warming and acidification resulting from greenhouse gas emissions.

Jackson describes the potently destructive effects when forces combine to degrade ocean health. For example, climate change can exacerbate stresses on the marine environment already brought by overfishing and pollution.

"All of the different kinds of data and methods of analysis point in the same direction of drastic and increasingly rapid degradation of marine ecosystems," Jackson writes in the paper.

Jackson furthers his analysis by constructing a chart of marine ecosystems and their "endangered" status. Coral reefs, Jackson's primary area of research, are "critically endangered" and among the most threatened ecosystems; also critically endangered are estuaries and coastal seas, threatened by overfishing and runoff; continental shelves are "endangered" due to, among other things, losses of fishes and sharks; and the open ocean ecosystem is listed as "threatened" mainly through losses at the hands of overfishing.

"Just as we say that leatherback turtles are critically endangered, I looked at entire ecosystems as if they were a species," said Jackson. "The reality is that if we want to have coral reefs in the future, we're going to have to behave that way and recognize the magnitude of the response that's necessary to achieve it."

To stop the degradation of the oceans, Jackson identifies overexploitation, pollution and climate change as the three main "drivers" that must be addressed.

"The challenges of bringing these threats under control are enormously complex and will require fundamental changes in fisheries, agricultural practices and the ways we obtain energy for everything we do," he writes.

"So it's not a happy picture and the only way to deal with it is in segments; the only way to keep one's sanity and try to achieve real success is to carve out sectors of the problem that can be addressed in effective terms and get on it as quickly as possible."

The research described in the paper was supported by the William E. and Mary B. Ritter Chair of Scripps Institution of Oceanography.

Journal reference:

1. Jackson et al. **Colloquium Paper: Ecological extinction and evolution in the brave new ocean**. *Proceedings of the National Academy of Sciences*, 2008; DOI: 10.1073/pnas.0802812105

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http://www.sciencedaily.com/releases/2008/08/080813144405.htm

In search of Western civilisation's lost classics

Luke Slattery | August 06, 2008

The unique library of the Villa of the Papyri in Herculaneum, buried beneath lava by Vesuvius's eruption in AD79, is slowly revealing its long-held secrets

STORED in a sky-lit reading room on the top floor of the Biblioteca Nazionale in Naples are the charred remains of the only library to survive from classical antiquity. The ancient world's other great book collections -- at Athens, Alexandria and Rome -- all perished in the chaos of the centuries. But the library of the Villa of the Papyri was conserved, paradoxically, by an act of destruction.

Lying to the northwest of ancient Herculaneum, this sumptuous seaside mansion was buried beneath 30m of petrified volcanic mud during the catastrophic eruption of Mt Vesuvius on August 24, AD79.

Antiquities hunters in the mid-18th century sunk shafts and dug tunnels around Herculaneum and found the villa, surfacing with a magnificent booty of bronzes and marbles. Most of these, including a svelte seated Hermes modelled in the manner of Lyssipus, now grace the National Archeological Museum in Naples.

The excavators also found what they took to be chunks of coal deep inside the villa, and set them alight to illuminate their passage underground. Only when they noticed how many torches had solidified around an umbilicus -- a core of wood or bone to which the roll was attached -- did the true nature of the find become apparent. Here was a trove of ancient texts, carbonised by the heat surge of the eruption. About 1800 were eventually retrieved.

A cluster of the villa's papyrus scrolls, in much the same state as they were found 250 years ago, lies in a display case in the Biblioteca Nazionale's Herculaneum reading room. The individual scrolls, which extend in some cases to 9m unrolled, look not unlike charcoaled arboreal limbs left at the bottom of a campfire. A group of six rolls, compacted by the weight of volcanic debris, has emulsified into one unsightly pile.

In a corner of the room stands a device invented in 1756 by the abbot Antonio Piaggio, a conservator of ancient manuscripts in the Vatican Library, to unroll the papyri by suspending them from silk threads attached to their surface with a paste of fish oil. These were fixed in place by a slice of pig's bladder. Piaggio's machine, though painstakingly slow, was used successfully until the beginning of the 20th century. The room also contains a 3m length of scroll unrolled by Piaggio's machine, with 40 columns of Greek text in a rhythmic procession.

Scholars today, using multi-spectral imaging technology, are able to decipher the otherwise inscrutable surface of black ink on black fabric of the papyrus scrolls. A multinational team has assembled to transcribe the collection. But work has stalled as they await refinement of a new technique, an application of the CT scan, which will allow some of the untouched texts to be deciphered without exposing them to the risk of further damage.

When I ask to view a papyrus fragment from the vaults, a librarian pauses to absorb the request, returning my gaze a little blankly. Just as I begin to frame a withdrawal of this possibly audacious demand, she blinks, smiles amiably, and disappears down one of the library's vast corridors. She returns carrying a gun-metal tray on which a sheet of papyrus, older than many a classical fluted column and as brittle as a desiccated insect wing, has been laid out with reverential delicacy. The glitter of ink is clearly visible under the lights. But the material itself has been scorched in antiquity, then torn and tattered in an effort to prise it open.

I am looking at one of the Dead Sea scrolls of classical antiquity: a shard of half-recovered time. It belongs, I realise, to a genre of accidental art that speaks of our relationship to the past more precisely than any intact work; it is the art of the fragment, an art that yields to us, but never surrenders.

The Villa of the Papyri is believed to have been owned by Roman statesman Lucius Calpurnius Piso, father-in-law of Julius Caesar. He was a man of wealth and refined taste. Like many members of the Roman elite of the time, Piso looked back fondly to the glories of ancient Greece. His library, written mostly in Greek, was dominated by works of the Epicurean school, which sought a salve for the troubled soul in the taming of runaway desire.

Epicurus, the creed's founder, was a fourth century BC atomist philosopher with an atheistic bent and a medicinal aim. He wanted to remedy human pain in this life rather than prepare sufferers for the next.

"Nothing to fear in God," he wrote, displaying a talent for pithy distillation. "Nothing to feel in death. Good can be attained. Evil can be endured."
Shortly before 300BC Epicurus withdrew his followers to a commune outside Athens, known to all as The Garden. Friendship and frugality were its guiding principles. In fact, Epicurus would regard the modern use of the adjective epicurean as a travesty of his ideals. "Plain fare gives us as much pleasure as a costly diet," he said. True pleasure for Epicurus was a "pot of cheese", though he was thought to enjoy a tipple from a wineskin.
Ancient gossip links him with a fellow communard called Mammarion (big breasts), which only shows that the sage was human.
Epicureanism takes up a radical position in the Hellenistic world, standing apart from the philosophical mainstream. When Paul addresses the Athenians, in Acts 17 of the Bible, he speaks of Epicureans and Stoics in the same breath. Christianity, naturally, set itself firmly against Epicurean materialism and its implicit atheism. But the Stoics were equally stern disputants. Epicureans, as a result, found themselves traduced by their fellow pagans and damned by the early church. The Garden, nevertheless, flourished for some eight centuries.
"Epicurus's philosophy exercised so widespread an influence that for a long time it was touch and go whether Christianity might not have to give way before it," writes Lawrence Durrell in a tone of lament.
One consequence of Christian hostility, a kind of passive resistance, is a broken tradition. Epicureanism was ignored by the monastic scribes who transferred the works of approved authors from the school of Athens, particularly Aristotle and Plato, from papyrus to parchment and vellum. Only a few letters, sayings and principles survive from the 300 scrolls attributed to Epicurus in antiquity.
A few fragments from Epicurus's lost work, On Nature, inspiration for the Roman poet Lucretius's magisterial poem, On the Nature of Things, have been unearthed at the Villa of the Papyri. But the Herculaneum scrolls are mainly the works of an Epicurean sage named Philodemus, previously known as the author of some rather racy light verse.
These finds are contributing to a revival of scholarly interest in Epicureanism, Europe's first green philosophy, at a time when the West urgently seeks advice on living with less. Epicurean counsel sounds at times like contemporary wisdom; it provides the philosophical language for an eco-friendly art of life.
A few lines from Lucretius, penned at the apogee of paganism, are equally applicable in the age of the plasma screen:
But while we can't get what we want, that seems
Of all things most desirable. Once got,
We must have something else.
But there is an exquisite edge to the discovery of this Epicurean library in Herculaneum, and it is honed not so much by the knowledge of what has been found as the fear of what might be lost. An alliance of mainly British and American scholars, convinced that more texts remain to be found at the Villa of the Papyri, are calling for its urgent excavation. They cite the threat posed to the villa, which has never been completely liberated from its prison of rock, by a further eruption of Vesuvius. The volcano's bellows were heard as recently as 1998.
Richard Janko, head of classical studies at the University of Michigan, believes the Villa of the Papyri promises to yield the greatest number of new texts since the discoveries in the 16th century that nourished the High Renaissance and fashioned Western secular humanism. "This is the only place in the world where we know for certain that a Greco-Roman library was entombed in a manner that ensured its preservation," Janko says.
"There are almost certainly more books to be found there."
He points out that many of the scrolls were discovered in carrying containers arrayed in a line, as if being evacuated towards the sea.
Robert Fowler, professor of Greek and dean of arts at Bristol University, hopes that a study recently published by the local archeological superintendent's office on the future conservation of the Herculaneum site, ancient and modern, might show the way forward.
"The villa remains one of the great buildings of the ancient world and it should certainly be excavated," Fowler says. "This would be true even if we were to find no further papyri, though the likelihood that we will find them adds much to the case. The building will certainly contain many other things, and is of unique historical interest. If we know of a site that should be excavated, and we have the capacity, let us

get on with it. Of all the sites in the world, this one ranks close to the top of the list for potential and historical importance."

If a significant number of lost classics are found at the Villa of the Papyri it would enlarge the cultural and intellectual tradition, and might even alter its course. Should scholars find the famous lost second book of Aristotle's Poetics, the narrative spring of Umberto Eco's best-selling medieval mystery, The Name of the Rose, the discovery might shift the ground of Western aesthetics. Of Sophocles' 120 plays, only seven are known, and of these the Oedipus trilogy has embossed itself eternally on the Western imagination. The Kypria, a martial epic believed to have been Homer's source material, disappeared some time in antiquity.

All gone. Or perhaps only lost from view.

Locking horns with scholars campaigning for a complete excavation at the Villa of the Papyri is the Italian Government. Local archeological authorities are mindful of the fact that while 50m of the villa has been brought to light, a further 250m of this extraordinary palatial structure lie beneath a mass of petrified lava-mud. Above it, literally, sits the modern town of Ercolano. The villa's thorough excavation requires the exercise of benign political judgment and sophisticated urban planning, qualities in rather short supply on the Gulf of Naples.

Roman Herculaneum, named after the musclebound demigod Hercules, lay at the foot of Vesuvius on a bluff overlooking the sea. It was last seen intact on the afternoon that the volcano, which had been dormant longer than living memory, roared into life. A heat blast of about 350C killed those of the city's inhabitants who had not managed to flee: the unflinching postures of skeletons found at the beach suggest they died instantaneously, microwaved in a millisecond.

Next, from the shattered cone of Vesuvius oozed a slow-moving river of liquid fire that swallowed the town whole. The eruption lasted 18 hours.

In the silent days that followed, the lava-mud cooled into a cement skin beneath which the Villa of the Papyri, a gorgeous three-storey beachfront mansion with unimpeded sea views, slept undisturbed for 17 centuries. Pompeii, lying to the south, received a much lighter covering of volcanic matter, which is one reason excavators shifted their attention there soon after the Villa of the Payri was discovered: it was an easier get.

The dead cities of Herculaneum and Pompeii were disinterred in stages from 1710, when a French aristocrat found a marble floor aglow at the bottom of a well at Herculaneum. His shafts yielded a set of beautiful statues garbed in the finest drapery, which he promptly purloined. Four decades later the Villa of the Papyri was discovered by Swiss engineer Karl Weber, who was excavating under the patronage of the Bourbon monarchy. Weber's architectural map of the subterranean villa, drafted from the evidence of his elaborate tunnel system, has proved to be accurate within a few centimetres.

So precise were his measurements that when American billionaire J.P. Getty decided to build a mansion in California evoking the villa's memory, his architects were able to consult Weber's plans with confidence. What emerged is a structure that recreates the Villa of the Papyri at an almost neurotic level of structural precision. Recently renovated, it now serves as the Getty Antiquities Museum.

Despite its glittering reputation as one of the famed monuments of the ancient world, the villa today is an aesthetic disaster: more open-cut mine than excavation.

With a grave and ceremonial air, Giuseppe Zolfo, Herculaneum's director of conservation and restoration, unlocks a metal gate protecting the site. Tourist visits are severely restricted and for the past six months access of any kind has been banned. On one side rises a solid wall of volcanic tuff; on the other, some 20m below today's ground level, stands a small excavated section of the buried villa.

Things improve with a tighter focus. As Zolfo leads the way towards an uncovered atrium whose floors are decorated in plain black-and-white tessellated tiles, we reach a plinth on which a team of archeologists busy themselves with odds and ends.

The walls in this southwest section of the villa were mostly shorn away by the eruption. But a small vaulted chamber, or cryptoporticus, has been excavated recently. After hooking up a battery of lights, Zolfo throws a switch to illuminate frescoed walls unseen for the past two millennia: dancing in the artificial light are images of cupids and a miniature maritime landscape. Painted in Pompeian red, yellow and cobalt blue, these are of a freshness rarely seen in the dead cities themselves.

The sight of this modest, yet exciting advance into the villa's buried remains invites the obvious question: What next?

"We cannot keep going down," Zolfo says, kicking at the floor of compacted mud. "We have a big problem with the water. If we excavate here, after one month we have a metre of water."
He adds that the western end of Herculaneum, which lies 4m below the water table, is kept dry only by an extensive system of pumps.
I ask one of the site archeologists, who has followed us into the villa's newly excavated room, if he thinks more scrolls remain to be found. He lifts his shoulders, turns out his palms, and offers a crooked pout. I take this dumb show to mean "Maybe. Maybe not."
Before leaving the site I step inside one of Weber's 18th-century tunnels, venturing several metres, and many centuries, into the past. I have seen scholars of the papyri wince at the thought of Weber's men setting the carbonised scrolls alight. But such is the obdurate darkness of this gallery, which would have been some 20m below ground level in the 1750s, that they can hardly beblamed.
When I meet the archeological superintendent of the region, Pietro Giovanni Guzzo, at his office in Pompeii, the curtains are partly drawn across a hard, bright Neapolitan sky. The author of several books on the region's antiquities, Guzzo is a genial man with a professorial air who speaks in heavily accented English.
"So you have seen the villa," he says, lighting a pipe, a lifted brow accenting his playful tone. "They make this cavity, this cave. It is not soclear, and they bring into view only a small part. And when they finish we have to manage the cave."
The chief impediment to further excavation, Guzzo adds, is not so much financial as political. "Our task is to preserve what is found but it is very difficult to project an entire excavation. Digging at the villa, that's a huge undertaking. We would have to change streets, demolish houses and change the lives of thousands of people in Ercolano and Portici. It is a problem for the mayors. It is a political decision in the true sense of the word."
Guzzo points out that barely half of the scrolls found at the villa have been read by scholars, and questions the motivation of those pushing for an excavation in search of antiquity's lost works. "For me they must open and read all the papyri they have had for centuries, before we look for others," he says. "If I want to eat a meal at my home I don't go to the supermarket if I have a full fridge."
He concedes, on the other hand, the strong possibility that more remains to be found in "parts of the villa where the ancient diggers don't go". And this seems to add weight to the claim by scholars such as Fowler and Janko that another wing of the library, perhaps a separate Latin collection, awaits discovery.
Vesuvius last erupted in 1944 as Allied soldiers were thrusting up the Sorrentine coast against the retreating Reich. It remains a restive, brooding presence. Scholars with a passionate concern for the Villa of the Papyri hear the ticking of the volcano's geological clock.
Guzzo, however, regards the threat with a combination of Neapolitan fatalism and incorrigible pragmatism. "Earthquakes are possible," he says. "But they are not. What can we do about nature?
"Today I think the method of archeology is not to find treasures," he concludes. "It's to solve historical problems."
Janko, not surprisingly, bridles at the likening of his scholarly impulse to the exploits of a tomb raider. "It is amazing to claim that it is treasure hunting when one asks to have the papyri excavated before Vesuvius buries them definitively," he says. "If lava flows over the site again, I doubt we will ever have access to them.
"As for the publication of all the papyri being demanded before more are excavated, might one ask that the whole of Pompeii and Herculaneum be properly published before anything more there is unearthed? It seems to me to be arrogance to deny future generations the opportunity to read more such books, just because there are at present very few classical scholars with the competence and the energy to decipher and bring out those that we do have."
Fowler stresses an obvious point that may have been overlooked: that conservation, restoration and excavation are not necessarily inconflict.
"There are, of course, serious issues about conservation and the interface with the modern city, which are not to be dismissed lightly," he says. "They are solvable. There is huge potential also for an excavation to contribute to the local economy and urban regeneration, if agreement could be reached on options."
But the path ahead, if Guzzo's account is taken at face value, lies through a thicket of southern Italian politics in which the Neapolitan mafia, or camorra, is deeply entwined.
A less cheering scenario, from the point of view of those fearing the permanent loss of Western culture's missing classics, can scarcely be imagined.

Meanwhile, scholars are confident that new technologies will allow them to make inroads into the trove of scrolls recovered from the Villa of the Papyri, most of which are stored at the Biblioteca Nazionale. As knowledge of Epicureanism deepens, a neglected and misunderstood creed is enjoying a revival.
"Empty is that philosopher's argument by which no human suffering is therapeutically treated," said the philosopher of the Garden. "For just as there is no use for a medical art that does not cast out the sickness of the body, so there is no use in philosophy, unless it casts out the sickness of the soul."
That sickness, in Epicurean terms, is rampant desire. If the Villa of the Papyri were to contribute nothing more to the 21st century than the taming of consumption, it might help save the planet as well as the soul.

http://www.theaustralian.news.com.au/story/0,25197,24096948-25132,00.html

Simply Listening To Music Affects One's Musicality

ScienceDaily (Aug. 13, 2008) — Researchers at the University of Amsterdam (UvA) have demonstrated how much the brain can learn simply through active exposure to many different kinds of music. "More and more labs are showing that people have the sensitivity for skills that we thought were only expert skills," Henkjan Honing (UvA) explains.

"It turns out that mere exposure makes an enormous contribution to how musical competence develops."* The results were recently presented at the Music & Language conference, organized by Tufts University in Boston, and will be published in an upcoming issue of the Journal of Experimental Psychology: Human Performance and Perception.

The common view among music scientists is that musical abilities are shaped mostly by intense musical training, and that they remain rather rough in untrained listeners, the so-called Expertise hypothesis.

However, the UvA-study shows that listeners without formal musical training, but with sufficient exposure to a certain musical idiom (the Exposure hypothesis), perform similarly in a musical task when compared to formally trained listeners.

Furthermore, the results show that listeners generally do better in their preferred musical genre. As such the study provides evidence for the idea that some musical capabilities are acquired through mere exposure to music. Just listen and learn!

In addition, the study is one of the first that takes advance of the possibilities of online listening experiments comparing musicians and non-musicians of all ages.

*Eichler, J. (2008, July 13), 'Can't get it out of my head', Boston Globe, p. N6.

Journal reference:

1. Honing, H., & Ladinig, O. **Exposure influences expressive timing judgments in music**. *Journal of Experimental Psychology: Human Performance and Perception*, DOI: 10.1037/a0012732

Adapted from materials provided by Universiteit van Amsterdam (UVA), via AlphaGalileo.
http://www.sciencedaily.com/releases/2008/08/080813110453.htm

Pesticide Spills Common When Farmers Transfer Highly Concentrated Liquids Into Spray Tanks

Scientists in Sweden call for more research on the biobed, which was developed in 1993 to prevent pesticide spills from spray tanks. (Credit: Maria Del Pilar Castillo)

ScienceDaily (Aug. 13, 2008) — Scientists in Sweden are cautioning about the need for further research as more countries embrace a popular method for preventing pesticide spills. Their review of current scientific knowledge on the so-called "biobed" is to be published in the Journal of Agricultural and Food Chemistry.

In the study, Maria Del Pilar Castillo and colleagues point out that pesticide spills are common when farmers transfer highly concentrated liquid preparations into spray tanks where the pesticide is diluted with water. Even if a small, few-inch wide puddle of this concentrate spilled under the tank, the nearby environment could be exposed to up to one hundred thousand times the normal pesticide dose. "The risk of contamination is obvious," says Castillo. To remedy the problem, Swedish scientists in 1993 developed the biobed. Built from layers of grass, clay and a biomixture of straw, peat and soil approximately two feet deep, the biobed functions as an absorbent sponge for leaking concentrate from parked spray tanks.

Castillo says the effectiveness and simplicity of biobed systems help them spread worldwide. But as biobeds are modified to suit local conditions and needs, she cautions that it is important to analyze their actual performance in each specific location and evaluate the effects of changes to the biobed's composition and how local temperature and other conditions affect performance.

Journal reference:

1. Castillo et al. **Biobeds for Environmental Protection from Pesticide Use -- A Review**. *Journal of Agricultural and Food Chemistry*, 2008; 56 (15): 6206 DOI: 10.1021/jf800844x

Adapted from materials provided by American Chemical Society.

http://www.sciencedaily.com/releases/2008/08/080811092448.htm

Onward, ye literary pilgrims

A remarkable gazetteer shows what writers owe to places – and how places are changed by writing

Toby Barnard

A story is told that Princess Margaret, having read Richard Holmes's biography of Coleridge, craved to see Nether Stowey. Accordingly she instructed her pilot on the way back from an official chore to circle several times around the Somerset cottage. If true, the incident shows the passion (and disregard for others) of literary pilgrims. It also suggests how biography kindles interest and can create cults. Byron Rogers's recent life of R. S. Thomas is currently driving devotees deep into the Lleyn peninsula. Indeed, ever since the biographies of writers came to be seen as an aid to appreciating their writings, their places of birth, education and residence have been scanned for presages and echoes. Samuel Johnson's Lives of the Poets and John Boydell's promotion of Shakespeare through his gallery were vital in popularizing the biographical approach. Pilgrimage was being secularized; the educational value of tourism strengthened. Because admirers bring custom, institutions and municipalities eagerly advertise associations. On occasion, indeed, they have exaggerated the links. Schools and colleges hoard, and sometimes exhibit, memorabilia from past pupils. Thus, the curious may stare at Johnson's teapot, Philip Larkin's spectacles, numerous locks of hair, quills and inkhorns, even, in the case of Jeremy Bentham, his embalmed body. More orthodox stimulus comes from portraits and busts. In the dining hall of Trinity College, Cambridge, hang images of Byron and Tennyson. The Long Room of the eighteenth-century library at Trinity Dublin, boasts Roubillac's head of Jonathan Swift, which is placed among the serried ranks of stern divines and forgotten scholars. Hull University Library proudly displays personal mementoes of Philip Larkin. In the Tate Gallery, the mawkishly mauve corpse of Chatterton, dead in his garret, in Henry Wallis's posthumous image continues to fascinate. The National Trust, with its astute blend of commerce and high-mindedness, has long preserved authors' houses. After all, one founder of the Trust was Beatrix Potter. As well as her Lake District home, the Trust's équipe includes Thomas Hardy, T. E. Lawrence, Rudyard Kipling, Jane Austen, Bernard Shaw and Thomas Carlyle. Smaller organizations cherish Laurence Sterne, John Keats, William Wordsworth, the Brontës, William Morris, D. H. Lawrence, Barbara Pym and P. G. Wodehouse. Where no residence can serve as a museum, relics are venerated, graves tidied and monuments erected. More modest cults agitate for blue plaques to record men and women of letters.

Requirements for entry into Oxford University Press's astonishing gazetteer vary. Birth, residence (no matter how brief) and death frequently suffice. In many cases, therefore, the connections are accidental and glancing. To evade landlady, bailiff, discarded lover, or Child Support Agency, writers frequently change addresses. Lurking here too is an uncertainty as to how much the specifics of a locality matter to writers. The euphony of the place names – "Clunton and Clunbury, Clungunford and Clun" – can suffice.

Ideally, a literary guide should address what writers owe to places and how places come to be seen, and are even changed, through writing. In general, the compilers of The Oxford Guide to Literary Britain and Ireland associate literature with poets, dramatists and novelists (the creative), rather than with journalists, diarists, letter-writers, antiquarians, philosophers and memoirists. But no genre or its practitioners is altogether excluded, even if inclusions are erratic. Authors vary between those who name real places, those who lightly veil them and the inventors. Among the last group, some break up the ground and reuse the fragments in their own patterns. For visionaries, locality is the starting trap out of which the imagination streaks. The compilers, the third pair to toil on the vast enterprise, have inherited a rich deposit. Indeed, there is a thick silt of sixteenth- to nineteenth-century obscurities. The principal novelty of this fresh version is to include the living and recently dead. Vividness in evoking particularity is seldom the qualification for admission. Both the meticulous and the sloppy find a place. The sharp startle us into seeing scenes as they did: "our blunt, bow-headed, whale-backed Downs": "ale like goldy foam that frocks an oar on Penmaen Pool"; "Their proper habits vaguely shown / As jointed armour, stiffened pleat". Hazier and maybe lazier characterizations – "England's green and pleasant land", "those blue remembered hills" – offer comfort. So serviceable is Housman's line that it serves as title both for the biography of the once popular historical novelist Rosemary Sutcliff and for a business selling cricketing

memorabilia. Towns sometimes undeservedly become the focus of writers' revenge. Yet Slough was not without fault when Betjeman singled it out for bombing. One of the supreme haters, Patrick Hamilton, spared few localities: Brighton, Henley, Reading and numerous London districts. Hamilton has his place in the Guide, although in it Reading escapes his invective. That unlovely town, maybe not courting literate sightseers, features equably in the volume for the schooling of Jane Austen, the home of Mary Russell Mitford's family, the incarceration of Oscar Wilde, an overnight stay of Jude the Obscure and, unexpectedly, the university education of Laurie Lee. In "The Friar" (can it be the still-extant "Monk's Retreat"?), Hamilton describes the public house in which Mrs Plumleigh-Bruce and her set of barflies, bores and tricksters met (or "foregathered") of an evening. Piling horror on horror in his evocation of interwar Reading, Hamilton adds Mrs Plumleigh-Bruce's pebble-dashed and semi-detached house in Sispara Road. Expertly he dots the garden with gnomes and the interior with brass bric-a-brac. Friends of Reading – and of the Thames Valley – could take away the taste of Hamilton's bile with one of the most topographically alert novelists. Regrettably, Elizabeth Taylor is a missing person. The cramped backstreets of the town, through which she had quixotically distributed left-wing leaflets during the 1930s, appear in varied guises in her stories. Once married to a successful chocolatier, she removed to a more salubrious Thameside life. Beneath the banal routines, she charted eddying emotions. In addition, she registered the unspoken but vital distinctions expressed in the old London postal districts (still understood today) and the (now forgotten) telephone exchanges – BAY[SWATER], FLA[XMAN], WEL[BECK]). The social slippages between W4, W8 and W12 have no finer recorder.

The Guide alerts readers to so many recondite associations that, overwhelmed by the trivia, they may ask ungratefully: what does it signify? To stand in the cramped quarters at Haworth, Chawton, or Shandy Hall is to grasp something of the enforced intimacies. Among poets, novelists and dramatists, surroundings trigger invention as well as reportage. The real and unreal are mixed together. Skilful juxtapositions of the imaginary alongside the actual foster the illusion of recognition. These fabrications, only patchily documented here, deserve more extended discussion. Angus Wilson, a currently unfashionable writer generously represented in the Guide, wrote revealingly of this, as of other aspects of fiction, in The Wild Garden. A master of deft topographical positioning, Wilson loaded places with cultural and social connotations, some of which were personal but most of which were readily grasped by his readers. He expected the attentive to recognize and respond appropriately to "a neutralized compound of Hertfordshire and Buckinghamshire", the windswept tedium of Seaford impaled as "one of the more hideous of seaside towns" (it has no entry in the Guide) or his "new town", Carshall. Wilson, in common with many writers, seemed a thwarted architect. He erected a grandiose but plausible baroque palazzo, Tothill House, between Dolphin Square, where he had a flat, and Westminster Abbey.

Imagined architecture belongs to a long tradition. With a creation like Henry James's Poynton, "the exquisite old house itself, early Jacobean, supreme in every part", it matters less to trace it plausibly to prototypes than to note its function as "a provocation, an inspiration, a matchless canvas for the picture". John Meade Falkner, retired to the precincts of Durham, invoked the boding presence of his abbey of Cullerne in The Nebuly Coat, but moved it closer to Wimborne Minster or Christchurch Priory. The dizzying raising of the Spire by William Golding's novel attests to his schoolmastering in Salisbury. The literary itinerant will be tested harder in tracking the originals of Oswald Fish's St Aidan, Purgstall Heath. Two accomplished fictive builders, both absent from the Guide, splice the real to their inventions. Alan Hollinghurst bounds his territory with Ladbroke Grove, the Portobello Road and Lowndes Square. In south Dorset, Litton Gambril is reached from the railway station at Crewkerne and is close to Weymouth. Maybe the author's own exasperation with geographical slovenliness causes a character to be corrected for assigning Plymouth to Dorset. Elsewhere, "Barwick" epitomizes the joyless towns of the South Midlands – Northampton, Rugby, Bedford, Wellingborough, Kettering – that swung readily to Thatcherism in the 1980s. "Hawkeswood" serves well for a Rothschild-like mansion. Hollinghurst even fabricates entries from Pevsner's Buildings of England and constructs a black book of plans for the imagined mansion of Tytherbury. A second virtuosic literary constructor is Neil Bartlett. The cutting rooms of a manufacturing furriers, with nineteen employees, is set with such exactitude that, had it not been consumed by fire, it ought to be easy to locate. Number 4, Skin Lane is related precisely to London Bridge Station and St James's Garlickhythe. Similarly, in Mr Clive and Mr Page, Bartlett uses the former

Turkish Baths in Jermyn Street and the long-defunct banking department at Selfridges to frame an all-too-plausible town house designed by H. H. Richardson in his "Romanesque" mode at 18 Brooke Street.

The Guide is calculated to cash in on and increase travel. Literary people, like the bulk of the population, were, for a long time, circumscribed by slow and costly means of movement. Resources allowed some, and need forced others, to move about. So long as the manner of locomotion was horse, coach or Shanks's pony, progress was slow. The ambling pace encouraged prolonged contemplation. Minute variations of altitude, accent, dialect, fauna and flora were obvious. Hungry for copy, writers noted and perhaps exaggerated these. Rivers, canals and coastal waters also offered leisurely exposure to a range of sensations. Then, suddenly, with steam power, travel sped up. The secluded were no longer trapped; privacy was easily disturbed by the sightseer. Tennyson, having fallen for the wild west of Wight, happily received Prince Albert, the photographer Julia Margaret Cameron and the Ballyshannon-born poet William Allingham. But quicker and cheaper ferries brought the celebrity-hunters from Southampton, so, forsaking the bluebells, primroses and windy cliffs near Farringford, the poet fled to mainland Hampshire. Undeterred, publications such as George G. Napier's The Homes and Haunts of Tennyson (1892) sustained the curiosity about the sights that had inspired the Poet Laureate.

First the advent and then the increasing ownership of automobiles enlarged the circuits of writers. Soon intrepid motorists joined bicyclists in pursuing even the most reclusive authors. Faster travel quickly altered what there was to view – crooked streets bulldozed for relief roads and car-parks, placid meadows bisected by motorways – and how it was seen. The more that centralization, uniformity and mechanization smoothed away parochial and regional oddities, the more the vernacular was cherished. Published tours of England during the 1930s, most famously J. B. Priestley's English Journey, were shot through with an ambivalence about modernity. Other sentimental perambulators – S. P. B. Mais, Robert Gibbings, E. V. Lucas, H. V. Morton, Arthur Mee, even Professor Joad of The Brains Trust, a passionate rambler – are ignored. Yet their influence in coupling writers with habitats was considerable. Moreover, they elevated the quaint and twee, the rustic over the urban or industrial. By doing so, they pandered to, even helped to foster, a nostalgic and self-congratulatory view of Englishness or Britishness.

During the Second World War, unified resistance involved the sacrifice of local quirks. Yet, paradoxically, the propaganda behind the war effort insisted that what was being defended was the physical idiosyncrasy of Britain. With tourism stunted by security and shortages of coal and petrol, reading offered the vicarious pleasures of travel. Anthologists busied themselves. John Arlott, G. Rostrevor Hamilton (by day, a special commissioner of Income Tax), Geoffrey Taylor, John Betjeman and – above all – Geoffrey Grigson resurrected the minor, the provincial and the parochial. Thankfulness for victory, tempered by austerity, expressed itself in new celebrations of the terrains of Great Britain (and Ireland). Fresh publishing ventures – series such as the Vision of England and Mee's patriotically titled The King's England – focused on the supposed personalities of counties. Fairgrounds, circuses, canals, even graveyards were treasured as oases of individuality. At the very moment when the look, names and boundaries of places were endangered, scholars were mapping their solid foundations. The historian W. G. Hoskins, and Alec Clifton-Taylor, through his revelatory book The Pattern of English Building (1962), documented what hitherto had been sentimental hunches. Auden might inventory the bedrocks of the island in "In Praise of Limestone", and remember a time when regional railway companies named their engines "after knights in Malory". But this instinct for local particularity was dwindling. Indeed, sceptics contended that only commercialized sport produced widespread identification with the county, through cricket, and with drab townships, via soccer and rugby.

In this Indian summer of literary localism, images frequently backed words. The Betjeman-Taylor anthology was illustrated by John Piper. In his Buildings and Prospects (1948) and Romney Marsh (1950), Piper wrote as well as drew. Another notable illustrator, Edward Bawden, conjured Life in the Village, as earlier his close associate Eric Ravilious had commemorated the visual and commercial variety of The High Street. Shell, profiteers from the transport revolution, helped to ensure that motoring brought cultural enrichment. Leisure was organized around goals. Through its county guides, started in the 1930s, Shell brought together writers (Betjeman, Robert Byron, James Lees-Milne) and artists (Piper,

Paul and John Nash). Even in Shell's later "Shilling guides", distinguished painters were employed and in composite representations of counties writers peep out.

Ardent in promoting informed awareness of the distinctiveness of place was Geoffrey Grigson. He pioneered the appreciation of two writers – William Barnes and John Clare – whose sense of belonging caused them to use an idiolect. He also rekindled interest in George Crabbe and Samuel Palmer, whose vision was centred on the then hermetic Darent Valley around Shoreham. He bicycled in Cornwall with Piper. Grigson's astringent eye unfailingly detected the slack and slick. His own writing – accounts of his upbringing in Cornwall and of Donegal, Limerick, West Looe, the Isles of Wight and Scilly and the Burren – reveals an erudite and unrivalled topographer. This understanding of local complexity also runs through his wife Jane's English Food. In the Guide, Grigson creeps onto the Isles of Scilly, the title of his early book of poems, but not into the index. Conjurors of place through words are properly the business of this Guide. Whether the written leaves a stronger imprint than the pictorial is not an issue that it addresses. In luring tourists into an area, who is the more powerful: Kyffin Williams or R. S. Thomas; Stanhope Forbes or Charles Causley? The passionate sightseer dithers between Constable and Shakespeare Country. Sadly, the interweaving of the visual and verbal is not probed. Few entries show equal facility with pigments and prose. The exceptions – Blake and Wyndham Lewis – did not bother much with specificity of place. The engraver Gwen Raverat is mentioned on the strength of her memoir Period Piece. Other artists have evoked places memorably through words: Kenneth Lindley on Swindon; Paul Nash with surreal Swanage; Lynton Lamb's Chelmsford. Clare Leighton, an equal of Raverat, describes in Tempestuous Petticoat the prosperous Edwardian ménage in St John's Wood, financed precariously by her mother's popular romances. The father, too, aspired to be a man of letters, but his laboriously researched westerns failed to find many readers. When newspaper commissions ceased, the family removed to an alarming house in Lowestoft facing directly into the North Sea towards enemy Germany.

The literary brio of the painter Edward Burra was appreciated only after his death. His letters, published in Well, Dearie!, are dashed off in a memorable argot. Burra's translation of Rye into the grotesque "Tinker Belle Town" corrects its sanctification as the home of Henry James and the quaint setting for E. F. Benson's Mapp and Lucia novels. Another whose artist's gaze animates his writings is Denton Welch. Invalidism after a road accident accentuated the obsessional and myopic quality of Welch's work. His descriptions of Derbyshire around Repton, where he was at school, of Croom's Hill, Blackheath, where he set off on his bicycle towards the fateful smash, and of Wealden Kent, during the 1940s, relish topographical minutiae. At school, the weedy Welch was beaten by Roald Dahl, Christopher Isherwood, Edward Upward and Vernon Watkins; all of these are noted here as Reptonians, except for Dahl, although he is given his due elsewhere under Cardiff and Great Missenden. Welch is forgotten.

Inclusions inevitably prompt reflections on the distinguished salon des refusés. Aintree racecourse hardly needs more punters, so neither Dick Francis nor Nancy Spain's crash to earth there (with her lover) is mentioned. Spain's detective stories are set in a girls' school, Radcliffe Hall, modelled on Roedean. She was sued by Evelyn Waugh for alleging in the Daily Express that the books of his brother Alec sold better than his. What more does she need to be admitted to this particular Pantheon? The Guide's aim (wonderfully achieved) is to amuse and inform. It is not conceived as an aid for the earnest, battling in high winds with a linen-backed Ordnance Survey map on the bonnet of the tourer. Yet the lavish format hardly lends itself to consultation in the Welcome Break during a sat-navigated quest for the setting of the latest television adaptation of Jane Austen or Inspector Morse. Instead, in its prodigious plenty, it updates the inconsequential charms (and annoyances) of Napier's Homes and Haunts.
Daniel Hahn and Nicholas Robins
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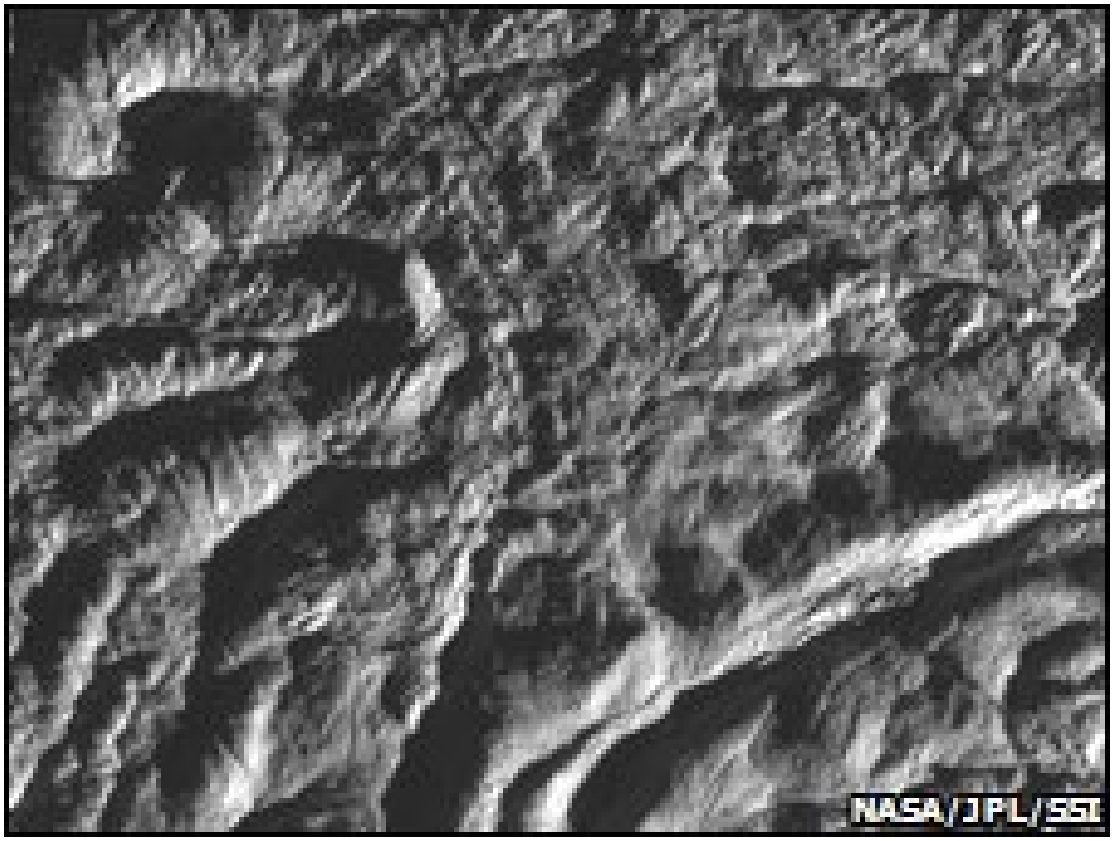
http://entertainment.timesonline.co.uk/tol/arts_and_entertainment/the_tls/article4523783.ece

Probe gets close up to Enceladus

The Cassini spacecraft has returned some remarkable new close-up images of the Saturnian moon Enceladus.



They were captured during a flyby on 11 August, with the probe passing above the icy terrain at a distance of just 50km at closest approach.

The pictures show previously unseen detail in the so-called tiger stripes that mark the south pole of Enceladus.

These cracks run across a "hot-spot" region that is hurling plumes of ice particles into space.

Scientists are intrigued by what might be driving this activity; and some have suggested the mechanisms involved could be sufficient to maintain a mass of liquid water below the moon's surface.

The flyby follows a similar close pass made in March, although on that occasion Cassini was turned to give the prime view to its Ion and Neutral Mass Spectrometer (INMS) and its Cosmic Dust Analyzer (CDA) - to allow them to "taste" the plumes.

Closer still

On this occasion, Cassini gave primacy to its cameras - its Imaging Science Subsystem - and the rest of its optical remote sensing instruments.

With the probe moving across the surface of Enceladus at 18 km/sec (about 40,000 mph), obtaining good pictures proved to be quite a challenge for the imaging team.

"The challenge is equivalent to trying to capture a sharp, unsmeared picture of a roadside billboard about a mile away with a 2,000mm telephoto lens held out the window of a car moving at 50mph," they reported on their blog.

Two more Enceladus flybys are planned for October, the first of which will go even closer - to an astonishing 25km from the surface.

Enceladus measures about 500km in diameter, just one-seventh the diameter of Earth's moon.

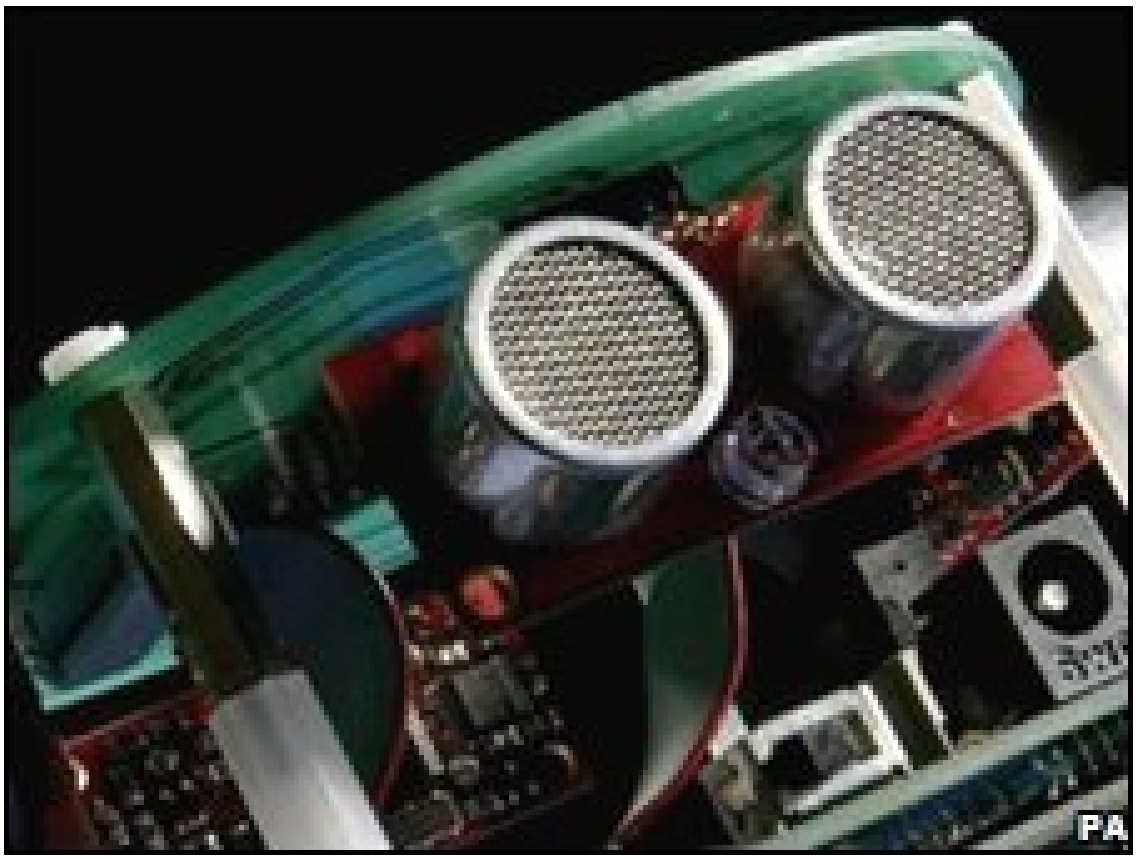
Cassini's manoeuvres are being commanded from Earth, at distance of more than one billion km.

The Cassini-Huygens mission is a joint venture between the US space agency (Nasa), the European Space Agency (Esa) and the Italian Space Agency (ASI).

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/science/nature/7559517.stm

Published: 2008/08/13 17:47:33 GMT

Rat-brain robot aids memory study



Dr Ben Whalley, from the University of Reading has carried out tests on the 'rat- brain-controlled' robot.

A robot controlled by a blob of rat brain cells could provide insights into diseases such as Alzheimer's, University of Reading scientists say.

The project marries 300,000 rat neurons to a robot that navigates via sonar.

The neurons are now being taught to steer the robot around obstacles and avoid the walls of the small pen in which it is kept.

By studying what happens to the neurons as they learn, its creators hope to reveal how memories are laid down.

Hybrid machines

The blob of nerves forming the brain of the robot was taken from the neural cortex in a rat foetus and then treated to dissolve the connections between individual neurons.

Sensory input from the sonar on the robot is piped to the blob of cells to help them form new connections that will aid the machine as it navigates around its pen.

As the cells are living tissue, they are kept separate from the robot in a temperature-controlled cabinet in a container pitted with electrodes. Signals are passed to and from the robot via Bluetooth short-range radio.

The brain cells have been taught how to control the robot's movements so it can steer round obstacles and the next step, say its creators, is to get it to recognise its surroundings.

Once the robot can do this the researchers plan to disrupt the memories in a bid to recreate the gradual loss of mental faculties seen in diseases such as Alzheimer's and Parkinson's.

Studies of how neural tissue is degraded or copes with the disruption could give insights into these conditions.

"One of the fundamental questions that neuroscientists are facing today is how we link the activity of individual neurons to the complex behaviours that we see in whole organisms and whole animals," said Dr Ben Whalley, a neuroscientist at Reading.

"This project gives us a really useful and unique opportunity to look at something that may exhibit whole behaviours but still remains closely tied to the activity of individual neurons," he said.

The Reading team is not the first to harness living tissue to control robots.

In 2003, Dr Steve Potter at the Georgia Institute of Technology pioneered work on what he dubbed "hybrots" that marry neural tissue and robots.

In earlier work, scientists at Northwestern University Medical Center in the US wired a wheeled robot up to a lamprey in a bid to explore novel ways of controlling prosthetics.

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/technology/7559150.stm

Published: 2008/08/13 17:25:47 GMT

How DNA Repairs Can Reshape Genome, Spawn New Species

Researchers have shown how broken sections of chromosomes can recombine to change genomes and spawn new species. (Credit: iStockphoto/Andrey Volodin)

ScienceDaily (Aug. 14, 2008) — Researchers at Duke University Medical Center and at the National Institute of Environmental Health Sciences (NIEHS) have shown how broken sections of chromosomes can recombine to change genomes and spawn new species.

"People have discovered high levels of repeated sequences in the genomes of most higher species and spun theories about why there are so many repeats," said Lucas Argueso, Ph.D., a research scholar in Duke's Department of Molecular Genetics and Microbiology. "We have been able to show with yeast that these repeated sequences allow the formation of new types of chromosomes (chromosome aberrations), and represent one important way of diversifying the genome."

The scientists used X-rays to break yeast chromosomes, and then studied how the damage was repaired. Most of the chromosome aberrations they identified resulted from interactions between repeated DNA sequences located on different chromosomes rather than from a simple re-joining of the broken ends on the same chromosome.

Chromosome aberrations are a change in the normal chromosome complement because of deletion, duplication, or rearrangement of genetic material. On rare occasions, the development of one of these new chromosome structures is beneficial, but more often DNA changes can be detrimental, leading to problems like tumors.

"Every so often the rearrangements may be advantageous," Argueso said. "Those particular differences may prove to be more successful in natural selection and eventually you may get a new species."

The radiation-induced aberrations in yeast were initially detected by co-author Jim Westmoreland in the NIEHS Laboratory of Molecular Genetics and the molecular dissection was done by Duke's Argueso.

In the yeast used for this study, the repeated DNA sequences account for about 3 percent of the genome. In higher species, like humans, about half of the genome consists of these repeated sequences, "which makes for an Achilles heel among humans," Argueso said. "If you have a break in this repeated part, you can repair not only from the same chromosome, but also from a similar repeated sequence in many other places in the genome."

Sequencing the genomes of different humans has turned up a surprising amount of structural variation between individuals, said Thomas D. Petes, Ph.D., chair of Duke molecular genetics and microbiology and co-author of the yeast study. "We expected to see primarily single base pair changes or small deletions and insertions. No one expected to see that one person would have two copies of a gene, while others would have one or three copies of the same gene."

These human studies also showed that many of the rearrangements found in humans are at sites of repeated DNA, which may occur through a mechanism similar to what this study found in yeast.

Petes said this work with yeast also could prove relevant to cancer research. "Most solid tumors have a high level of these rearrangements, as well as a high level of extra chromosomes; recombination between repeated genes is clearly one way of generating rearrangements, although some rearrangements also occur by other pathways," he said. "It is an evolutionary battle between normal cells and tumor cells. One way that tumor cells can break free of normal cell growth regulation is to rearrange their genomes."

The study was to be published online August 13 in the Proceedings of the National Academy of Sciences in collaboration with senior author Michael A. Resnick of the Laboratory of Molecular Genetics at NIEHS. Funding for this study came from a National Institutes of Health grant and by intramural research funds from the National Institute of Environmental Health Sciences. Other authors on the paper were Piotr A. Mieczkowski and Malgorzata Gawel of the Duke Department of Molecular Genetics and Microbiology.

Adapted from materials provided by Duke University Medical Center.

http://www.sciencedaily.com:80/releases/2008/08/080813144407.htm

Novel Mechanism That Controls The Development Of Autoimmunity Discovered

ScienceDaily (Aug. 14, 2008) — Scientists at the National Institutes of Health (NIH) have found a mechanism in the immune systems of mice that can lead to the development of autoimmune disease when turned off.The findings shed light on the processes that lead to the development of autoimmunity and could also have implications for the development of drugs to increase the immune response in diseases such as cancer and HIV.

The scientists from the National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS) and the National Institute of Allergy and Infectious Diseases (NIAID), both part of the NIH, studied immune system T cells – specifically the helper T cell, an immune system component that helps other cells fight infection. They focused on the protein furin, an enzyme that plays an important role in the functioning of T cells.Scientists have been limited in their ability to study the protein furin, because other enzymes can perform some of the same functions. Also, furin is essential to life, so scientists have been unable to create a mouse without furin that lives past the embryo stage of development. Since the NIH scientists were unable to see what a mouse without furin would look like, they collaborated with Belgium scientists to create a mouse without furin only in T cells.

What they discovered was that mice without furin in these cells developed systemic autoimmune disease. This means that the immune systems of the mice attacked their own cells and tissues throughout their bodies."We already know that furin seems to have roles in a variety of human diseases, such as cancer, cystic fibrosis and infectious diseases," says lead author Marko Pesu, Ph.D., in the NIAMS' Molecular Immunology and Inflammation Branch. "These findings show that having no furin in certain immune system cells can increase the immune response and lead to autoimmune disease in mice."The researchers found that deleting furin in helper T cells affected the functioning of two types of T cells, regulatory and effector T cells. The former cells, also called Tregs, promote immune tolerance to the body's own cells and tissues. Upon further examination, the researchers found that mice lacking furin in Tregs had lower levels of a specific protein, TGF-ß1, which is produced by these cells and is important for their ability to preserve immune tolerance. However, the researchers noted that effector T cells also produce TGF-ß1. They found that furin is also needed for TGF-ß1 production by effector T cells and that the absence of furin in effectors makes these cells more aggressive in causing autoimmune disease and tissue damage.

"Inhibiting furin has been thought to reduce growth of malignant cells or to block infections by preventing essential activation of a pathogen," says study author and NIAMS' Scientific Director John J. O'Shea, M.D., chief of the NIAMS' Molecular Immunology and Inflammation Branch. "However, these results suggest that the development of drug interventions could have an unexpected side effect of increasing the risk of developing autoimmune disease."Investigators from the NIH's National Cancer Institute also contributed to this study.

Journal reference:

1. Marko Pesu, Wendy T. Watford, Lai Wei, Lili Xu, Ivan Fuss, Warren Strober, John Andersson, Ethan M. Shevach, Martha Quezado, Nicolas Bouladoux, Anton Roebroek, Yasmine Belkaid, John Creemers, & John J. O'Shea. **T-cell-expressed proprotein convertase furin is essential for maintenance of peripheral immune tolerance**. *Nature Advance Access*, August 13, 2008 DOI: 10.1038/nature07210

Adapted from materials provided by NIH/National Institute of Arthritis and Musculoskeletal and Skin Diseases, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2008/08/080813144359.htm

Alternative Energy Technologies: Solar-powered Home Appliances Being Developed By Students

The UC dryer closet at left will connect with the conventional dryer at right. Both will use solar-powered hot water as the energy source for drying clothing. (Credit: Image courtesy of University of Cincinnati)

ScienceDaily (Aug. 14, 2008) — Cost savings, energy sources, appliances and more are all subjects for ongoing experimentation this summer in the University of Cincinnati solar house.

The house, constructed last year and ultimately displayed in Washington, D.C.

And now, the house is – appropriately enough – being recycled for additional use as a learning lab by UC faculty and students representing the university architecture, engineering and physics programs. Ongoing experiments in the house include:

Using hot water to create new kinds of appliances and energy-saving adaptions to today's appliances.

- Determining different ways to generate electricity using hot water.
- Determining the presumed energy and cost savings from alternative-energy technology and methods.
- Hot water as a giant battery

This summer's focus on hot water as a power source stems from the house's unique design elements. One of these is a patio shade wall consisting of 120 evacuated tubes. The tubes contain water that, when heated by the sun, translate into usable energy – a lot of usable energy.

Last year, hot-water derived energy powered the air conditioning. But, it could additionally do much more, like powering appliances and lights.

Conversion of a conventional clothes dryer

UC student Adam Saltzman, a graduate architecture student from Columbus, is creating a new kind of dryer closet that can serve as a stand alone and/or be connected – via an adapter – to a conventional dryer.

Two pipes carrying solar-heated water enter a heat exchanger at the bottom of the dryer closet. Hot air then rises in the closet to dry hanging clothes – which will then need little to no ironing.

Additionally, heat from this dryer closet can be passed – via an adapter – to a conventional dryer now in use throughout the world.

Thus, the conventional dryer now needs no conventional electric- or gas-powered heat source, only a minimal amount of grid-provided electricity to rotate wet apparel.

"Use of this adapter would represent a significant cost and energy savings annually and over the life of the dryer. One day, we'd love it if conventional dryers could be sold with our idea as a simple modification kit," said Anton Harfmann, a leader of the solar house project and associate dean of UC's top-ranked College of Design, Architecture, Art, and Planning.

A new "appliance" in the house

UC physics major Todd Kolloff of Northside is heading an experiment where hot and cold water work together to generate electricity for general use in the home.

His "appliance" is a small cistern filled with hot water. (In fact, the evacuated tubes found outside the UC solar house easily heat water to 180 to 195 degrees Fahrenheit.) Attached to this cistern are thermo-electric modules (palm-sized panels that conduct energy). In what is known as the Seebeck effect, heat passing through these devices creates electricity.

If these panels – heated on one side by the solar-heated hot water and cooled on the other by tap water – are found to work here, such panels could just as easily be placed on a much larger thermal-storage tank. Or in the chimney of the house to recapture heat and then convert it to electricity or even in the exhaust manifold of a car to create electricity for the vehicle's use.

Showing the savings

In the construction phase of UC's solar house, students and faculty applied alternative-energy uses for technology. However, precise determinations regarding cost savings – based on field experiments – have not yet been possible due to time constraints.

At the end of the summer, the current team working on these experiments hopes to gather data in regard to the capital equipment costs and operational-cost savings connected to these alternative-energy experiments and then compare these to conventional equipment and energy-generation costs.

The best education for the future

UC architecture student Adam Saltzman sees his involvement in ongoing solar experiments as the best preparation for his professional future. He explained, "Architects integrate technology into buildings and make that technology practicable. For instance, an architect can orient the house to receive solar energy."

Adapted from materials provided by University of Cincinnati.

http://www.sciencedaily.com/releases/2008/08/080812094528.htm

New Theory For Latest High-temperature Superconductors

ScienceDaily (Aug. 14, 2008) — Physicists from Rice and Rutgers universities have published a new theory that explains some of the complex electronic and magnetic properties of iron "pnictides." In a series of startling discoveries this spring, pnictides were shown to superconduct at relatively high temperatures.The surprising discoveries created a great deal of excitement in the condensed matter physics community, which has been scrambling to better understand and document the unexpected results.

High-temperature superconductivity -- a phenomenon first documented in 1986 -- remains one of the great, unexplained mysteries of condensed matter physics. Until the discovery of the iron pnictides (pronounced NIK-tides), the phenomena was limited to a class of copper-based compounds called "cuprates" (pronounced COO-prayts).

The new pnictide theory appears in this week's issue of Physical Review Letters."There is a great deal of excitement in the quantum condensed matter community about the iron pnictides," said paper co-author Qimiao Si, Rice University theoretical physicist. "For more than 20 years, our perspective was limited to cuprates, and it is hoped that this new class of materials will help us understand the mechanism for high-temperature superconductivity."

From its initial discovery, high-temperature superconductivity came as a shock to physicists. Superconductors are materials that conduct electricity without any resistance, and in 1986, the prevailing theory of superconductivity held that the phenomenon could not occur at temperatures greater than about 30 kelvins (minus 405 degrees Fahrenheit). Some cuprates have since been discovered to superconduct at temperatures higher than 140 kelvins.The 2006 discovery of superconductivity in one iron pnictide did not receive much notice from the physics community, since it occurred only below several kelvins. In February 2008, a group from Japan discovered superconductivity above 20 kelvins in another of the iron pnictides. In March and April, several research groups from China showed that related iron pnictides superconduct at temperatures greater than 50 kelvins.

In their new theory, Si and Rutgers University theorist Elihu Abrahams explain some of the similarities and differences between cuprates and pnictides. The arrangement of atoms in both types of materials creates a "strongly correlated electron system" in which electrons interact in a coordinated way and behave collectively.

Si and Abrahams propose that the pnictides exhibit a property called "magnetic frustration," a particular atomic arrangement that suppresses the natural tendency of iron atoms to magnetically order themselves in relation to each other. These frustration effects enhance magnetic quantum fluctuations, which may be responsible for the high-temperature superconductivity."Precisely how this happens is one of the challenging questions in strongly correlated electron systems," Abrahams said. "But even though we don't know the precise mechanism, we are still able to make some general predictions about the behavior of pnictides, and we've suggested a number of experiments that can test these predictions." The tests include some specific forms of the electronic spectrum and spin states.

The research at Rice is supported by the National Science Foundation and the Robert A. Welch Foundation.

Adapted from materials provided by Rice University.

http://www.sciencedaily.com/releases/2008/08/080813122943.htm

Southern Ocean Seals Dive Deep For Climate Data

Elephant seals fitted with special oceanographic sensors are providing a 30-fold increase in data recorded in parts of the Southern Ocean rarely observed using traditional ocean monitoring techniques. (Credit: Dr Martin Biuw)

ScienceDaily (Aug. 14, 2008) — According to a paper published today by a team of French, Australian, US and British scientists in the Proceedings of the National Academy of Sciences, elephant seals fitted with special oceanographic sensors are providing a 30-fold increase in data recorded in parts of the Southern Ocean rarely observed using traditional ocean monitoring techniques.

“They have made it possible for us to observe large areas of the ocean under the sea ice in winter for the first time,” says co-author Dr Steve Rintoul from the Antarctic Climate & Ecosystem Cooperative Research Centre (ACE CRC) and CSIRO’s Wealth from Oceans National Research Flagship.

"Conventional oceanographic platforms cannot provide observations under the sea ice, particularly on the Antarctic continental shelf where the most important water mass transformations take place. Until now, our ability to represent the high-latitude oceans and sea ice in oceanographic and climate models has suffered as a result.”

“They have made it possible for us to observe large areas of the ocean under the sea ice in winter for the first time,”

says co-author Dr Steve Rintoul from the Antarctic Climate & Ecosystem Cooperative Research Centre (ACE CRC) and CSIRO’s Wealth from Oceans National Research Flagship.

Co-author, University of Tasmania Professor Mark Hindell says the seal data complements traditional oceanographic sampling from ships, satellites and drifting buoys. “By providing ocean measurements

under the sea ice, the seals are helping us to establish the global ocean observing system we need to detect and understand changes in the ocean," he says.

The polar regions play an important role in the earth's climate system and are changing more rapidly than any other part of the world. In the southern hemisphere, the limited observations available suggest that the circumpolar Southern Ocean has warmed more rapidly than the global ocean average and that the dense water formed near Antarctica and exported to lower latitudes has freshened in some locations and warmed in others. Polar changes are important because a number of feedbacks involving ocean currents, sea ice and the carbon cycle have the potential to accelerate the rate of change.

The seals typically covered a distance of 35-65 kilometres a day with a total of 16,500 profiles obtained in 2004-5. Of these, 8,200 were obtained south of 60S, nine times more than have been obtained from floats and research and supply ships. The 4,520 profiles obtained within the sea ice is a 30-fold increase over conventional data. The seals dived repeatedly to a depth of more than 500 metres on average and to a maximum depth of nearly 2000m. The Australian team included scientists from CSIRO, the ACE CRC, the University of Tasmania's School of Zoology and Centre for Marine Science and Charles Darwin University.

Adapted from materials provided by CSIRO Australia.

http://www.sciencedaily.com/releases/2008/08/080812135658.htm

Trapping White Blood Cells Proves Novel Strategy Against Chronic Viral Infections

ScienceDaily (Aug. 14, 2008) — Seeing disease-fighting white blood cells vanish from the blood usually signals a weakened immune system.But preventing white blood cells' circulation by trapping them in the lymph nodes can help mice get rid of a chronic viral infection, researchers at Yerkes National Primate Research Center and the Emory Vaccine Center have found.

Their findings, recently published in the journal Nature, suggest a new strategy for fighting chronic viral infections that could apply to the treatment of human diseases such as hepatitis C and HIV/AIDS.The team's discoveries grew out of their study of two varieties of a virus that causes meningitis in mice, says senior author John Altman, PhD, associate professor of microbiology and immunology at Yerkes Research Center and Emory University School of Medicine.

The first author of the paper was postdoctoral fellow Mary Premenko-Lanier, PhD, with contributions from Sarah Pruett, PhD, assistant director of the Biomarkers Core Lab at Yerkes Research Center and graduate students Nelson Moseley and Pablo Romagnoli.Standard black laboratory mice can fight off infection by the Armstrong strain of lymphocytic choriomeningitis virus (LCMV), but are vulnerable to chronic infection by a variant called clone 13.

Altman and his co-workers found that infecting mice with the Armstrong strain sequesters white blood cells in the lymph nodes, while clone 13 does so less stringently."Our hypothesis was that if we could artificially induce conditions like those produced by the Armstrong strain, it would help the immune system clear an infection by clone 13," says Altman.

His team turned to an experimental drug called FTY720, which prevents white blood cells from leaving lymph nodes.FTY720, also known as fingolimod, desensitizes white blood cells so they can't respond to the chemical messenger sphingosine-1-phosphate (S1P). S1P also influences heart rate and smooth muscle contraction in the airways.

Scientists had previously thought of FTY720 as something that suppresses the immune system, Altman says. While not approved for sale by the FDA, doctors have tested it for the treatment of multiple sclerosis and preventing kidney transplant rejection.Even if mice have a stable chronic LCMV clone 13 infection, treatment with FTY720 can still improve their immune response against LCMV enough to have them rid it from their systems, the authors found.FTY720 appears to prevent "exhaustion" in the group of white blood cells called CD8+ T cells, which are responsible for killing off other cells that become infected by LCMV. Usually, the stress of infection kills some CD8+ T cells and leaves others unable to respond to the virus, Altman says.

It is unclear whether FTY720 resuscitates non-responsive T cells or allows new ones to avoid being killed off, he says.

Altman says he and his co-workers are planning to test FTY720's effects with other viruses.

The research was funded by the National Institutes of Health.

Reference: Nature, Premenko-Lanier et al. Vol 454 (August 14, 2008)

Adapted from materials provided by Emory University, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2008/08/080813144355.htm

Built Environment Connected With Obesity In Baby Boomers

ScienceDaily (Aug. 14, 2008) — Does your neighborhood have a lot of fast food outlets, few sidewalks, and no parks? If yes, your physical neighborhood may be hampering your ability to be physically active and placing you at increased risk for obesity. According to a research study conducted in Portland, Oregon by scientists at Oregon Research Institute (ORI), neighborhoods with lower mixed-land use and higher densities of fast-food outlets were more likely to have residents who were overweight/obese.

In contrast, residents living in neighborhoods with higher mixed-land use, high street connectivity, better access to public transportation, and more green and open spaces were more likely to engage in some form of neighborhood-based walking.

The study was unique in that it focused on the pre-Baby Boom/early-Baby Boom generations (ages 50-75) which will become the major demographic related to healthcare utilization in the next 20 years. By 2030, 36% of the total U. S. population (compared to 24.9% currently), will be over 50, and the numbers of those over 60 will more than double from current levels (ranging from an 82% increase in people aged 60-64 to a 126% increase in those aged 85+). Results from the study, funded by the National Institute of Environmental Health Sciences, are reported in the July issue of the American Journal of Preventive Medicine.

"Findings from this study suggest the significant role that built environment plays in either positively or negatively impacting our health and/or lifestyle," notes study lead Fuzhong Li, Ph.D. "34% of U.S. adults aged 20 and over are obese. Part of the rise in this disease may be attributed to our surroundings -- for example, increased accessibility to unhealthy foods. The built environment is also creating barriers for our ability to exercise: many neighborhood areas lack parks and other recreational facilities and suburbs are often designed to discourage neighborhood walking. Simply focusing on encouraging people to change their lifestyles – to eat better and to get more exercise -- is insufficient. Measures are also needed to improve features of the built environment, which are often modifiable (e.g., via changes in city zoning, development policies), to support people in making such changes." says Li.

ORI scientists studied the built environment characteristics (land-use mix, density of fast-food outlets, street connectivity, & public transit stations, and the presence of green & open spaces) of 120 neighborhoods in Portland, Oregon. Over 1200 residents of the neighborhoods provided the researchers information on their age, gender, education, race/ethnicity, household income, alcohol & tobacco use, general health status, Body Mass Index (BMI), and eating habits. The residents' levels of physical activity were also measured, including neighborhood walking, walking for transportation (to catch a bus), walking for household errands, and moderate or vigorous exercise. All participants were between the ages of 50 and 75.

The results showed significant associations among built-environment factors and the prevalence of overweight/obesity and various forms of physical activity in middle-aged and older adults. These findings suggest the need for public health and city planning officials to consider how modifiable neighborhood-level, built-environment characteristics can create more livable residential communities and promote active, healthy lifestyles.

Adapted from materials provided by Oregon Research Institute, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2008/08/080811200345.htm

Overweight Hispanic Children At Significant Risk For Pre-diabetes, According To New Study

ScienceDaily (Aug. 13, 2008) — A study by researchers at the University of Southern California (USC) found that overweight Hispanic children are at significant risk for pre-diabetes, a condition marked by higher than normal blood glucose levels that are not yet high enough for a diagnosis of diabetes.

The persistence of pre-diabetes during growth is associated with progression in risk towards future diabetes, according to the study, which will be published in an upcoming issue of the journal Diabetes, and is now available online.

With a population of more than 35 million, Hispanics are the largest and fastest growing minority group in the United States. Despite the fact that Hispanics are at high risk for developing type 2 diabetes, few previous studies have looked at physiological causes of the disease within this population.

Researchers led by Michael I. Goran, Ph.D., professor of preventive medicine, physiology and biophysics and pediatrics, and director of the USC Childhood Obesity Research Center at the Keck School of Medicine of USC, followed a cohort of 128 overweight Hispanic children in East Los Angeles. The children were tested over four consecutive years for glucose tolerance, body mass index, total body fat and lean mass and other risk factors for type 2 diabetes. The study found that an alarming 13% of the children had what the investigators termed "persistent pre-diabetes."

Most prior studies examining pre-diabetes in overweight and obese children looked at a one-time assessment of metabolic risk factors for type 2 diabetes, but fluctuations over time led to poor reliability for these tests. In the new study, Goran and colleagues examined longitudinal data to look at a progression of risk factors over four years. Children were identified as having persistent pre-diabetes if they had three to four positive tests over four annual visits.

The children who had persistent pre-diabetes had signs of compromised beta-cell function, meaning that their bodies were unable to fully compensate to maintain blood glucose at an appropriate level, and they had increasing accumulation of visceral fat or deposition of fat around the organs. Both of these outcomes point towards progression in risk towards type 2 diabetes.

"What this study shows is that doctors should be doing regular monitoring of these children over time, because a one-time checkup might not be enough to tell if they are at risk for developing diabetes," Goran says.

Visceral fat, which pads the spaces between abdominal organs, has been linked to metabolic disturbances and increased risk for cardiovascular disease and type 2 diabetes.

Increased obesity has been identified as a major determinant of insulin resistance. Lower beta-cell function is a key component in the development of type 2 diabetes, as the cells are unable to produce enough insulin to adequately compensate for the insulin resistance.

"To better treat at-risk children we need better ways to monitor beta-cell function and visceral fat buildup," Goran says. "Those are tough to measure but are probably the main factors determining who will get type 2 diabetes."

Future studies will examine different interventions, including improving beta-cell function and reducing visceral fat.

"The study provides great insight into the risk factors that lead to the progression towards type 2 diabetes in this population," says Francine Kaufman, professor of pediatrics at the Keck School of Medicine at

USC and head of the division of endocrinology and metabolism at Childrens Hospital Los Angeles, who was not directly involved in the study. "Only by understanding how this devastating disease develops will be able to begin taking steps to prevent it."

The study was supported by the National Institutes of Health and the General Clinical Research Center, National Center for Research Resources.

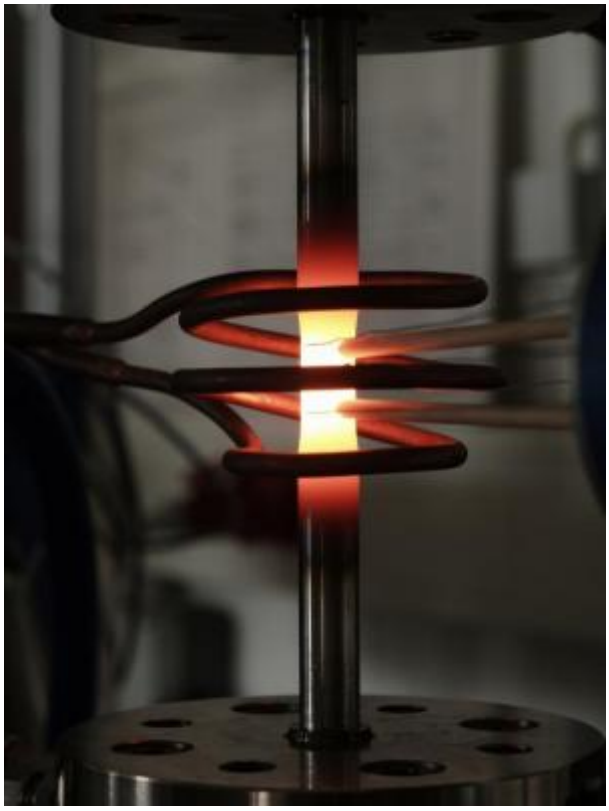
Journal reference:

1. Goran et al. **Persistence of Pre-Diabetes in Overweight and Obese Hispanic Children: Association With Progressive Insulin Resistance, Poor Beta-cell Function and Increasing Visceral Fat**. *Diabetes*, 2008; DOI: 10.2337/db08-0445

Adapted from materials provided by University of Southern California.

http://www.sciencedaily.com/releases/2008/08/080812135656.htm

Computer Simulates Thermal Stress



A high-temperature material being tested in the laboratory. It has to withstand temperatures of up to 1000°C. (Credit: Copyright Fraunhofer IWM)

ScienceDaily (Aug. 13, 2008) — A new simulation method has made it possible to predict in record time when and where heavily stressed engine components are likely to fail. Car manufacturers can thereby significantly reduce the time for developing new engine components.

Exhaust fumes come hissing out of car engines at up to 1050 degrees Celsius – and that's pretty hot! It exposes the engine components to tremendous stress, for they expand heavily in the heat. On frosty days, by contrast, the material contracts. There can be no doubt about it: In the long run, such temperature fluctuations put the material under enormous pressure. The manufacturers therefore test particularly stressed components on a test rig while the vehicle is still under development.

However, these investigations cost time and money. Component prototypes have to be built and modified in a time-consuming trial-and-error process until the manufacturer has finally produced a reliable component with no weak points. These investigations have to be repeated for each new material. For certain car manufacturers and suppliers, however, time-consuming component tests are now a thing of the past.

A new simulation method developed at the Fraunhofer Institute for Mechanics of Materials IWM in Freiburg enables companies to significantly reduce the time taken to develop exhaust manifolds. Exhaust manifolds collect the hot exhaust fumes from the engine and pass them on to the catalytic converter. They are exposed to particularly high temperatures and therefore under very great stress.

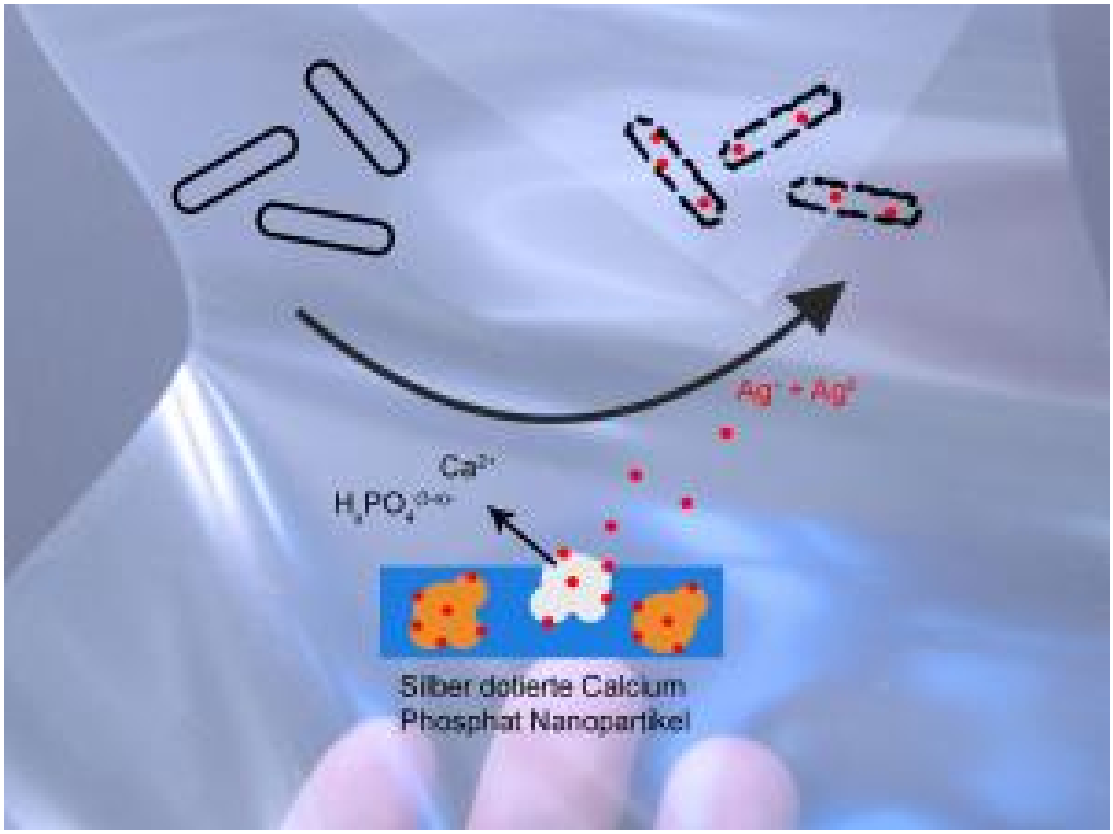
The new simulation method enables the researchers to work out the places in which a component will wear out and fail after a certain number of heating and cooling cycles. Thanks to this, the manufacturer can optimize the shape of the workpiece on the computer and greatly reduce the number of real test runs. The Freiburg scientists take a very close look at the material. Starting by testing the material in the laboratory, they heat, squeeze and pull the metal, repeatedly checking under the microscope when and where tiny cracks begin to form. The researchers then feed these insights into their simulation software.

From now on, car manufacturers can use it to calculate how the material will behave and when it will fail, for each new component shape. “It goes without saying that our simulation models can also be applied to all kinds of materials and used in other sectors of industry,” says IWM project manager Dr. Thomas Seifert. At present, Seifert and his colleagues are engaged in a joint project with RWE Power and Thyssen-Krupp to investigate heat-resistant nickel alloys for a new generation of power stations. These will be built to operate at particularly high temperatures and achieve a higher degree of efficiency than today’s facilities.

Adapted from materials provided by Fraunhofer-Gesellschaft.

http://www.sciencedaily.com/releases/2008/08/080811095502.htm

Coated Film As A Bacteria Killer



The diagram shows the self-disinfecting action of the silver and calcium phosphate nanoparticles applied to the plastic film. (Credit: Image courtesy of Swiss Federal Institute Of Technology)

ScienceDaily (Aug. 13, 2008) — A nanoproduct made from silver and calcium phosphate and developed by ETH Zurich researchers is lethal to bacteria. Its special feature is that the bacteria themselves invoke and dispense this disinfectant effect.

The fact that silver is an antiseptic and thus a disinfectant has been known for about 3000 years. This is why well-to-do households used silver cutlery, which has an antibacterial effect, while poorer people put silver coins in their milk jugs.

Silver was used medicinally for around two hundred years before it was replaced by antibiotics, and, for a long time, practically its only remaining use was in alternative medicine. The noble metal has undergone a kind of renaissance in medicine since the start of the nanotechnology era. Medical instruments, artificial limbs, hospital furniture or even hospital linen are lined, sheathed or fortified with it.

Nutrient substrate activates the mechanism

However, until now it has been impossible to use the noble metal in a specific, controlled amount. The research group led by Wendelin Stark, Assistant Professor at the Institute for Chemical and Bioengineering of ETH Zurich, has now developed a plastics film coated with silver and calcium phosphate that fulfils these conditions and, in addition, is self-disinfecting.

For example, the combination of the two substances has an effect on the bacterium Escherichia coli that is up to 1000 times more lethal than conventional silicon-based silver preparations. One decisive factor appears to be that the bacteria use the calcium substrate for their metabolism. The calcium phosphate particles, 20 to 50 nanometres in size, are absorbed by the micro-organisms as food and are thereby disintegrated. This releases thousands of tiny silver particles measuring 1 to 2 nanometres which the researchers had coated onto the calcium nutrient.

According to current knowledge, silver nanoparticles have multiple effects on bacteria: they suppress the cell's nutrient transport, attack the cell membrane and interfere with cell division and thus with the reproduction of the germs. Experiments with the carrier substances calcium phosphate and silicon dioxide, each coated with silver, showed different effects on various bacterial strains in the test.

The calcium phosphate substrate had an efficiency factor of up to 1000 times stronger than silicon dioxide. Within 24 hours, less than one bacterium out of 100,000 to 1,000,000 bacteria survived. However, according to the researchers, since the consumption of the organic calcium phosphate also nourishes the bacteria – without the effect of the silver, they would multiply thousand-fold in 24 hours – the silver must fight not only the bacteria that already exist but also those that would newly form. Wendelin Stark says, "This makes the effect even more astonishing."

Reducing the risk of infection

The new product has enabled Stark's group to successfully develop a preparation that is effective against a series of pathogenic bacteria and which becomes active in a targeted manner and in the correct dose only if a bacterium is present. The silver adhering to the calcium phosphate is only released in a quantity corresponding to the amount of calcium phosphate consumed by the bacterium. This saves costs, is efficient and is less stressful for the human body. The product is already being manufactured by the Perlen Converting AG Company in Perlen near Lucerne, which was involved in the development.

This involves coating a film with nanoparticles of silver and calcium phosphate. The film can be used in hospitals, for example, hotspots for germ transmission. Door handles, beds or sanitary equipment onto which the self-disinfecting film is stuck could protect patients from dreaded and dangerous hospital pathogens that can lead to complications, for example after surgical operations. It must be renewed from time to time because the bacteria consume and use up the calcium, so the film is not effective indefinitely.

Journal reference:

1. Loher S, Schneider OD, Maienfisch T, Borkony S, Stark WJ. **Micro-organism-Triggered Release of Silver Nanoparticles from Biodegradable Oxide Carriers Allows Preparation of Self-Sterilizing Polymer Surfaces**. *Small*, 2008; 4 (6), 824-832 DOI: 10.1002/smll.200800047

Adapted from materials provided by Swiss Federal Institute Of Technology.

http://www.sciencedaily.com/releases/2008/08/080811091257.htm

Tai Chi Program Helps Prevent Falls Among Older Adults

ScienceDaily (Aug. 13, 2008) — It is not easy to translate research into practice, and a therapy that works well in the sterile research lab is not always successful in the real world. Researchers across the country are driven not only to discover new treatments but also to make sure their treatments are designed to be used successfully in a variety of community settings.

In the July issue of the American Journal of Public Health, Oregon Research Institute (ORI) senior scientist Fuzhong Li, Ph.D., describes how senior community centers in Lane County, Oregon successfully adopted an evidence-based Tai Chi program to prevent falls among older adults. Based on this success, the Oregon Department of Human Services, in partnership with 4 counties in Oregon, has now adopted the Tai Chi program as part of its efforts to disseminate evidence-based interventions to promote physical activity and reduce falls among community-living older adults.

"Our results are very important from a public health perspective," says Li. "The U.S. population is aging rapidly and falls are a leading cause of mortality and morbidity among adults age 65 and older. Falls are associated with an enormous burden to individuals, society, and to the health care system. Tai Chi, as a proven fall intervention, may have much to offer in terms of reducing the public health burden of falls and the benefits accrued for prevention."

The study was funded by the Centers for Disease Control and Prevention (CDC) to determine how well the exercise program translated into positive results when taught in community centers by lay people. There is wide recognition within public health that proven programs must be translated, implemented and adopted to have widespread effects. In previously-funded research, the Tai Chi program developed by Li and his team showed positive results in improving balance and reducing falls among the elderly.

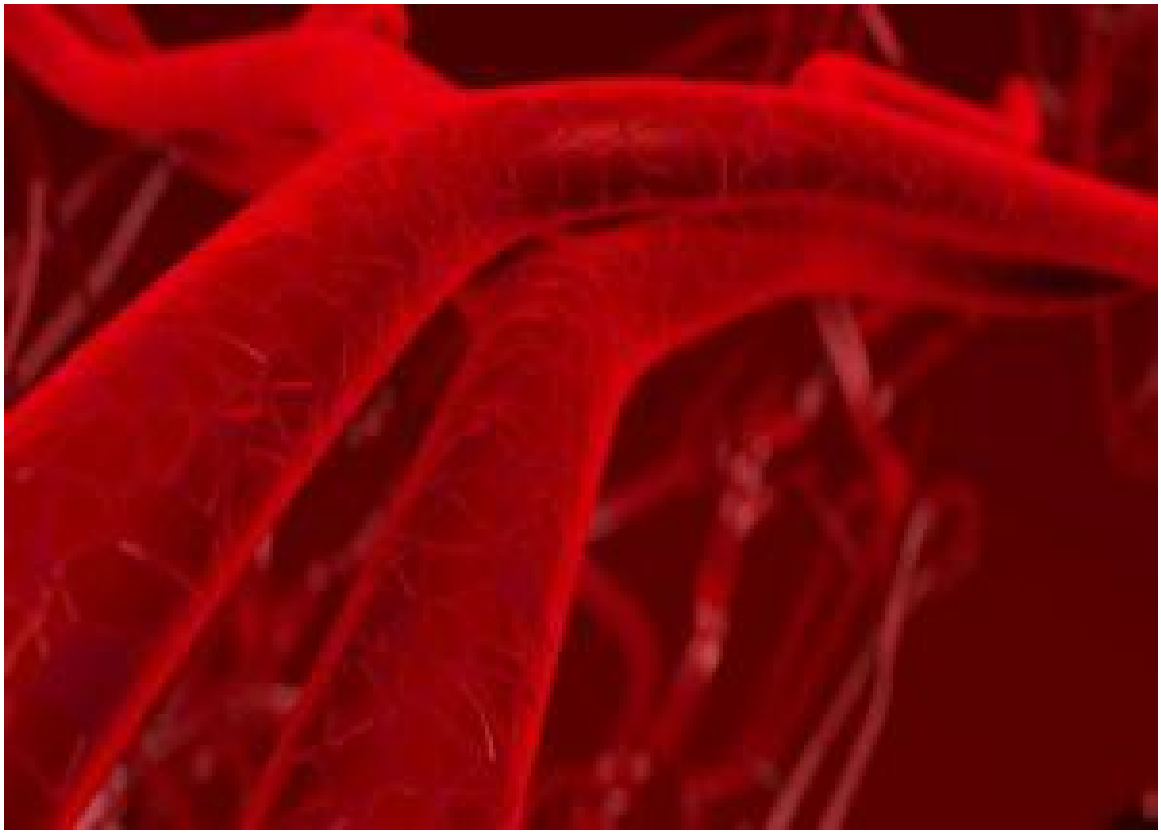
Twice-weekly 1-hour classes were held in local senior centers in for 12 weeks. Trained tai chi instructors delivered the program. Li and his team assessed several factors including how many centers adopted the program, whether teachers and staff were successful in implementing key elements of the program, and whether participants in the tai chi sessions experienced healthy benefits. Also of critical importance is whether the community center was willing to consider tai chi as part of its regular programs, and the extent to which participants continued their tai chi practice once the 12 weeks were over.

Results indicated that the all centers invited agreed to participate and all participating centers successfully implemented the program. Program participants showed significant improvements in health-related outcome measures such as balance, reduction in falls, and increased functional independence. Tai chi has been considered a low-cost exercise activity because no equipment and few facilities are needed. These results indicate that an evidence-based tai chi program can be implemented in urban and rural community settings.

Adapted from materials provided by Oregon Research Institute, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2008/08/080811200343.htm

Tiny Molecule Helps Control Blood-vessel Development



Researchers have found that the development and repair of heart tissue and blood vessels is intimately tied to a tiny piece of ribonucleic acid (RNA). (Credit: iStockphoto)

ScienceDaily (Aug. 13, 2008) — The development and repair of heart tissue and blood vessels is intimately tied to a tiny piece of ribonucleic acid (RNA) that is found nowhere else in the body, researchers at UT Southwestern Medical Center have found.

Because of its specificity to the cardiovascular system, this "microRNA" is an attractive potential target for therapeutic treatment, the researchers said.

"Manipulating this microRNA provides a completely new way of addressing cardiovascular disorders," said Dr. Eric Olson, chairman of molecular biology and senior author of a study appearing in Developmental Cell, August 12.

MicroRNAs are tiny snippets of genetic material, naturally produced by the body, that help fine-tune the production of proteins by DNA. More than 500 have already been identified.

In the current study, the researchers focused on a specific microRNA called miR-126, which was already known to be associated with blood vessels. They found that miR-126 is found only in a class of cells called endothelial cells, which line the inside surfaces of blood vessels.

Endothelial cells control the development of new blood vessels in developing embryos; the repair of injured blood vessels; and the creation of blood vessels to support developing tumors.

The researchers genetically engineered mice to lack miR-126, and found that about 40 percent of them died before or just after birth. These mice showed cardiovascular abnormalities such as fragile, leaking blood vessels.

The surviving mice, however, appeared normal and lived to adulthood. The researchers concluded that miR-126 is important in creating new vessels, but once the cardiovascular system is established, it is not needed to maintain the system.

However, the surviving mice were less able to recover from a simulated heart attack. Almost all mice lacking miR-126 died within three weeks, while 70 percent of normal mice survived for at least three weeks.

The researchers also tested the role of miR-126 in the branching of blood vessels using cut sections of mouse aortas in culture. When cultured with growth factors that stimulate branching, aortal sections from normal mice displayed branching of their endothelial cells.

Aortal sections from mice lacking miR-126, however, showed much less branching.

"MicroRNA research represents a new frontier in understanding and treating human disease. This is just a hint of what can come," said Dr. Olson, director of the Nancy B. and Jake L. Hamon Center for Basic Research in Cancer and the Nearburg Family Center for Basic Research in Pediatric Oncology.

The researchers have filed several patents related to miR-126, and plan to license it for development as a therapeutic agent through Miragen Therapeutics, a Boulder-based company co-founded by Dr. Olson, which UT Southwestern owns equity in.

Other UT Southwestern researchers involved in the study were lead author Dr. Shusheng Wang, postdoctoral researcher in molecular biology; Dr. Arin Aurora, postdoctoral researcher in molecular biology; graduate student Brett Johnson; Xiaoxia Qi, research scientist in molecular biology; John McAnally, research associate in molecular biology; Dr. Joseph Hill, professor of internal medicine; Dr. James Richardson, professor of pathology; and Dr. Rhonda Bassel-Duby, professor of molecular biology.

The work was supported by the National Institutes of Health, the Donald W. Reynolds Clinical Cardiovascular Research Center, the Sandler Foundation for Asthma Research, the Welch Foundation and the American Heart Association.

Adapted from materials provided by UT Southwestern Medical Center.

http://www.sciencedaily.com/releases/2008/08/080812094524.htm

'Anti-noise' Silences Wind Turbines

The round vibration exciter (left), suspended from a crane, induces vibrations in the rectangular iron platform that are similar to those of a wind energy converter. The active damper -- located at the center of the platform -- reduces these vibrations. (Credit: Copyright Fraunhofer IWU)

ScienceDaily (Aug. 13, 2008) — If wind turbines clatter and whistle too loudly, they are only permitted to operate under partial load to protect the local residents – but this also means a lower electricity output. An active damping system cancels out the noise by producing counter-vibrations.

If wind energy converters are located anywhere near a residential area, they must never become too noisy even in high winds. Most such power units try to go easy on their neighbors' ears, but even the most careful design cannot prevent noise from arising at times: One source is the motion of the rotor blades, another is the cogwheels that produce vibrations in the gearbox. These are relayed to the tower of the wind turbine, where they are emitted across a wide area – and what the residents hear is a humming noise.

"People find these monotone sounds particularly unpleasant, rather like the whining of a mosquito," says André Illgen, a research associate at the Fraunhofer Institute for Machine Tools and Forming Technology IWU in Dresden. If the wind energy converters hum too loudly, they are only permitted to operate under partial load: They rotate at a slower speed and generate less electricity. In some cases the operators have to install additional damping systems or even replace the gearbox – an expensive business.

However, the effectiveness of the passive damping systems used until now is somewhat limited: They only absorb noise at a certain frequency. Since modern wind energy converters adapt their rotational speed to the wind velocity in order to generate as much electricity as possible, however, the frequency of the humming sound also varies. Despite noise attenuation measures, humming noises penetrate the surrounding area.

In a joint project with colleagues from Schirmer GmbH, ESM Energie- and Schwingungstechnik Mitsch GmbH and the Dr. Ziegler engineering office, IWU researchers have developed an active damping system for wind turbines. The project is being funded by the Deutsche Bundesstiftung Umwelt.

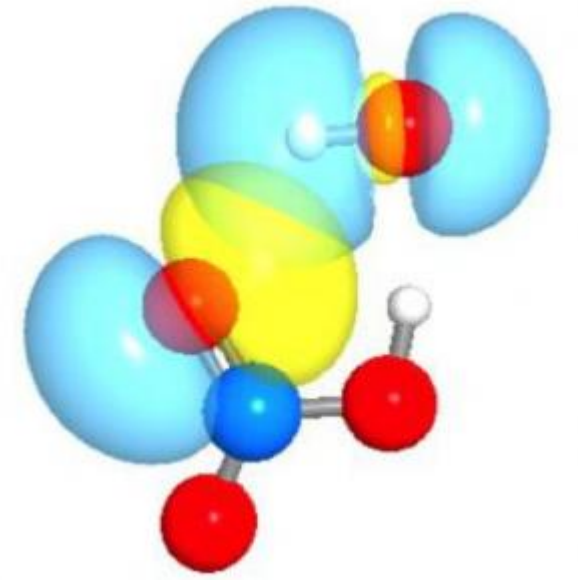
"These systems react autonomously to any change in frequency and damp the noise – regardless of how fast the wind generator is turning," says Illgen. The key components of this system are piezo actuators. These devices convert electric current into mechanical motion and generate "negative vibrations", or a kind of anti-noise that precisely counteracts the vibrations of the wind turbine and cancels them out. The piezo actuators are mounted on the gearbox bearings that connect the gearbox to the pylon.

But how do these piezo actuators adjust themselves to the respective noise frequencies? "We have integrated sensors into the system. They constantly measure the vibrations arising in the gearbox, and pass on the results to the actuator control system," says Illgen. The researchers have already developed a working model of the active vibration dampers, and their next step will be to perform field trials.

Adapted from materials provided by Fraunhofer-Gesellschaft.

http://www.sciencedaily.com/releases/2008/08/080811095500.htm

Strange Molecule In The Sky Cleans Acid Rain, Scientists Discover



Scientists at Purdue and Pennsylvania universities have discovered an atmospheric molecule that is essential to the breakdown of pollutants in the atmosphere. The molecule, which had not been seen before, is unusual because it has two hydrogen bonds. This image shows the structure of the molecule, with the blue ball being a nitrogen atom, red representing hydrogen atoms, white representing oxygen atoms, and the yellow clouds showing the location of the double hydrogen bonds. (Credit: Purdue News Service image/Joseph Francisco)

ScienceDaily (Aug. 13, 2008) — Researchers have discovered an unusual molecule that is essential to the atmosphere's ability to break down pollutants, especially the compounds that cause acid rain.

It's the unusual chemistry facilitated by this molecule, however, that will attract the most attention from scientists.

Marsha Lester, the University of Pennsylvania's Edmund J. Kahn Distinguished Professor, and Joseph Francisco, William E. Moore Distinguished Professor of Chemistry at Purdue University, found the molecule, which had puzzled and eluded scientists for more than 40 years.

A technical paper describing the molecule is published this week in a special edition of the Proceedings of the National Academy of Science. Somewhat like a human body metabolizing food, the Earth's atmosphere has the ability to "burn," or oxidize pollutants, especially nitric oxides emitted from sources such as factories and automobiles. What doesn't get oxidized in the atmosphere falls back to Earth in the form of acid rain.

"The chemical details of how the atmosphere removes nitric acid have not been clear," Francisco says. "This gives us important insights into this process. Without that knowledge we really can't understand the conditions under which nitric acid is removed from the atmosphere."

Francisco says the discovery will allow scientists to better model how pollutants react in the atmosphere and to predict potential outcomes. "This becomes important in emerging industrial nations such as China, India and Brazil where there are automobiles and factories that are unregulated," Francisco says. "This chemistry will give us insight into the extent that acid rain will be a future concern."

Lester says the molecule had been theorized by atmospheric chemists for 40 years and that she and Francisco had pursued it for the past several years.

"We've speculated about this unusual atmospheric species for many years, and then to actually see it and learn about its properties was very exciting," she says.

What makes the molecule so unusual is its two hydrogen bonds, which are similar to those found in water.

Chemists know that although water is one of the most common substances found on the planet, it has unusual properties. For example, the solid form - ice - is lighter than the liquid form and floats. Water also boils at a much higher temperature than would be expected from its chemical structure.

The cause of these strange behaviors are weak hydrogen bonds that hold water molecules together.

The new atmospheric molecule has two hydrogen bonds, which allows it to form a six-sided ring structure. Hydrogen bonds are usually weaker than the normal bonds between atoms in a molecule, which are known as covalent bonds. In fact, covalent bonds are 20 times stronger than hydrogen bonds. But in this case, these two hydrogen bonds are strong enough to affect atmospheric chemistry, Francisco says.

Lester says the new molecule exhibits its own unusual properties.

"The reaction involving this molecule proceeds faster as you go to lower temperatures, which is the opposite of most chemical reactions," she says. "The rate of reaction also changes depending on the atmospheric pressure, and most reactions don't depend on external pressure. The molecule also exhibits unusual quantum properties."

Lester says the unusual properties prevented scientists from being able to model the reaction for so long.

"This is not how we explain chemistry to high school students," she says.

Francisco says that this discovery will be used in areas other than atmospheric chemistry.

"Here's a situation where we were studying this purely environmental problem, but, because the findings are so fundamental, it may have broader ramifications to biological systems that depend on hydrogen bonds," he says.

The breakthrough was enabled by laser-based laboratory techniques at the University of Pennsylvania and the supercomputing resources available at Purdue, Francisco says. The computation was done on an SGI Altix supercomputer operated by the Office of Information Technology at Purdue.

"The key is knowing where to look and how to identify new chemical entities, and with the computing resources we have at Purdue we can help identify processes to within experimental uncertainty," he says. "We couldn't have done this without the supercomputing power that we have available."

Journal reference:

1. O'Donnell et al. **Special Feature: Spectroscopic identification and stability of the intermediate in the OH HONO2 reaction**. *Proceedings of the National Academy of Sciences*, 2008; DOI: 10.1073/pnas.0800320105

Adapted from materials provided by Purdue University.

http://www.sciencedaily.com/releases/2008/08/080812213935.htm

Clumsy young 'face obesity risk'

Clumsy and poorly co-ordinated children could be at higher risk of obesity in later life, a study says.

Researchers found youngsters who performed least well in tests assessing cognitive and physical function were far more likely to be obese aged 33.

Experts suggested it was likely such children shied away from sport.

The research, published online by the British Medical Journal, was based on tests involving more than 11,000 people.

They formed part of the on-going National Child Development Study in Great Britain, which began in 1958.

> **All children, regardless of their natural abilities, should be given adequate encouragement and support to be physically active at school and at home**
> Dr Ian Campbell, of Weight Concern

Teachers and medical officers assessed pupils when they were aged seven and 11 for their ability in hand control, coordination, and clumsiness.

Tests included copying a simple design to measure accuracy, marking squares on a paper within a minute, and the time in seconds it took to pick up 20 matches.

When the participants were aged 33, their body mass index (a measure of body fat based on height and weight) was recorded and analysis showed poorer function was associated with obesity.

In the case of seven-year-olds, poor co-ordination meant the risk of obesity was twice as high, the research by a joint team from Imperial College London and Sweden's Orebro University Hospital found.

Sport

The reseachers did not look at what was causing the link between obesity and clumsiness, but other experts predicted it could be related to the amount of sport youngsters went on to play.

Dr Ian Campbell, medical director at Weight Concern, said poorly co-ordinated children may be less active, but added obesity was a complex problem and there were likely to be other underlying causes.

"While this helps us understand the root causes, it doesn't change the fundamental problem that we are, as a nation, less active than we should be.

"All children, regardless of their natural abilities, should be given adequate encouragement and support to be physically active at school and at home."

And Cambridge University obesity expert Dr Nick Finer said: "This research adds to other work that tells us that most people don't become obese just because they want to, and that many of the causes are subtle and complex."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/7557028.stm

Published: 2008/08/12 23:36:33 GMT

Why real and imagined disgust have the same effect

- 00:01 13 August 2008
- NewScientist.com news service
- Helen Thomson

Warning: this story contains a paragraph of disgusting text.

How can reading a good book or watching a film be almost as emotional an experience as events in your own life? The answer may be that you use the same brain region to make sense of them all.Previous studies indicated that the same brain regions – the anterior insula and adjacent frontal operculum, known collectively as the IFO – are activated both when we observe someone experiencing an emotion such as disgust, delight or pain, and when we experience it ourselves. It is thought that this allows us to empathise with others and understand their intentions. But is the IFO also active when we imagine an emotion, such as when we read about it in a book?

Yuk yuk yuk

To answer this question, Mbemba Jabbi and colleagues at the University of Groningen in the Netherlands, focused just on disgust – an easy emotion to evoke. "You can't just tell someone to get into a scanner and be 'happy' for 30 seconds," says co-researcher Christian Keysers. "But it's relatively easy to make someone disgusted."They placed quinine – which has a bitter, "disgusting" taste - onto the tongues of 12 volunteers while they lay in an MRI scanner. The volunteers also watched a video of someone acting disgusted and read a story describing a disgusting situation:

*You turn around because someone is leaning on your shoulder, suddenly looking into the open mouth of a drunken beggar… you see his rotten teeth, surrounded by pustulant sores, while he suddenly releases the reeking content of his stomach all over you… You feel your stomach turn over as you suddenly feel the acidic taste of a clump of his vomit on your lips.*The researchers found that the IFO was activated in all three tasks. They say this similarity between first-hand experience and imagination could help to explain why books can be so vivid and compelling.

Understanding others

"There is a partial overlap – if you taste something disgusting, see something disgusting or imagine a disgusting scenario there's a common pathway," says Keysers. "This is why books and movies work - because they stimulate the area of the brain which is involved in what it really feels like to be disgusted."

The team suspects that reading about delight or pain also activates similar converging networks in the brain.

The next step will be to study IFO activation in autism. It is generally assumed that autistic people can't identify the emotions of others, but clinical studies alternatively suggest that perhaps they feel others' emotions too well, to the point that they are overwhelmed. "These experiments can help tease these options apart," says Keyser. **Journal reference**: *PLoS ONE*, DOI: 10.1371/journal.pone.0002939

The Human Brain - With one hundred billion nerve cells, the complexity is mind-boggling. Learn more in our cutting edge *http://www.newscientist.com/channel/health/brain*

http://www.newscientist.com:80/channel/being-human/dn14511-why-real-and-imagined-disgust-have-the-same-effect.html?feedId=online-news_rss20

Signs Of Alzheimer's Disease May Be Present Decades Before Diagnosis

ScienceDaily (Aug. 13, 2008) — Scientists from the University of South Florida and the University of Kentucky report that people who develop Alzheimer's disease may show signs of the neurodegenerative illness many decades earlier in life — including compromised educational achievement.

Participants in the Nun Study were studied to identify those who became demented before death or had characteristic brain changes of Alzheimer's disease at autopsy. Among nuns who became demented or had evidence of Alzheimer's disease at autopsy, those with small head sizes had significantly lower educational achievement in earlier adult life. In those dying without a dementia diagnosis or autopsy evidence of Alzheimer's disease, head size had no relationship with education.

Adult head size can be used to estimate the size of the fully-developed brain. Previous studies have found that clinical expression of Alzheimer's disease is related to head size, with people having smaller heads more likely to show the characteristic symptoms of this illness. Larger brains provide reserve against Alzheimer's, allowing people to function normally despite having considerable Alzheimer pathology in their brains.

"If brain damage related to Alzheimer's disease begins earlier in adult life, then having less reserve due to a smaller brain could compromise intellectual ability in those destined to get Alzheimer's and lead to them getting less education," said lead author James Mortimer, PhD, professor of epidemiology at USF.

"Although it has been known for many years that individuals with lower education have a greater risk of getting Alzheimer's, this is the first report showing that reduced educational attainment may actually be an early sign of the underlying disease."

The study findings add to others showing that individuals who will eventually develop Alzheimer's differ from those who don't many decades before. In 1996, the Nun Study found that Alzheimer's disease with onset in old age could be predicted accurately from characteristics of autobiographical essays written at an average age of 22. Other studies have shown that those who develop Alzheimer's have specific deficits on tests of memory and thinking decades before the disease is diagnosed. The fact that subtle signs of Alzheimer's appear many years before symptoms appear may be useful for predicting who is at risk of the illness and identifying individuals earlier in life who could benefit from preventive therapies.

The Nun Study, begun in 1992, is a study of 678 Catholic sisters, initially 75 to 102 years of age, who were evaluated annually for dementia and who agreed to brain donation at the time of their deaths. The study is sponsored by the National Institute on Aging.

This research is published online this month in the journal Alzheimer's Disease and Associated Disorders.

Adapted from materials provided by University of South Florida Health.

http://www.sciencedaily.com:80/releases/2008/08/080811200341.htm

Parents Shape Whether Their Children Learn To Eat Fruits And Vegetables

ScienceDaily (Aug. 13, 2008) — Providing fruits for snacks and serving vegetables at dinner can shape a preschooler's eating patterns for his or her lifetime.

To combat the increasing problem of childhood obesity, researchers are studying how to get preschoolers to eat more fruits and vegetables. According to researchers at Washington University in St. Louis, one way is early home interventions — teaching parents how to create an environment where children reach for a banana instead of potato chips.

"We know that parents have tremendous influence over how many fruits and vegetables their children eat," says Debra Haire-Joshu, Ph.D., a professor at the George Warren Brown School of Social Work. "When parents eat more fruits and vegetables, so do their children. When parents eat and give their children high fat snacks or soft drinks, children learn these eating patterns instead."

Haire-Joshu and researchers at Saint Louis University School of Public Health tested a program that taught parents in their homes how to provide preschool children easy access to more fruits and vegetables and examined whether changes in what the parents ate affected what their children consumed. The study was published in the July issue of the journal Preventive Medicine.

"This research shows that it's important to communicate with parents in real world settings," Haire-Joshu says. "They control the food environment for their young child. This environment is key to not only what children eat today but how they will eat in the future."

Past research has shown that diets high in fruits and vegetables are associated with a lower risk of obesity. Previous studies also have established that children learn to like and eat vegetables at a young age — before they turn five years old.

In this five-year study in rural, southeast Missouri, 1,306 parents and children between the ages of two and five participating in Parents As Teachers, a national parent education program, were randomly assigned to two groups. One group enrolled in the High 5 for Kids program, and the other group received standard visits from Parents as Teachers. In the High 5 for Kids group, parents first completed a pretest interview about fruit and vegetable consumption.

Parent educators then visited the home four times, providing examples of parent-child activities designed around nutrition, such as teaching the child the names and colors of various fruits and vegetables and having the child select a variety of fruits and vegetables for breakfast. At each visit, parents also received materials and informational handouts with suggestions for improving feeding practices and the food environment in the home. Many of these materials were tailored to the individual patterns of that parent, with suggestions for how to improve his or her specific intake and that of their child.

Additionally, children were given four High 5 for Kids sing-along-stories with audiocassettes and coloring books.

The same parent interviewed before the intervention completed a telephone survey to determine changes in the number of fruits and vegetables eaten and behaviors of both the preschool children and parent. The average time between the before and after intervention survey was seven months.

Parents in the High 5 for Kids group ate significantly more fruits and vegetables, and a change in the parent's servings of fruits and vegetables predicted a change in the child's diet, too. An increase of one fruit or vegetable serving per day in a parent was associated with an increase of half a fruit or vegetable serving per day in his or her child. These parents also reported an increase in fruit and vegetable knowledge and availability of fruits and vegetables in the home.

Although the High 5 for Kids program was effective in improving fruit and vegetable intake in children of normal weight, overweight children in this group did not eat more of these foods. "Overweight children have already been exposed to salty, sweet foods and learned to like them," says Haire-Joshu, who also holds an appointment at the School of Medicine as a professor. "To keep a child from becoming overweight, parents need to expose them early to a variety of healthy foods and offer the foods many times."

Haire-Joshu says many children today are taught patterns that lead to obesity. "We want families to provide their child with an environment in which they not only learn how to eat healthy but have the opportunity to practice what they learn," she says. "And by partnering with Parents As Teachers, we now can disseminate this program to their sites nationwide. This further impacts healthy eating patterns in parents and their preschool children."

Adapted from materials provided by Washington University in St. Louis.

http://www.sciencedaily.com/releases/2008/08/080811200425.htm

New Group Of Plant Hormones Discovered

Pea Plant. Botanists found mutants of pea that were branching without restraint. It turned out that these pea plants were not capable of producing strigolactones. When the plants were administered strigolactones, the unrestrained branching stopped. (Credit: iStockphoto/Stan Rohrer)

ScienceDaily (Aug. 13, 2008) — Scientists from the Wageningen University Laboratory of Plant Physiology and an international team of scientists have discovered a new group of plant hormones, the so-called strigolactones. This group of chemicals is known to be involved in the interaction between plants and their environment.

The scientists have now proven that strigolactones, as hormones, are also crucial for the branching of plants. The discovery will soon be published in Nature and is of great importance for innovations in agriculture. Examples include the development of cut flowers or tomato plants with more or fewer branches. These crops are of major economic and social importance worldwide.

The growth and development of plants is largely controlled by plant hormones. Plants produce these chemicals themselves, thus controlling the growth and development of roots and stems, for example. A number of plant hormones, such as auxins, giberellins and cytokinins, were discovered by scientists decades ago. Now a new group of hormones has been found: The so-called strigolactones.

Previous research by institutes including Wageningen UR has shown that strigolactones plays a major part in the interaction between plants and their environment. As plants cannot move, they commonly use their own chemicals to control the environment as best as they can.

Strigolactones are of major importance to the interaction between plants and symbiotic fungi, for example. These fungi live in a symbiotic relationship with plants, lthat is mutually beneficial. They transport minerals from the soil to the plant, while the plant gives the fungi sugars 'in return'.

Unfortunately, the strigolactones have also been "hijacked" by harmful organisms: They help seeds of parasitic plants to germinate when plant roots are in the vicinity. The seedlings of the parasite attach to the root of the plant and use the plant's nutrients for their own growth and reproduction. Unlike the symbiotic fungi, however, they do not give anything in return. On the contrary, the parasitism often causes the host plant to die, eventually.

The international research team consisting of French, Australian and Dutch scientists, coordinated in France, found mutants of pea that were branching without restraint. It turned out that these pea plants were not capable of producing strigolactones. When the plants were administered strigolactones, the unrestrained branching stopped. The same effect occurred in an entirely different plant, thale cress. The mutant plants also caused a significant lower germination of the parasitic plant seeds and induced less interaction with symbiotic fungi.

The scientists also showed that a specific 'receptor reaction' for the strigolactones occurs in plants, a phenomenon that is characteristic for plant hormones. Although some previously discovered plants with unrestrained branching turned out to be producing strigolactones themselves, their receptor connection was disturbed: Strigolactones administered from the outside could not stop the uncontrolled branching.

It has also been shown that the plants are capable of transporting strigolactones internally and that the chemicals work at very low concentrations, two other typical characteristics of plant hormones.

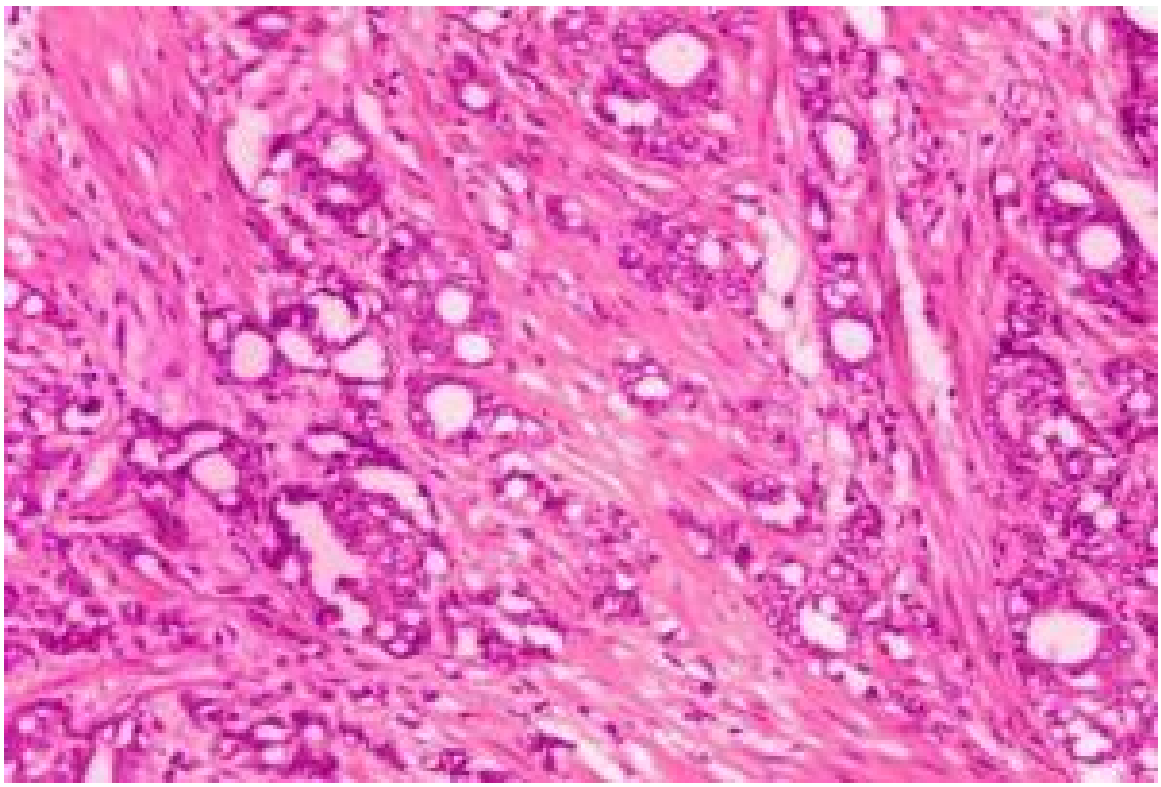
It is expected that this new knowledge will be applied in agriculture and horticulture, for example in breeding and the development of branching regulators.

Cut flower varieties and potted plants with either more or less branching may have special ornamental value, while crops with more or less branching may be beneficial in cultivation. Tomato plants in which less branching occurs can benefit the greenhouse horticulture, for instance.

Adapted from materials provided by Wageningen University and Research Centre, via AlphaGalileo.

http://www.sciencedaily.com/releases/2008/08/080812100327.htm

Survival Of The Fittest: Even Cancer Cells Follow The Laws Of Evolution



Microscopic view of cancerous prostate tissue. New research suggests that a molecular "survival of the fittest" scenario plays out in every living creature as gene mutations strive for ultimate survival through cancerous tumors. (Credit: CDC/Dr. Edwin P. Ewing, Jr.)

ScienceDaily (Aug. 12, 2008) — Scientists from The Institute of Advanced Studies at Princeton and the University of California discovered that the underlying process in tumor formation is the same as for life itself—evolution. After analyzing a half million gene mutations, the researchers found that although different gene mutations control different cancer pathways, each pathway was controlled by only one set of gene mutations.

This suggests that a molecular "survival of the fittest" scenario plays out in every living creature as gene mutations strive for ultimate survival through cancerous tumors. This finding, which appears in the August 2008 issue of The FASEB Journal, improves our understanding of how evolution shapes life in all forms, while laying a foundation for new cancer drugs and treatments.

"This study lays the groundwork for understanding the nature of different mutations in cancers," said Chen-Hsiang Yeung, first author of the study, "and helps with understanding the mechanisms of cancers and their responses to drug treatments."

To arrive at these conclusions, researchers analyzed about 500,000 cancer mutation records from the Catalog of Somatic Mutations in Cancer database and then divided the data into 45 tissue types. Within each tissue type, they calculated the frequency that multiple genes were mutated in the same sample. They identified the frequencies of mutations that were significantly higher or lower than if the genes had mutated independently. Then they mapped out how these genes ultimately lead to cancerous tumors and checked whether the genes occurring in specific tissues used the same or different cancer pathways.

"Little could Darwin have known that his 'Origin of the Species' would one day explain the 'Origin of the Tumor,'" said Gerald Weissmann, MD, Editor-in-Chief of The FASEB Journal. "This research report completely changes our understanding of the many gene mutations that cause cancer."

Journal reference:

1. Yeang et al. **Combinatorial patterns of somatic gene mutations in cancer**. *The FASEB Journal*, 2008; 22 (8): 2605 DOI: 10.1096/fj.08-108985

Adapted from materials provided by Federation of American Societies for Experimental Biology.

http://www.sciencedaily.com/releases/2008/08/080801094300.htm

For The Birds Or For Me? Why Do Conservationists Really Help Wildlife?

Purple martins rely on the volunteer efforts of conservationists, whether their motivations to help are egoistic or altruistic. (Credit: Photo courtesy University of Alberta)

ScienceDaily (Aug. 12, 2008) — Volunteers who take part in conservation efforts may do it more for themselves than the wildlife they are trying to protect, a University of Alberta case study shows.

A study of purple martin landlords—those who keep and monitor special birdhouses on their land—revealed that they were more motivated to take part in the conservation project for egoistic rather than altruistic reasons.

"Though there were areas of overlap, we found that common motivations for self-benefit included interaction with the birds, a sense of achievement, social interaction, personal stimulation and enjoyment," said Glen Hvenegaard, a co-author on the qualitative study and a professor of geography and environmental studies at the University of Alberta's Augustana campus in Canada.

The study, which compared self-motivated volunteers with recruited ones, was launched to find out what compelled people to donate their time. Understanding why they take part in conservation projects is important, says Hvenegaard. "Past research shows that people take part in wildlife activities for many reasons and so require a sophisticated level of management. Our findings reinforce that.

"Though self-satisfaction motivations were mentioned most often, people also had many unselfish reasons for taking part in conservation, including helping this vulnerable species, preserving nature for future generations and serving the community," Hvenegaard noted.

The results may help organizers of other conservation movements recruit and, more importantly, keep satisfied volunteers. "With declining budgets, most wildlife agencies are not well-equipped to manage the growing number of species at risk, so they are depending more on volunteers to help with wildlife management operations," Hvenegaard said.

This applies especially to purple martins, a member of the swallow family that is almost completely dependent on nest boxes and subsequent management provided by volunteers.

The study, which will be presented this fall at the Conference on Integrating Human Dimensions into Fisheries and Wildlife Management in Colorado, recommends that project organizers offer opportunities for social interaction through meetings, mentoring and phone lists, encourage landlords to record nesting results for their birds, and provide a broader understanding about the conservation of purple martins.

Adapted from materials provided by University of Alberta.

http://www.sciencedaily.com/releases/2008/08/080807130929.htm

Anything But Modest: The Mouse Continues To Contribute To Humankind

ScienceDaily (Aug. 12, 2008) — "Big things come in small packages," the saying goes, and it couldn't be more true when discussing the mouse. This little creature has become a crucial part of human history through its contributions in understanding human genetics and disease.

In a review published in Disease Models & Mechanisms (DMM), genetics researchers from Yale University School of Medicine and Fudan University School of Life Sciences discuss the history and future of mice as a model organism. They predict that the next frontiers in mouse genetics – such as creating mice expressing human genes to create "humanized" mice – will continue to provide scientists with new tools to not only decipher clinical mysteries, but also to test novel therapies and cures.

The review's authors, Duc Nguyen and Tian Xu, discuss the many ways in which scientists manipulate mouse genes in order to study their biology. One such technique that Nguyen and Xu are working on involves inserting a segment of DNA sequence into the much lengthier full genome of the mouse. These insertable DNA sequences are known as transposons. Use of transposons, as well as other genetic tools, allows scientists to disrupt a specific mouse gene and deduce the gene's function by studying the effect on the mouse. The hope is that the research community can combine the results of extensive mouse studies into a comprehensive library to form a functional map of the mouse genome. Such a map will help researchers navigate and explore the even more extensive human genome to pinpoint the genetic underpinnings of human disease.

Not only do the researchers discuss how mice help us understand disease, but they also highlight methods which enable research of novel disease therapies. For example, humanized mice – mice engineered to carry human genes – can provide new experimental systems for testing new therapeutics.

The full review can be found in the inaugural July/August issue of a new research journal, Disease Models & Mechanisms (DMM), published by The Company of Biologists, a non-profit based in Cambridge, UK.

The DMM website is located at: http://dmm.biologists.org

Journal reference:

1. Duc Nguyen, Tian Xu. **The expanding role of mouse genetics for understanding human biology and disease**. *Disease Models and Mechanisms*, 2008; 1 (1): 56 DOI: 10.1242/dmm.000232

Adapted from materials provided by The Company of Biologists, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2008/08/080807130923.htm

How Babies Understand The World Around Them And Their Place In It

ScienceDaily (Aug. 12, 2008) — New research could provide an insight into the way that babies understand the world around them and their place within it. A study led by Goldsmiths, University of London suggests that babies as young as six or seven months are able to actively respond to stimuli and understand them in relation to their own bodies.

In a series of tests, low-frequency buzzers were placed in the hands of babies. Six month old babies would respond to a buzzer being set off by pulling-back or shaking the hand which held the activated buzzer. The tests were repeated with older babies who also looked towards the stimulated hand, indicating a further developed visual awareness.

The babies' arms were then crossed to see if they were able to appreciate that their hands, and the buzzes, were not in their usual place. The older cohort was more likely than the younger group to recognise that their hands had been crossed to the other side of their body when responding to an activated buzzer. The younger group made more mistakes, showing less awareness that their limbs had moved.

The results of this study suggest that at six months babies have some comprehension of the world around them and how they can respond to it. The study indicates that a spatial awareness of the body and its physical location, particularly where the limbs are, develops over the first year of life.

While cognitive development theorists such as Jean Piaget have long argued that babies develop through exploring the world with their senses, the question of how our understanding of our own bodies develops has received little consideration until now. The study shows that an awareness of peripersonal space – the way the body relates to its close environment, the space in which it can act – undergoes some significant developments in the first year of life.

Dr Andrew Bremner from the Department of Psychology at Goldsmiths said: "Research in recent years has demonstrated that even very little babies know a lot about the outside world. This has led many to suggest that we are born with a great deal of the knowledge we need. But these new findings urge us to think differently about early development. Despite having a good grasp of what goes on in the outside world, young babies may have more difficulties in understanding how they themselves, and their bodies, fit into that world."

Journal reference:

1. Bremner et al. **Infants lost in (peripersonal) space?** *Trends in Cognitive Sciences*, 2008; 12 (8): 298 DOI: 10.1016/j.tics.2008.05.003

http://www.sciencedaily.com/releases/2008/08/080811200442.htm

New Evidence On Benefits Of Breast Feeding

Scientists have identified sugar-based proteins in human breast-milk that could help fight disease. (Credit: iStockphoto)

ScienceDaily (Aug. 12, 2008) — Researchers in Switzerland and Australia are reporting identification of proteins in human breast-milk — not present in cow's milk — that may fight disease by helping remove bacteria, viruses and other dangerous pathogen's from an infant's gastrointestinal tract.

Niclas Karlsson and colleagues point out that researchers have known for years that breast milk appears to provide a variety of health benefits, including lower rates of diarrhea, rashes, allergies, and other medical problems in comparison to babies fed with cow's milk. However, the biological reasons behind this association remain unclear.To find out, the scientists collected human and cow's milk samples and analyzed their content of milk fat. They found that fat particles in human milk are coated with particular variants of two sugar-based proteins, called MUC-1 and MUC-4.

Previous studies by others have shown that these proteins can block certain receptors in the GI tract that are the main attachment sites for E. coli, Helicobacter pylori and other disease-causing microbes, thereby preventing infection. By contrast, since cow's milk lacks these protein variants, it may not offer the same disease protection, the researchers say.

Journal reference:

1. Wilson et al. **Glycoproteomics of Milk: Differences in Sugar Epitopes on Human and Bovine Milk Fat Globule Membranes**. *Journal of Proteome Research*, 2008; 0 (0): 0 DOI: 10.1021/pr700793k

Adapted from materials provided by American Chemical Society.

http://www.sciencedaily.com/releases/2008/08/080811094951.htm

New Breastfeeding Study Shows Most Moms Quit Early

ScienceDaily (Aug. 12, 2008) — While the CDC recently reported that more moms than ever give breastfeeding a try, a new national study shows most moms do not stick with it as long as they should.

Although 77 percent of moms nationally start to breastfeed, the new Brigham Young University study found that only 36 percent of babies are breastfed through six months, well short of the federal government's goal to hit 50 percent by 2010. The American Association of Pediatricians recommends continued breastfeeding through the first year.

"Breastfeeding promotion programs encourage women to start but don't provide the support to continue," said Renata Forste, author of a new article on the topic.

Breast milk is considered healthiest for babies because it is easily digested and provides antibodies that prevent ear infections and other illnesses. Earlier work by Forste supports research highlighting the link between breastfeeding and infant survival.

Many personal characteristics, such as a mother's age and education level, influence whether a baby is breastfed. Surprisingly, the new study found that where babies live also plays a role.

"We are finding that breastfeeding rates aren't just explained by the individuals who live in these areas, there's something about the areas themselves and breastfeeding," said BYU co-author John Hoffmann.

The researchers arrived at this finding by matching moms' survey responses to state and metropolitan data on infant health. Unfortunately, breastfeeding rates are lowest in areas where babies' health is considered most at risk. In the Baltimore and Philadelphia metropolitan areas, which rank low on infant health scores, only 30 percent of babies are breastfed six months or more.

"Where the need is greatest, breastfeeding happens the least," Forste said. "It's a sad irony both in terms of health needs and the expense these families incur buying formula."

Hoffmann said the research suggests future efforts to increase breastfeeding rates could target specific communities and not just individual mothers.

Forste and Hoffmann teach and research in BYU's sociology department, where Forste serves as department chair.

Journal reference:

1. Forste et al. **Are US Mothers Meeting the Healthy People 2010 Breastfeeding Targets for Initiation, Duration, and Exclusivity? The 2003 and 2004 National Immunization Surveys**. *Journal of Human Lactation*, 2008; 24 (3): 278 DOI: 10.1177/0890334408317617

Adapted from materials provided by SAGE Publications, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2008/08/080811092454.htm

X-rays Use Diamonds As Window To Center Of The Earth

SORS Raman spectroscopy. (Credit: STFC)

ScienceDaily (Aug. 12, 2008) — Diamonds from Brazil have provided the answers to a question that Earth scientists have been trying to understand for many years: how is oceanic crust that has been subducted deep into the Earth recycled back into volcanic rocks?

A team of researchers, led by the University of Bristol, working alongside colleagues at the STFC Daresbury Laboratory, have gained a deeper insight into how the Earth recycles itself in the deep earth tectonic cycle way beyond the depths that can be accessed by drilling. The full paper on this research has been published July 31 in the scientific journal, Nature.

The Earth's oceanic crust is constantly renewed in a cycle which has been occurring for billions of years. This crust is constantly being renewed from below by magma from the Earth's mantle that has been forced up at mid-ocean ridges. This crust is eventually returned to the mantle, sinking down at subduction zones that extend deep beneath the continents. Seismic imaging suggests that the oceanic crust can be subducted to depths of almost 3000km below the Earth's surface where it can remain for billions of years, during which time the crust material develops its own unique 'flavour' in comparison with the surrounding magmas. Exactly how this happens is a question that has baffled Earth scientists for years.

The Earth's oceanic crust lies under seawater for millions of years, and over time reacts with the seawater to form carbonate minerals, such as limestone, When subducted, these carbonate minerals have the effect of lowering the melting point of the crust material compared to that of the surrounding magma. It is thought that this melt is loaded with elements that carry the crustal 'flavour'.

This team of researchers have now proven this theory by looking at diamonds from the Juina area of Brazil. As the carbonate-rich magma rises through the mantle, diamonds crystallise, trapping minute quantities of minerals in the process. They form at great depths and pressures and therefore can provide clues as to what is happening at the Earth's deep interior, down to several hundred kilometres - way beyond the depths that can be physically accessed by drilling. Diamonds from the Juina area are particularly renowned for these mineral inclusions.

At the Synchrotron Radiation Source (SRS) at the STFC Daresbury Laboratory, the team used an intense beam of x-rays to look at the conditions of formation for the mineral perovskite which occurs in these diamonds but does not occur naturally near the Earth's surface. With a focused synchrotron X-ray beam less than half the width of a human hair, they used X-ray diffraction techniques to establish the conditions at which perovskite is stable, concluding that these mineral inclusions were formed up to 700km into the Earth in the mantle transition zone.

These results, backed up by further experiments carried out at the University of Edinburgh, the University of Bayreuth in Germany, and the Advanced Light Source in the USA, enabled the research team to show that the diamonds and their perovskite inclusions had indeed crystallised from very small-degree melts in the Earth's mantle. Upon heating, oceanic crust forms carbonatite melts, super-concentrated in trace elements with the 'flavour' of the Earth's oceanic crust. Furthermore, such melts may be widespread throughout the mantle and may have been 'flavouring' the mantle rocks for a very long time.

Dr Alistair Lennie, a research scientist at STFC Daresbury Laboratory, said: "Using X-rays to find solutions to Earth science questions is an area that has been highly active on the SRS at Daresbury Laboratory for some time. We are very excited that the SRS has contributed to answering such long standing questions about the Earth in this way."

Dr. Michael Walter, Department of Earth Sciences, University of Bristol, said: "The resources available at Daresbury's SRS for high-pressure research have been crucial in helping us determine the origin of these diamonds and their inclusions."

Adapted from materials provided by Science and Technology Facilities Council.

http://www.sciencedaily.com/releases/2008/08/080812100333.htm

Risks of Cheerleading: Two-thirds Of Severe Sports Injuries To Female Students Due To Cheerleading

ScienceDaily (Aug. 12, 2008) — A new report on severe sporting injuries among high school and college athletes shows cheerleading appears to account for a larger proportion of all such injuries than previously thought.

The latest annual report from the University of North Carolina at Chapel Hill-based National Center for Catastrophic Sports Injury Research shows high school cheerleading accounted for 65.1 percent of all catastrophic sports injuries among high school females over the past 25 years.

Previously, the figure was believed to be 55 percent, but new data included in this year's survey indicates that the true number of cheerleading injuries appears to be higher.

The story is the same for college participants as well. At that level, the new data shows cheerleading accounted for 66.7 percent of all female sports catastrophic injuries, compared to past estimates of 59.4 percent.The difference is due to a new partnership between the UNC center and the National Cheer Safety Foundation, a California-based not-for-profit body created to promote safety in the sport and collect data on injuries, which provided the center with previously unreported data. The addition of new information compiled by the foundation saw the inclusion of an additional 30 injury records from high schoolers and college students. Beforehand, the number of direct catastrophic injuries in all sports totaled 112.

The center's director, Frederick O. Mueller, Ph.D., professor of exercise and sports science in UNC's College of Arts and Sciences, who has authored the report since it was first published in 1982, said catastrophic injuries to female athletes have increased over the years."A major factor in this increase has been the change in cheerleading activity, which now involves gymnastic-type stunts," Mueller said. "If these cheerleading activities are not taught by a competent coach and keep increasing in difficulty, catastrophic injuries will continue to be a part of cheerleading."

Between 1982 and 2007, there were 103 fatal, disabling or serious injuries recorded among female high school athletes, with the vast majority (67) occurring in cheerleading. No other sports registered double-figure tallies; gymnastics (9) and track (7) had the 2nd and 3rd highest totals, respectively.

Among college athletes, there have been 39 such injuries: 26 in cheerleading, followed by three in field hockey and two each in lacrosse and gymnastics.

In 2007, two catastrophic injuries to female high school cheerleaders were reported, down from 10 in the previous season, and the lowest number since 2001. However, there were three catastrophic injuries to college-level participants, up from one in 2006.

Mueller said catastrophic sporting injuries may never be totally eliminated, but collecting and constantly analyzing reliable injury data can help reduce them dramatically.

According to the report, almost 95,200 female students take part in high school cheerleading annually, along with about 2,150 males. College participation numbers are hard to find since cheerleading is not an NCAA sport. The report also notes that according to the NCAA Insurance program, 25 percent of money spent on student athlete injuries in 2005 resulted from cheerleading.

Adapted from materials provided by University of North Carolina at Chapel Hill.

http://www.sciencedaily.com/releases/2008/08/080811200423.htm

Students Build And Launch A Sensor Into Space

The high-altitude balloon carrying a radiation detector, high-resolution camera, sensors for temperature, pressure and humidity, and a GPS launches from OSU in Stillwater. (Credit: Image courtesy of Oklahoma State University)

ScienceDaily (Aug. 12, 2008) — Students from OSU's Radiation Physics Laboratory built and successfully launched a cosmic radiation detector this summer that reached the edge of outer space. Carried by a helium-filled balloon 12 inches in diameter, the detector flew for more than two hours and reached 104,000 feet in altitude.

The device recorded radiation levels at the varying altitudes – information that will be used by NASA to develop instrumentation for space flight.

"This is really amazing," said Carl Johnson, a physics graduate student who designed andconstructed the device. "Our detector actually flew to the edge of outer space and then back to ground, and the whole time it workedperfectly."

In addition to the radiation sensor, the balloon carried a high-resolution camera, sensors for temperature, pressure and humidity, and a GPS module to determine altitude and geographic position. The balloon and instrumentation launched from the Stillwater campus and landed about 10 miles away in Perry. OSU engineering graduate and undergraduate students Joe Conner, Xander Buck and Ryan Paul conducted the launch.

Funded through a NASA EPSCoR grant, this project was overseen by Drs. Eric Benton and Eduardo Yuihara of the OSU physics department and Dr. Andy Arena of OSU department of mechanical and

aerospace engineering. Art Lucas of Lucas Newman Science and Technologies also assisted on the design and development of the radiation detector.

Benton said the purpose of the grant is two-fold.

"The purpose of the grant is not only to develop instrumentation for use in space flight but also to promote student interest in science and engineering through experiments with high-altitude balloons," he said. "The best part about the project is that the detector was built from everyday materials and launched into near space from right here in our own backyard. This proves you can accomplish really amazing things with simple materials."

The detector serves as a prototype for radiation detectors that will be included in the Near Space Standard Science Platform, a program used by science students at high schools and colleges around the country conducting research on high-altitude balloons.

Adapted from materials provided by Oklahoma State University.

http://www.sciencedaily.com/releases/2008/08/080811200142.htm

Arsenic-munching bacteria found

By Jennifer Carpenter
Science reporter, BBC News

In the warm, bubbling pools of Mono Lake in California, scientists have isolated a bacterium that fuels itself on arsenic.

Combining light and arsenic, these bacteria make their food and multiply using a chemical that is toxic to most other life forms.

The researchers think using arsenic as an energy source was a process used by ancient bacteria.

Their findings are reported in the journal Science.

Ronald Oremland of the US Geological Survey explained that these bacteria are photosynthetic, using sunlight - like plants - to turn carbon dioxide into food.

What is different about them is that instead of using water in this process, they use arsenic.

The US-based researchers isolated the bacterium from the lake, which lies at the foot of the Sierra Nevada.

Colour film

"These lakes are fed by hydrothermal waters that leach out arsenic-containing minerals from the surrounding rocks," Dr Oremland told BBC News.

The researchers noticed that the bacteria had colonised small, hot pools, forming colourful "biofilms".

"We suspected that these bacteria were using arsenic to make a living, so we scraped the biofilms off the rock and studied them under laboratory conditions."

By first withholding light, then arsenic, the team showed that the bacteria required both to grow.

This the first time an organism has been found that can use arsenic to photosynthesise under anaerobic conditions, Dr Oremland believes.

He suspects that this is an ancient ability in bacteria.

"We think that bacteria were photosynthesising before oxygen was present in the atmosphere," he said.

Primordial niche

Understanding how arsenic is metabolised by bacteria could help scientists comprehend its damaging affects inside human cells.

Worldwide, 144 million people are exposed to toxic levels of arsenic in their drinking water.

It enters the body's cells by diffusion; and once inside, it disrupts how they function by binding to their machinery, inactivating it, and disrupting the way energy is transported.

Long-term exposure can lead to skin disease and kidney and bladder cancer, and it is thought to stunt the intellectual development of children.

The most arsenic-contaminated regions are in India, Pakistan, and China, where soluble arsenic in ground waters is above the World Health Organization's (WHO) suggested maximum safe level of 10 parts per billion.

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/science/nature/7558448.stm

Published: 2008/08/14 18:01:06 GMT

Legal milestone for open source

By Maggie Shiels
Technology reporter, BBC News, Silicon Valley

Advocates of open source software have hailed a court ruling protecting its use even though it is given away free.

The US federal appeals court move overturned a lower court decision involving free software used in model trains that a hobbyist put online.

The court has now said conditions of an agreement called the Artistic Licence were enforceable under copyright law.

"For non-lawgeeks, this won't seem important but this is huge," said Stanford Law Professor Larry Lessig.

"In non-technical terms, the Court has held that free licences set conditions on the use of copyrighted work. When you violate the condition, the licence disappears, meaning you're simply a copyright infringer.

"This is a very important victory."

Copyright infringement

According to details outlined in the ruling, Robert Jacobsen had written and then released code under an Artistic Licence. This meant anyone using that free code had to attribute the author, highlight the original source of the files and explain how the code had been modified.

Mr Jacobsen, who manages open source software group Java Model Railroad Interface, accused commercial software developer Matthew Katzer and his company of ignoring the terms of the Artistic Licence when they took his code and used it to develop commercial software products for trains.

An earlier court ruling did not agree with Mr Jacobsen's stance that Mr Katzer and his company had infringed his copyright and said the licence Mr Jacobsen used was "intentionally broad." Instead the court ruled he might be able to claim breach of contract.

Legal experts have said the distinction is important since under federal copyright law a plaintiff can seek statutory damages and can be more easily granted an injunction than under contract law.

But now the US appeals court "determined that the terms of the Artistic License are enforceable copyright conditions".

"Copyright holders who engage in open source licensing have the right to control the modification and distribution of copyrighted materials," Judge Jeffrey White wrote in his 15-page decision.

"Open source licensing has become a widely used method of creative collaboration that serves to advance the arts and sciences in a manner and at a pace few could have imagined just a few decades ago," Judge White said.

'Welcome change'

Mark Radcliffe of the Open Source Initiative said: "Although the reasoning is limited to the Artistic Licence and the interpretation of each open source licence will depend on the wording of its provisions, this decision is a welcome change."

The ruling has implications for the Creative Commons licence which offers ways for work to go into the public domain and still be protected. These licenses are widely used by academic organisations like MIT for distributing coursework, scientific groups, artists, movie makers and Wikipedia among others.

Creative Commons filed an amicus or friends brief on behalf of Mr Jacobsen. Its general counsel Diane Peters told BBC News "The federal court recognised that even though licensors give up some rights it doesn't mean they have any less rights to access the remedies our law provides.

"This opinion demonstrates a strong understanding of a basic economic principle of the internet; that even though money doesn't change hands, attribution is a valuable economic right in the information economy."

If the case had gone the other way it would have been a real blow to the open source movement, according to Jeff Neuberger a partner at Proskauer Rose LLP.

He told the Wall Street Journal: "Lots of companies rely on open source, and if they had lost their ability to enforce their rights they would have shied away from the software."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/technology/7561943.stm

Published: 2008/08/14 22:45:31 GMT

Call to end animal pain-research

Using animals to research pain has "limited value" and should be replaced by newer technologies, argues a panel of medical experts from across England.

Animal tests can only simulate some aspects of chronic pain and are too simplistic, their report says.

With newer brain-imaging techniques, more studies could be done in humans, they write in the journal Neuroimage.

Ministers said at present "licensed animal use remains essential to develop improved healthcare technologies".

There are few effective and safe treatments for chronic pain, such as that suffered by people with osteoarthritis and fibromyalgia, the researchers from London, Manchester, Liverpool and Oxford say.

> **It is critical that these often simplistic experiments are replaced with more advanced techniques that don't involve inflicting animal suffering**
> Dr Gill Langley, Dr Hadwen Trust

Animal experiments are commonly used in pain research, both under anaesthesia and with conscious animals.

However, as well as raising ethical questions, they are not an accurate mimic of the processes of human pain, the experts concluded.

At a workshop organised by charities and organisations funding or promoting alternatives to animal experiments, such as the RSPCA and UK Human Tissues Bank, the experts said modern, powerful brain imaging had the potential to change how some experiments were done.

It means healthy volunteers and patients suffering from pain could take part in studies where researchers can monitor the effects of pain and pain relief in the brain using MRI or other scans.

Other research in the laboratory using human cells and tissues could support the work done in humans, they said.

'Not representative'

One of the authors of the report, Professor Qasim Aziz, from the Barts and the London School of Medicine and Dentistry, uses imaging to study how the brain interprets pain signals in patients suffering from disorders such as irritable bowel syndrome and unexplained chest pain.

"In my research, animal models don't represent human patients sufficiently well," he said.

"And that's a problem that extends across pain research as a whole.

"New and highly sophisticated brain-imaging technology is providing vital insights that animal research has failed to produce.

"I would like to see far greater uptake of these and other human-relevant approaches to pain research."

However, he added that there were instances where animal research was needed, such as in drug dose experiments.

Dr Gill Langley, of the Dr Hadwen Trust, a medical research charity set up to promote non-animal research techniques, also helped to write the report.

She said: "It is critical that these often simplistic experiments are replaced with more advanced techniques that don't involve inflicting animal suffering."

Home Office Minister Meg Hillier said under the terms of the Animals (Scientific Procedures) Act 1986, the use of animals for experimental and other scientific purposes can be authorised only when it is the only option and can be shown to be justified.

"Advances with non-animal test methods continue to be made, but at present licensed animal use remains essential to develop improved healthcare technologies."

Alan Silman, medical director of the Arthritis Research Campaign, agreed that animals were not good models of pain in humans.

"We lack really effective ways of studying pain which is why perhaps there has been no real advance in understanding why people with arthritis get pain."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/7561061.stm

Published: 2008/08/14 23:39:31 GMT

Ear infections 'link' to obesity

A history of severe ear infections or tonsil trouble may increase the chances of being obese later in life, according to scientists.

About a third of children get recurrent otitis media and research presented at a US conference suggests a link.

Infections may affect food choices by damaging nerves involved in taste, the researchers said.

However, a number of UK experts raised doubts about the findings, with one saying a link was "extremely unlikely".

Five separate studies aired at the American Psychological Association's conference hinted at an association between either ear infection or tonsil removal surgery and obesity.

The potential link as reported leaves us somewhat agog
Tam Fry
National Obesity Forum

In the first, more than 6,000 adults were quizzed about their history of ear infections and the results suggested that those with a moderate to severe history were 62% more likely to be obese.

Dr Linda Bartoshuk, who led the study at the University of Florida College of Dentistry, said that the finding was of "considerable" public health interest.

Another research project found that women who had impaired taste functioning were more likely to prefer sweet and high fat foods and more likely to be overweight.

The study authors suggested that nerve damage caused by severe infections could be to blame for this.

Dr Kathleen Daly, from the University of Minnesota Twin-Cities, presented research which suggested that babies treated with grommets for recurrent ear infections were likely to increase in terms of "body mass index" (BMI).

She said: "Obesity has doubled over the past 20 years among pre-school children.

"The more data we collect on what contributes to this major public health problem, the greater likelihood that we can help prevent it."

Having tonsils removed can be a sign of recurrent infection problems in the ear, nose and throat, and a survey of almost 14,000 people found that those who had had tonsils removed were 40% more likely to be overweight as adults.

'Other explanations'

However, UK experts raised doubts about the strength of the findings.

Paediatric ear, nose and throat surgeon Ray Clarke, from Alder Hey Children's Hospital in Liverpool, said it was well known that severe ear infections, and operations, could affect taste.

However, he said there was no other evidence that this could play a role in developing obesity.

He said: "There may well be some other common factor in obesity.

"In terms of tonsillectomies, these are frequently given to children with breathing problems such as sleep apnoea, which is certainly linked to being overweight in adults, and may be linked to weight in children."

Tam Fry, from the National Obesity Forum, said: "The potential link as reported leaves us somewhat agog.

"It is possible for there to be a link between otitis externa - a different form of ear infection - and obesity, because of the connection between obesity and type II diabetes, which can contribute to this condition."

Professor Mark Haggard, from the charity Deafness Research UK, said while there was a small chance that there might be an underlying genetic predisposition to both severe ear infections and obesity, the associations found here should not be overplayed.

"A connection is not impossible, but to be frank, is extremely unlikely," he said.

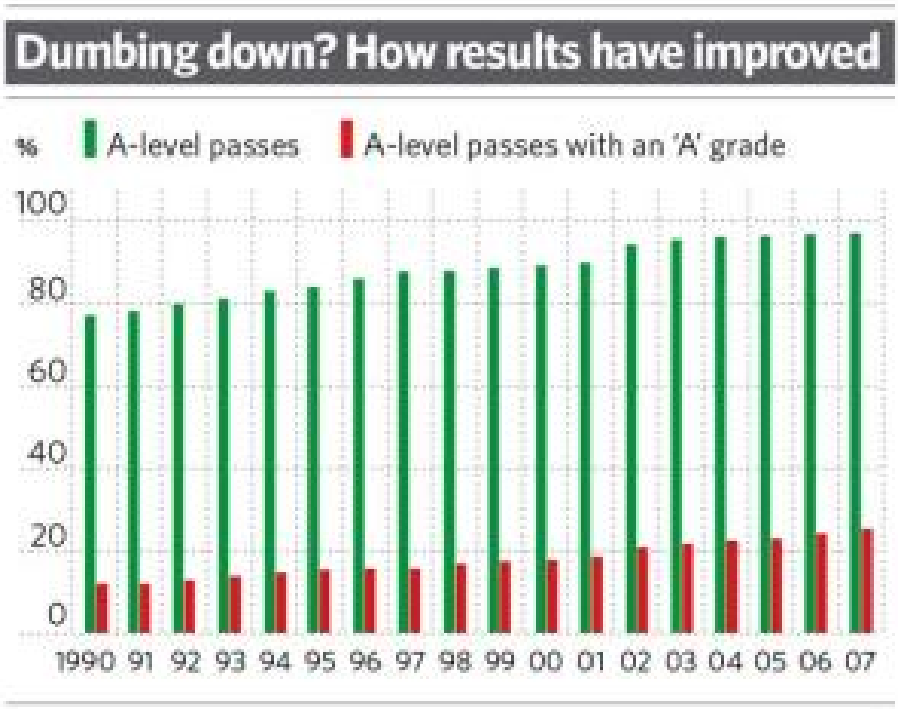
Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/7561293.stm

Published: 2008/08/14 23:35:32 GMT

Universities: the grade 'A' problem

One in 10 pupils achieves straight 'A's in exams

By Richard Garner, Education Editor
Thursday, 14 August 2008



At least one in 10 teenagers will get three straight A-grade passes today, as more pupils than ever before receive top grades in their A-levels. More than one in four scripts are expected to be awarded an A grade with less than three per cent of scripts set to be marked as a fail.

The rise in top grades is almost entirely down to improved performance by the country's independent schools and state grammar schools. The figures highlight the growing dilemma facing university admissions staff as they attempt to select the brightest candidates for popular courses amidst claims of growing grade inflation following 26 consecutive years of rises in the A-level pass rate.

Some admissions officers are now calling on more schools to adopt the International Baccalaureate which, they argue, makes it easier to differentiate between the brightest pupils. This year, *The Independent* has established, about 12,000 teenagers who will receive three A-grade passes at A-level have been turned down for places at Oxford and Cambridge universities.

University application figures show that 13,384 people applied to Oxford this year for about 3,000 places. Once overseas applicants have been taken out of the equation that leaves about 5,000 A-level candidates due to get three A-grade passes being refused admission.

At Cambridge, the university receives 14,000 applications – with just over 3,000 from overseas students – competing for 3,400 places. Dr Geoff Parks, head of admissions at Cambridge, said the vast majority of those applying from the UK would be expected to get three straight A-grades – which means about 7,000 in that position have been rejected.

Exam boards are today expected to announce a further rise in the percentage of scripts being awarded an A-grade pass – pushing it up from 25.3 per cent last year to about 26 per cent. A slight rise in the overall pass rate is expected, which would put it up to 97 per cent for the first time ever. In all, about 25,000 candidates out of an estimated 250,000 taking the exam, are expected to get three A-grade passes.

In an interview with *The Independent*, the Higher Education minister, Bill Rammell, said it would be "a record year" with more people going to university than ever before – and applications from candidates from disadvantaged areas rising as well. The figures emerge as a survey of university admissions officers published today reveals that six out of 10 believe A-levels in their current form do not encourage creativity.

Only half believe they encourage independent thought. The majority would like to see an expansion of the International Baccalaureate which – they believe – offers evidence of a much broader-based education and stretches students' creative skills. One admissions tutor told ACS International Schools, which conducted the survey: "A-levels need to recover creative thinking elements and skills needed for university study."

However, Mr Rammell said: "I think anybody who articulates the view that A-levels are worthless is flying in the face of reality – it is still an internationally reputable qualification – and is delivering a slap in the face to all students who have worked so hard."

A new A* grade will be introduced for candidates who start their A-levels next month with tougher essay-style questions designed to stretch thinking skills.

http://www.independent.co.uk:80/news/education/education-news/universities-the-grade-a-problem-894506.html

Snooze Button For Body's Circadian Clock

A new study uncovers how the switch to our internal body's clock can go haywire, identifying one potential cause of heritable sleep disorders. (Credit: iStockphoto/Phil Date)

ScienceDaily (Aug. 15, 2008) — We may use the snooze button to fine-tune our sleep cycles, but our cells have a far more meticulous and refined system. Humans, and most other organisms, have 24-hour rhythms that are regulated by a precise molecular clock that ticks inside every cell.

After decades of study, researchers are still identifying all the gears involved in running this "circadian" clock and are working to put each of the molecular cogs in its place. A new study by Rockefeller University scientists now shows how two of the key molecules interact to regulate the clock's cycle and uncovers how that switch can go haywire, identifying one potential cause of heritable sleep disorders.

Michael Young, Richard and Jeanne Fisher Professor and head of the Laboratory of Genetics, and his colleagues have shown that the circadian clock contains the equivalent of an on/off switch that's controlled by an enzyme called doubletime. Doubletime, or DBT, was originally named for the way that mutations of the gene create flies with a fast-running clock. DBT works by attaching phosphate groups to proteins in a process called phosphorylation. And the protein it phosphorylates, called period or PER, plays a substantial role in the timing of the clock itself, regulating the activity of other genes as it cycles on and off with a 24-hour rhythm. Researchers knew DBT played a role in regulating the period protein by attaching phosphates to it. But Young's new study shows that DBT can either suppress or activate PER, by placing phosphates at different sites.

With the discovery that DBT has not one but two separate phosphorylation targets on PER came the realization that the enzyme is acting essentially as a switch. "It's a phosphorylation switch controlled by doubletime that determines whether the protein is active at all," Young says. During the "off" phase, the cell churns out PER proteins that are stable but inactive, kept so by the presence of phosphate groups at that first target site. During the "on" phase, the phosphate group in the second target site activates the protein but destabilizes it so that PER is only active for a few hours. After that, the cell begins accumulating inactive protein again and the cycle begins anew.

Young and his colleagues also uncovered mutant flies with a DBT-dependent, accelerated clock: Their period proteins were missing the first target phosphorylation site that should suppress phosphorylation of

their "on" switch. As a result, their period proteins never completely stabilized. "If you can't phosphorylate the first site, you automatically skip to the second site, phosphorylate it prematurely and produce a hyperactive repressor," Young says. "With a repressor that acts too soon and goes away too quickly, you get a short-period phenotype." In other words, you get a fly that wakes up too soon and falls asleep too early, a fly with a fast-running clock.

Scientists have been studying human families that have members who appear to suffer from a heritable version of this short-period phenotype, termed FASPS (for Familial Advanced Sleep Phase Syndrome); these people wake up before dawn and crash before sunset. Studies of one of these families in Utah has shown a similar period protein phosphorylation defect. Now, the researchers believe that effects like those revealed by Young's group in the fly could very well be what's causing the fast-running clocks in people afflicted with FASPS. "Many of the features that they're seeing in humans are consistent with what we're finding in flies," Young says. "So it may help us understand the human syndrome as well."

Journal reference:

1. Kivimäe et al. **Activating PER Repressor through a DBT-Directed Phosphorylation Switch**. *PLoS Biology*, 2008; 6 (7): e183 DOI: 10.1371/journal.pbio.0060183

Adapted from materials provided by Rockefeller University.

http://www.sciencedaily.com:80/releases/2008/08/080813202158.htm

Wide Variety Of Errors Found In Testing Process At Family Medicine Clinics

ScienceDaily (Aug. 15, 2008) — The largest study to date of testing errors reported by family physician offices in the United States found that problems occur throughout the testing process and disproportionately affect minority patients.

In the June 2008 issue of Quality & Safety in Health Care, the researchers report that medical testing errors led to lost time, lost money, delays in care, and pain and suffering for patients, with adverse consequences affecting minority patients far more often.

"I think everybody has had an occasion where their physician did a test, and they just didn't hear back," said John Hickner, MD, professor and vice chair of family medicine at the University of Chicago Medical Center. "People identify that as a common experience. The incident reports we received voluntarily from family physicians and their office staff detail what the problem areas are."

"There's a fair amount of risk and harm that results from testing mistakes and slips," he added. "This data provides a starting point for improvement."

The study took place at eight family physician offices--all part of the American Academy of Family Physicians National Research Network. Four of the doctors' offices were rural, three urban and one suburban.

During 32 weeks in 2004, 243 clinicians and office staff submitted 590 anonymous reports describing 966 medical-test-related errors. The tests included lab work, diagnostic imaging and other tests such as pulmonary function tests and electrocardiograms.

Errors were classified in one of 10 categories: test ordering, test implementation, reporting results to the clinician, clinician responding to results, notifying the patient of results, administrative, treatments, communications, other process errors, and knowledge and skills.

The most common errors involved failure to report results to the clinician, accounting for one out of four (24.6%) reported mistakes. Test implementation (17.9%) and administrative errors (17.6%) were the next most common.

Test implementation errors were nearly double for minority groups, at 32 percent versus 18 percent for non-Hispanic whites. The investigators believe this may reflect difficulties with transportation to the testing site or lack of insurance to pay for the test.

A quarter of the errors resulted in delays in care for patients, and 13 percent caused pain, suffering or a definite adverse clinical consequence. Eighteen percent resulted in harm.

"One of the most striking and disturbing findings was that minority patients were nearly three times more likely to experience adverse consequences," Hickner said, and twice as likely to experience physical harm from errors.

The researchers reported considerable variation in the types of errors reported from each practice. "While significant physical harm was rare, adverse consequences for patients were common," Hickner observed. "This study strongly supports the need for office-by-office improvements in the overall testing process within primary care."

Although this study was not designed to determine the true error rate, "testing-process errors appear to be common," the authors conclude. "Since many errors are undetected or unreported, we can assume this is an extreme lower bound."

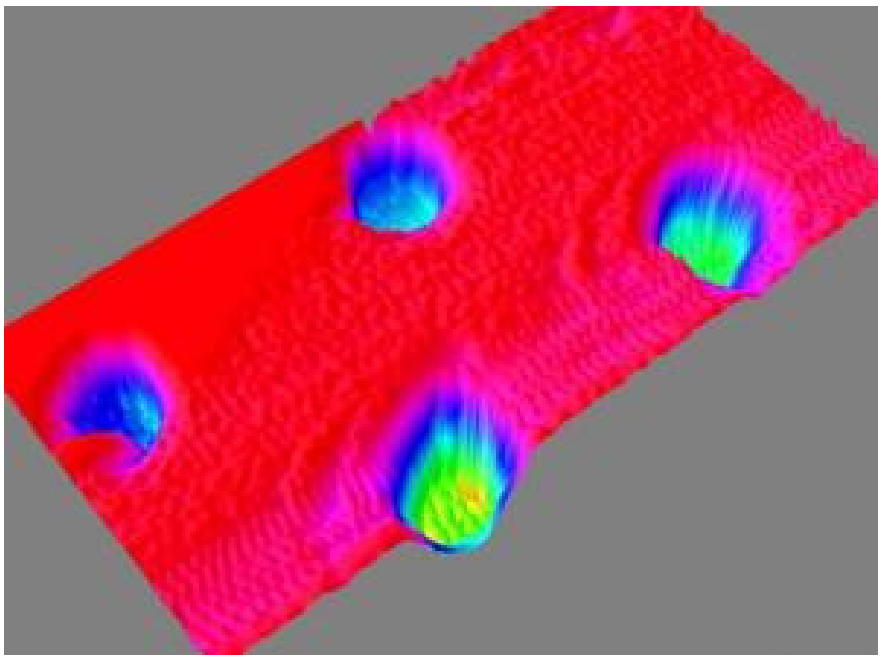
An accompanying paper in the same journal from the same study looked at how often harm to patients was prevented or reduced by early detection and intervention. About 25 percent of the errors were discovered in time for an intervention, usually by physicians. "This demonstrates the continuing importance of people," the authors note, "and cautions against the over-reliance on current technological systems."

The study was funded in part by the Agency for Health Care Research and Quality. Additional authors include Deborah Graham and Elias Brandt of the American Academy of Family Physicians National Research Network, Nancy Elder of the University of Cincinnati, Caroline Emsermann of the University of Colorado, Susan Dovey of the Royal New Zealand College of General Practitioners and Robert Phillips of the Robert Graham Center for Policy Studies in Family Medicine and Primary Care. Elizabeth Staton, University of Colorado, contributed to the error-mitigation paper.

Adapted from materials provided by University of Chicago Medical Center, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2008/08/080813183558.htm

Phoenix Microscope Takes First Image Of Martian Dust Particle



This color image is a three dimensional view of a digital elevation map of a sample collected by NASA's Phoenix Mars Lander's Atomic Force Microscope. A Martian particle -- only one micrometer, or one millionth of a meter, across -- is held in the left pit. (Credit: NASA/JPL-Caltech/University of Arizona/University of Neuchatel/Imperial College London)

ScienceDaily (Aug. 15, 2008) — NASA's Phoenix Mars Lander has taken the first-ever image of a single particle of Mars' ubiquitous dust, using its atomic force microscope.

The particle -- shown at higher magnification than anything ever seen from another world -- is a rounded particle about one micrometer, or one millionth of a meter, across. It is a speck of the dust that cloaks Mars. Such dust particles color the Martian sky pink, feed storms that regularly envelop the planet and produce Mars' distinctive red soil.

"This is the first picture of a clay-sized particle on Mars, and the size agrees with predictions from the colors seen in sunsets on the Red Planet," said Phoenix co-investigator Urs Staufer of the University of Neuchatel, Switzerland, who leads a Swiss consortium that made the microscope.

"Taking this image required the highest resolution microscope operated off Earth and a specially designed substrate to hold the Martian dust," said Tom Pike, Phoenix science team member from Imperial College London. "We always knew it was going to be technically very challenging to image particles this small."

It took a very long time, roughly a dozen years, to develop the device that is operating in a polar region on a planet now about 350 million kilometers or 220 million miles away.

The atomic force microscope maps the shape of particles in three dimensions by scanning them with a sharp tip at the end of a spring. During the scan, invisibly fine particles are held by a series of pits etched into a substrate microfabricated from a silicon wafer. Pike's group at Imperial College produced these silicon microdiscs.

The atomic force microscope can detail the shapes of particles as small as about 100 nanometers, about one one-thousandth the width of a human hair. That is about 100 times greater magnification than seen

with Phoenix's optical microscope, which made its first images of Martian soil about two months ago. Until now, Phoenix's optical microscope held the record for producing the most highly magnified images to come from another planet.

"I'm delighted that this microscope is producing images that will help us understand Mars at the highest detail ever," Staufer said. "This is proof of the microscope's potential. We are now ready to start doing scientific experiments that will add a new dimension to measurements being made by other Phoenix lander instruments."

"After this first success, we're now working on building up a portrait gallery of the dust on Mars," Pike added.

Mars' ultra-fine dust is the medium that actively links gases in the Martian atmosphere to processes in Martian soil, so it is critically important to understanding Mars' environment, the researchers said.

The particle seen in the atomic force microscope image was part of a sample scooped by the robotic arm from the "Snow White" trench and delivered to Phoenix's microscope station in early July. The microscope station includes the optical microscope, the atomic force microscope and the sample delivery wheel. It is part of a suite of tools called Phoenix's Microscopy, Electrochemistry and Conductivity Analyzer.

The Phoenix mission is led by Peter Smith from the University of Arizona with project management at NASA's Jet Propulsion Laboratory, Pasadena, Calif., and development partnership at Lockheed Martin, Denver. International contributions come from the Canadian Space Agency; the University of Neuchatel; the universities of Copenhagen and Aarhus in Denmark; the Max Planck Institute in Germany; and the Finnish Meteorological Institute. The California Institute of Technology in Pasadena manages JPL for NASA.

The latest Phoenix images and information are at

http://www.nasa.gov/phoenix http://phoenix.lpl.arizona.edu

Adapted from materials provided by NASA/Jet Propulsion Laboratory.

http://www.sciencedaily.com/releases/2008/08/080814164414.htm

Towards Zero Training For Brain-computer Interfacing

ScienceDaily (Aug. 15, 2008) — While invasive electrode recordings in humans show long-term promise, non-invasive techniques can also provide effective brain-computer interfacing (BCI) and localization of motor activity in the brain for paralyzed patients with significantly reduced risks and costs as well as novel applications for healthy users.

However, two issues hamper the ease of use of BCI systems based on non-invasive recording techniques, such as electroencephalography (EEG).

First, the demands for electrode preparation for multi-channel EEG – necessary for optimal performance – are significant. Second, EEG signals are highly subject-specific and vary considerably even between recording sessions of the same user performing the same experimental paradigm.

Therefore, the BCI software that includes preprocessing and classification needed to be adapted individually for optimal performance before every session. While Popescu et al. (Single Trial Classification of Motor Imagination Using 6 Dry EEG Electrodes, PLoS ONE, 2007) have proposed a solution to the first issue by introducing dry electrodes, which can reduce the EEG electrode preparation time from 40 minutes to one minute, the second problem has, until now, remained unsolved.

Reporting in the online, open-access journal PLoS One, on August 13, a new study by Matthias Krauledat and colleagues at the Berlin Institute of Technology suggests a novel data analysis method that bypasses the need for the time-consuming calibration for long-term BCI users and may reduce the calibration time to one minute. This is achieved by a clustering approach, which extracts most representative spatial filters for each individual subject from prior recordings.

Taken together, these developments of the Berlin BCI group pave the way to make BCI technology more practical for daily use in man-machine interaction both for patients and for the healthy.

Journal reference:

1. Krauledat et al. **Towards Zero Training for Brain-Computer Interfacing**. *PLoS One*, 2008; 3 (8): e2967 DOI: 10.1371/journal.pone.0002967

Adapted from materials provided by Public Library of Science, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2008/08/080812213820.htm

Hard Day's Night? Enhancing The Work-life Balance Of Shift Workers

ScienceDaily (Aug. 14, 2008) — Introducing a Compressed Working Week may enhance the work-life balance of shift workers without damaging productivity or competitiveness suggests a new systematic review published in the Journal of Epidemiology and Community Health.

One in five European workers are involved in some form of shift work. Health problems associated with shift work include sleep disturbances, fatigue, digestive problems, and stress-related illnesses, as well as increases in sickness absence.

The Compressed Working Week is an alternative work schedule in which the hours worked per day are increased, whilst the days worked are decreased in order to work the standard number of weekly hours in less than five days Typically three to four 12hr days are worked instead of five 8hr days.

This systematic review was conducted by researchers from the Department of Geography (Durham University), the MRC Public and Social Health Sciences Unit (University of Glasgow), the Centre for Reviews and Dissemination (University of York), and the Department of Public Health (University of Liverpool) as part of the work of the Public Health Research Consortium.

The review combines 40 previous studies and represents the only comprehensive and robust review to date on the effects on the health and work-life balance of shift workers of Compressed Working Week interventions.

The existing evidence, albeit somewhat methodologically limited, suggests that introducing a Compressed Working Week may enhance work-life balance for shift workers. It does not appear to be detrimental to self-reported health in the short term.

Importantly, the studies conducted so far suggest that Compressed Working Week interventions tend to have a low risk of adverse health or organisational effects and so work-life balance and wellbeing may be improved through the workplace without necessarily damaging productivity or competitiveness.

The Compressed Working Week could, therefore, be an important tool for both policymakers and employers in terms of promoting healthier work places and improving working practices.

Adapted from materials provided by Public Health Research Consortium, via AlphaGalileo.

http://www.sciencedaily.com/releases/2008/08/080814104601.htm

Exploring Sichuan Fault

Picture taken before quake: Fault line runs along wall and through farmhouse. (Credit: Image courtesy of Durham University)

ScienceDaily (Aug. 14, 2008) — Durham University expert, Alex Densmore, is to explore the fault lines that caused the May 12th earthquake in China that killed 69,000 people.

Dr. Densmore, Director of Hazards Research at the Institute of Hazard and Risk Research at Durham University, is the first UK scientist to visit the region to research the faults and the effects and causes of the Sichuan earthquake since the disaster.

Dr. Densmore said: "We'll be looking at the effects of the earthquake on the ground and for evidence of what actually happened during the earthquake. We'll be looking very closely at how the tectonic blocks actually moved in relation to each other.

"Much of what actually happens during earthquakes is difficult to view because it occurs deep below the surface. By looking at the way in which roads, pipelines, rivers and other man-made markers are affected, we can map out how the earth moved, what faults were responsible, and what kind of activity we might expect in future events."

Dr. Densmore leaves for China on Wednesday 13th August and will be working alongside colleagues from Shell UK Ltd, the Chengdu University of Technology, and the Seismological Bureau of Sichuan Province. The research team will study:

1. which faults were active during the earthquake and what actually happened;
2. how the tectonic blocks are moving relative to each other in this part of the India-Asia collision; and
3. what is expected to happen in the future the next time an earthquake happens

It is thought that two main faults were involved in the May 12 earthquake, out of four or five active faults in that part of China. At least 22,000 aftershocks, measuring up to 6.9 in magnitude, have been monitored in the quake zone, according to the China Earthquake Administration.

Dr. Densmore said: "Aftershocks are expected after every large earthquake and this has been no exception. Earthquakes release stress where they occur, but they also cause increased stress in the surrounding rock, and this additional pressure has to be released. Peak aftershock activity is generally in the first few days after the main quake, and the number and size of aftershocks decreases rapidly after that."

18,000 people are still officially missing and a further 374,000 people have been classified as injured following the Sichuan disaster. Beichuan town has been completely evacuated following the earthquake. The Chinese authorities are looking at building a whole new town for the former residents.

Dr. Densmore said: "We are conscious of being as sensitive as possible while working in this area. There is still a lot of recovery work going on and there are obvious long-term infrastructural problems. We hope to be able to visit the town of Beichuan which was decimated by the earthquake, but this will depend very much on the local authorities. We're very thankful to the Sichuan provincial government for granting us access to the earthquake zone at such a critical time.

The location of the active faults is crucial. We want to see if the faults that we've previously mapped were activated during the earthquake, or if the quake occurred along a new set of faults. Knowing where the active faults lie, and how much they are likely to move in future events, can help the Chinese authorities in planning new buildings and towns to reduce the likelihood of future casualties."

Dr. Alex Densmore's research in China is funded by The Natural Environment Research Council (NERC).

Adapted from materials provided by Durham University.

http://www.sciencedaily.com/releases/2008/08/080814091216.htm

Solar Collector Could Change Asphalt Roads Into Renewable Energy Source

Researchers are developing a solar collector that could turn roads and parking lots into ubiquitous--and inexpensive--sources of electricity and hot water. (Credit: iStockphoto/Forest Woodward)

ScienceDaily (Aug. 14, 2008) — Anyone who has walked barefoot across a parking lot on a hot summer day knows that blacktop is exceptionally good at soaking up the sun's warmth. Now, a research team at Worcester Polytechnic Institute (WPI) has found a way to use that heat-soaking property for an alternative energy source.

Through asphalt, the researchers are developing a solar collector that could turn roads and parking lots into ubiquitous—and inexpensive–sources of electricity and hot water.

The research project, which was undertaken at the request of Michael Hulen, president of Novotech Inc. in Acton, Mass, which holds a patent on the concept of using the heat absorbed by pavements, is being directed by Rajib Mallick, associate professor of civil and environmental engineering.

On Monday, Aug. 18, 2008, team member Bao-Liang Chen, a PhD candidate at WPI, will present the results of research aimed at evaluating the potential for transforming stretches of asphalt into a cost-effective energy source at the annual symposium of the International Society for Asphalt Pavements in Zurich, Switzerland. The study looks not only at how well asphalt can collect solar energy, but at the best way to construct roads and parking lots to maximize their heat-absorbing qualities.

"Asphalt has a lot of advantages as a solar collector," Mallick says. "For one, blacktop stays hot and could continue to generate energy after the sun goes down, unlike traditional solar-electric cells. In

addition, there is already a massive acreage of installed roads and parking lots that could be retrofitted for energy generation, so there is no need to find additional land for solar farms. Roads and lots are typically resurfaced every 10 to 12 years and the retrofit could be built into that cycle. Extracting heat from asphalt could cool it, reducing the urban 'heat island' effect. Finally, unlike roof-top solar arrays, which some find unattractive, the solar collectors in roads and parking lots would be invisible."

Mallick and his research team, which also includes Sankha Bhowmick of UMass, Dartmouth, studied the energy-generating potential of asphalt using computer models and by conducting small- and large-scale tests. The tests were conducted on slabs of asphalt in which were imbedded thermocouples, to measure heat penetration, and copper pipes, to gauge how well that heat could be transferred to flowing water. Hot water flowing from an asphalt energy system could be used "as is" for heating buildings or in industrial processes, or could be passed through a thermoelectric generator to produce electricity.

In the lab, small slabs were exposed to halogen lamps, simulating sunlight. Larger slabs were set up outdoors and exposed to more realistic environmental conditions, including direct sunlight and wind. The tests showed that asphalt absorbs a considerable amount of heat and that the highest temperatures are found a few centimeters below the surface. This is where a heat exchanger would be located to extract the maximum amount of energy. Experimenting with various asphalt compositions, they found that the addition of highly conductive aggregates, like quartzite, can significantly increase heat absorption, as can the application of a special paint that reduces reflection.

Finally, Mallick says the team concluded that the key to successfully turning asphalt into an effective energy generator will replacing the copper pipes used in the tests with a specially designed, highly efficient heat exchanger that soaks up the maximum amount of the heat absorbed by asphalt. "Our preliminary results provide a promising proof of concept for what could be a very important future source of renewable, pollution-free energy for our nation. And it has been there all along, right under our feet."

Adapted from materials provided by Worcester Polytechnic Institute.

http://www.sciencedaily.com/releases/2008/08/080812135702.htm

Microbes, By Latitudes And Altitudes, Shed New Light On Life's Diversity

*Jessica Green, right, works with Lise Ovreas, a scientist with the University of Bergen (Norway) Center for Geobiology, to obtain microbes at Svalbard, an island in a Norway-controlled archipelago about 300 miles south of the North Pole. (Credit: Photo by Steve Coulson)*ScienceDaily (Aug. 14, 2008) — Microbial biologists, including the University of Oregon's Jessica L. Green, may not have Jimmy Buffett's music from 1977 in mind, but they are changing attitudes about evolutionary diversity on Earth, from oceanic latitudes to mountainous altitudes.

In two recent National Science Foundation-funded papers in the Proceedings of the National Academy of Sciences, Green and colleagues show that temperature, not productivity, primarily drives the richness of bacterial diversity in the oceans, and that life, both plant and microbial, by altitude in the Rocky Mountains may be close, but not exactly, to what biologists have theorized for years.Swedish naturalist and botanist Carl Linnaeus, the father of taxonomy who died in 1778, proposed that the planet once was covered by oceans, except for Paradise Island on the equator, and that all organisms emerged from the island and migrated as waters receded. More than a century later, microbiologist Lourens G.M. Bass Becking in the 1930s wrote that "everything is everywhere, but the environment selects."

"What's interesting to me," said Green, a professor of biology and member of the UO Center for Ecology and Evolutionary Biology, "is that the founders of these disciplines envisioned the same thing: That you have this broad dispersal of all of the organisms that each happened to be studying, and that they would colonize the surface of the Earth depending on whether the environment was suitable for them."

In the last decade, microbial biology, using molecular techniques, has changed everything, Green said in an interview about the two PNAS papers and an extensive review of microbial biogeography in the May 23 issue of the journal Science. She was lead author on the Science paper."Before now, all biologists could do was look at the biodiversity of microbes that could be cultured in a petri dish. We now know that the vast majority of microbial life cannot be kept in captivity. Now we have the ability to grab DNA from the environment and try to characterize different species or taxonomic groups using genetic material, allowing our field to blast off."

Yet, she added: "We are just beginning to scratch the surface of what these patterns look like."

Green was among several co-authors on a project led by biologist Jed A. Fuhrman of the University of Southern California and published in PNAS in May.

Using samples of ocean-dwelling bacteria collected over 15 years from 57 locations around the world and sorting them into species or taxonomic units, researchers found twice as many microbes at the equator than at the poles. In particular, they found that samples from colder waters still contained many bacterial species, suggesting that productivity as generated by light through photosynthesis has little influence on diversity.Warmth dictated such diversity, the seven co-authors concluded, but they left open the possibility that the kinetics of metabolism related to temperature is still linked with photosynthesis. "What we found," Green said, "was that the diversity gradient more correlated with temperature than primary productivity."

As for the mountains, traditional wisdom, beginning with Linnaeus, has said that diversity of animal and plant life is highest at the bottom and decreases as you climb. While that scenario has been observed, a second one is emerging, that of a hump shape, with diversity at its height just above the foothills.

In a paper published Aug. 12 in a PNAS special publication (the "Sackler Colloquium: In the Light of Evolution--Biodiversity and Extinction") , Green, as principal investigator, and five colleagues documented diversity patterns of a combination of plant and microbial life, focusing on flowering plants and soil-abundant Acidobacteria, in the Rocky Mountains in Colorado. They found significant differences, using a combination of classical taxonomic and phylogenetic approaches.Plant communities became less phylogenetically clustered than did microbial life as they drew samples from five sites rising over 24 miles, from 8,071 feet to 11,089 feet. As they went higher, plant life saw a decline in species richness, but for microbes, researchers saw a hump shape in species richness as they went up the slopes.

Their conclusion: "From our study, we saw that environmental selection seemed to play a larger role and was more important for microbes than the plants," Green said.

The trick to the research, she said, involved the scale from which the samples were drawn. Plants were gathered from one-meter-square quadrants, while microbes were taken from soil cores. "You have to be careful about the conclusions that you make," Green said. "So on a 2,000-meter elevation gradient, for example, the spatial scale relative to the body size of a plant is much, much larger when you consider what the universe looks like to a microbe." That spatial consideration, she said, led her team to narrowly focus on the diversity of Acidobacteria rather than a wide range of microbes present in each area. This allowed the researchers to focus on patterns within one microbial phylum.

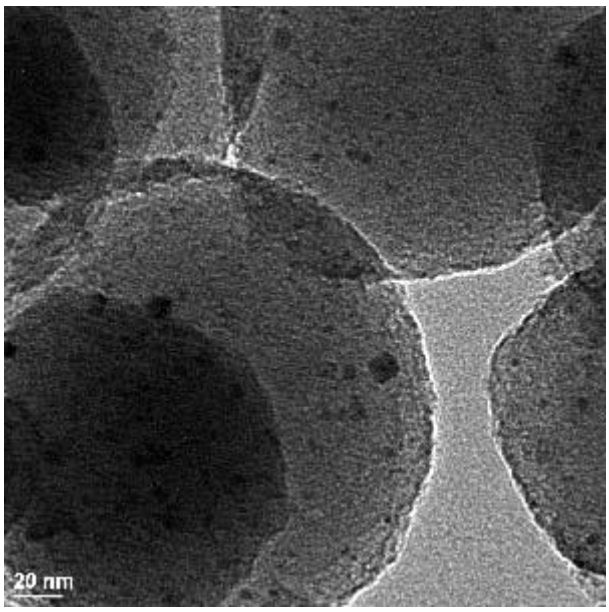
"Diversity patterns on mountainsides have been studied mostly on plants and animals for hundreds of years," Green said. "Yet microbes are the most diverse set of organisms on Earth, and they are really important for how ecosystems work. Our study establishes the first elevation-gradient pattern for microbes. We found that, yes, microbes do have a diversity pattern that is similar to what has been studied for plants and animals, but the pattern is different than what you see for plants in the Rockies, and there is much to be done to understand why microbes might have a different biodiversity pattern."

It could boil down to finding a good comparative technique, she said. "I don't think that microbes are fundamentally different from a biological standpoint from plants and animals. I think that we haven't figured out how to study them in an analogous way."

Adapted from materials provided by University of Oregon.

http://www.sciencedaily.com/releases/2008/08/080811200016.htm

Turning Waste Material Into Ethanol



In this transmission electron micrograph of the mesoporous nanospheres, the nano-scale catalyst particles show up as the dark spots. Using particles this small (~ 3nm) increases the overall surface area of the catalyst by roughly 100 times. (Credit: Image courtesy of DOE/Ames Laboratory)

ScienceDaily (Aug. 14, 2008) — Say the word "biofuels" and most people think of grain ethanol and biodiesel. But there's another, older technology called gasification that's getting a new look from researchers at the U.S. Department of Energy's Ames Laboratory and Iowa State University.

By combining gasification with high-tech nanoscale porous catalysts, they hope to create ethanol from a wide range of biomass, including distiller's grain left over from ethanol production, corn stover from the field, grass, wood pulp, animal waste, and garbage.

Gasification is a process that turns carbon-based feedstocks under high temperature and pressure in an oxygen-controlled atmosphere into synthesis gas, or syngas. Syngas is made up primarily of carbon monoxide and hydrogen (more than 85 percent by volume) and smaller quantities of carbon dioxide and methane.

It's basically the same technique that was used to extract the gas from coal that fueled gas light fixtures prior to the advent of the electric light bulb. The advantage of gasification compared to fermentation technologies is that it can be used in a variety of applications, including process heat, electric power generation, and synthesis of commodity chemicals and fuels.

"There was some interest in converting syngas into ethanol during the first oil crisis back in the 70s," said Ames Lab chemist and Chemical and Biological Science Program Director Victor Lin. "The problem was that catalysis technology at that time didn't allow selectivity in the byproducts. They could produce ethanol, but you'd also get methane, aldehydes and a number of other undesirable products."

A catalyst is a material that facilitates and speeds up a chemical reaction without chemically changing the catalyst itself. In studying the chemical reactions in syngas conversion, Lin found that the carbon monoxide molecules that yielded ethanol could be "activated" in the presence of a catalyst with a unique structural feature.

"If we can increase this 'activated' CO adsorption on the surface of the catalyst, it improves the opportunity for the formation of ethanol molecules," Lin said. "And if we can increase the amount of surface area for the catalyst, we can increase the amount of ethanol produced."

Lin's group looked at using a metal alloy as the catalyst. To increase the surface area, they used nano-scale catalyst particles dispersed widely within the structure of mesoporous nanospheres, tiny sponge-like balls with thousands of channels running through them. The total surface area of these dispersed catalyst nanoparticles is roughly 100 times greater than the surface area you'd get with the same quantity of catalyst material in larger, macro-scale particles.

It is also important to control the chemical makeup of the syngas. Researchers at ISU's Center for Sustainable Environmental Technologies , or CSET, have spent several years developing fluidized bed gasifiers to provide reliable operation and high-quality syngas for applications ranging from replacing natural gas in grain ethanol plants to providing hydrogen for fuel cells.

"Gasification to ethanol has received increasing attention as an attractive approach to reaching the Federal Renewable Fuel Standard of 36 billion gallons of biofuel," said Robert Brown, CSET director.

"The great thing about using syngas to produce ethanol is that it expands the kinds of materials that can be converted into fuels," Lin said. "You can use the waste product from the distilling process or any number of other sources of biomass, such as switchgrass or wood pulp. Basically any carbon-based material can be converted into syngas. And once we have syngas, we can turn that into ethanol."

The research is funded by the DOE's Offices of Basic Energy Sciences and Energy Efficiency and Renewable Energy.

Adapted from materials provided by DOE/Ames Laboratory.

http://www.sciencedaily.com/releases/2008/08/080813164640.htm

Provocateur: The Peter Saul Manifesto

By HOLLAND COTTER

NEWPORT BEACH, Calif. — Peter Saul, who turns 74 on Saturday, is a classic artist's artist, one of our few important practicing history painters and a serial offender in violations of good taste. His career, while long, steady and admired, has never exceeded cult status. It's an example of can't-see-the-tree-for-the-forest visibility.

The influence of Mr. Saul's paintings, with their cartoony figures, lurid-lush colors, splatter-film expressionism and contrarian take on topical subjects, pervades recent art. It has contributed mightily to major careers, like those of Carroll Dunham and Elizabeth Murray. And it has paved the way for the neo-Surrealist noodlings of countless student painters spilling out of art schools and straight into the arms of a ravenous market.

Yet his own welcome by the market has been, until fairly recently, less than avid. His reception by museums has been marked by indifference, if not avoidance. That the retrospective of his work at the Orange County Museum of Art here in Southern California is not scheduled to go to New York City, where Mr. Saul now lives, says much.

True, the Museum of Modern Art, with its white-box politeness, is not a natural home for his visual perversities. Nor is the Metropolitan Museum, despite its vaunted embrace of "challenging" new art. But why hasn't the Whitney, which owns one of Mr. Saul's grandly scathing Vietnam War paintings, stepped up to the plate? And where is the new New Museum? Totally lost to painted prettiness these days? (The Saul show of 50 works is organized by a former New Museum curator, Dan Cameron.)

Mr. Saul's art is not pretty, though it has many eye-catching pleasures. Nor is it polite. Indeed, the artist makes zealous efforts to ensure the opposite. In America today, he says in a catalog interview, "there's a tremendous need to not be seen as racist, not seen as sexist. So I want to make sure I am seen as those things."

He succeeds. What museum would be the right one for a painting of a knife-wielding O. J. Simpson strapped down for execution as a buxom blond angel points to a blood-stained glove and intones, "This is why you have to die"? Or for a picture of Christopher Columbus slaughtering New World natives who themselves hold platters of chopped human limbs in their arms?

What is the appropriate place for art that stirs together John Wayne Gacy and Angela Davis, Mickey Mouse and Ethel Rosenberg, Stalin and Willem de Kooning, Basil Wolverton and George W. Bush, then spikes the broth with prickly references to capitalism, Communism, homophobia, feminism, Black Power, racism, pedophilia and art-world politics and — last but not least — to the aging, decaying, self-lacerating artist himself?

Depending on who's looking, Mr. Saul might be seen either to embrace or revile individual ingredients in this stew, though when his art is pressed to declare its loyalties, it gives no unequivocal answers. Indeed, it seems to be answer-averse, a species of painting as agitation, picture-making as button-pushing.

Mr. Saul, who was born in San Francisco, started pushing buttons in the late 1950s when he discovered that although he liked the way certain Abstract Expressionist artists painted, he couldn't stomach the Existentialist mumbo-jumbo that surrounded their work. So he adopted the brushy style but dumped the pretensions. Instead of spiritual depths, he painted icebox interiors stocked with soft drinks, steaks, daggers, penises and toilets. In the process he created a painterly version — Larry Rivers did the same — of what would come to be called Pop Art.

During this time, from 1956 to 1964, he was living in relative isolation in Europe. In Paris he met a few career-shaping figures, including the Surrealist painter Roberto Matta and the American art dealer Allan Frumkin, who would represent Mr. Saul for more than 30 years. He also had transformative encounters with Rembrandt's "Night Watch" and Mad magazine.

In the mid-to-late '60s, after he returned to California, Mr. Saul produced a series of paintings prompted by the war in Southeast Asia. In "Vietnam" (1966), done in a sleek, linear but oozy graphic style, figures embodying racial whiteness, blackness and yellowness twist together in a kind of apocalyptic gang rape, with all parties violated and violating.

Other paintings in the series — what an amazing and timely show they would make on their own — push a vision of universal defilement even further. In their unchartable moral compass, their disdain of humanist solace and their alarming formal beauty, they are among the benchmark art images of their era.

In 1975 Mr. Saul moved to New York. But by then painting, or at least his kind, was out of fashion. So in 1981 he relocated, this time to Austin, Tex., to teach. He stayed there for almost 20 years, once again removing himself from the mainstream, and at a time when political art, including political painting, was finding a new audience.

Actually, Mr. Saul had long been doing some of his work for an audience of one, himself, specifically a series of self-portraits that he began in the '70s and continues to add to today. The images are, almost without exception, of the body caught in the grip of mortifying instincts and erupting emotions while under assault from a hostile world.

In "Oedipus Junior" (1983), the artist simultaneously stabs himself in the eye with a paintbrush, castrates himself with a buzz saw and offers a beer to a female breast that sprouts from his neck. In a 1997 drawing, a vomiting woman pushes through a man's forehead with a placard reading, "Your sexist jokes make me sick." In several paintings, heads are shown in meltdown, dissolving into fat and sweat, eyes and teeth swimming around in a puddle of fleshy goo.

Such images — Rembrandt's late self-portraits are not all that far off — have increased in number as Mr. Saul has grown older. Yet his work continues to look youthfully of the moment. And for young artists he is, for several reasons, a worthy role model.

He has kept himself more or less clear of the art world, so owes it nothing. He has also kept clear of fashion — having a longtime supportive dealer was, naturally, an enabling factor in this — and, with scant critical encouragement until recent years, has gone his own masterly realized hideous-hilarious way. And that way has been based on taking a fundamentally facile genre, Surrealism, and loading it with purposeful, critical content.

If his work has softened and broadened with time — a few of the later pictures in this otherwise sterling selection feel undercooked or overstated — its essence remains tough and firm. This is an art of combative moral ambiguity that looks as if it's coming from some laugh-riot lunatic fringe but is, in fact, a sane and realistic depiction of the world. What's wrong with this picture? each Saul painting asks. And each one answers: Everything.

"Peter Saul" remains through Sept. 21 at the Orange County Museum of Art, 850 San Clemente Drive, Newport Beach, Calif.; (949) 759-1122, ocma.net. It travels to the Pennsylvania Academy of Fine Arts in Philadelphia, Oct. 18 to Jan. 4; and the Contemporary Art Center in New Orleans, Feb. 14 to May 24.

http://www.nytimes.com/2008/08/16/arts/design/16saul.html?_r=1&th&emc=th&oref=slogin

New Orleans Is Proud to Put Its Long, Complex Past on Display

By EDWARD ROTHSTEIN

NEW ORLEANS — Now that many museums are no longer imagined as repositories for cherished objects, they are becoming repositories of cherished identities, chronicling the ways we like to imagine ourselves or portray ourselves to others. They have always been declarations of pride: look what we have made! Look what we have collected! Now they are declarations of our self-images: look at what we have been! Look at what we seek to be!

And the pride is not always pure; sometimes it incorporates accounts of suffering or confessions of sins.

Perhaps because New Orleans has had more than its share of near-death experiences — one is still being felt — or because decadence, disease and racial strife have long accompanied its ecstatic festivities and intermingling cultures, many of its museums seem to touch slightly raw nerves. In some cases unsteadiness almost seems to be sought. This can be felt in the imaginative exploration of arthropods in the new Audubon Insectarium, whose creatures inspire a strange mixture of fascination and repulsion.

But you can feel that tipsiness as well in the epic telling of Louisiana history in the permanent exhibition at the Louisiana State Museum at the Cabildo, in tours of nearby plantations, in the very subject of a new museum devoted to the history of the American cocktail, even in the extraordinary ambitions of the National World War II Museum as it plans a major expansion.

First, the Cabildo. Its multistory exhibition recounts Louisiana history in an almost leisurely fashion, its panels of text revealing latent contradictions and tensions.

New Orleans, we learn, was once a cultural backwater that in the decades before the Civil War could boast the highest death rate of any American city. But it was also the largest metropolis in the antebellum South. Its slaveholding society mixed the ugliest brutality with tolerance for a considerable population of free blacks. It also established quadroon balls in which light-skinned black women were courted by white Louisiana men prepared for what were essentially common-law marriages under a system known as

plaçage. And New Orleans's polyglot culture evolved under the oversight of the French, then the Spanish, then again the French, and finally the Americans.

As for the region's long-celebrated carnivalesque atmosphere, the show suggests that colonial Louisianans "most likely made such an effort at having fun because, for many, life was short and filled with suffering."

"True to its complex past," the exhibition also notes, "Louisiana had ties to both the Confederacy and the Union during the Civil War." But those ties, the show outlines, were also contortions. New Orleans was the first Confederate city to fall. By May 1862, "occupied New Orleans," as the exhibition puts it, was under martial law, controlled by Maj. Gen. Benjamin F. Butler from Massachusetts, a man Lincoln asked to be his running mate in 1864.

Here, though, Butler was known as "the Beast." He ordered New Orleans citizens to respect the American flag, and imprisoned those who did not. When there were complaints that women were taunting Union soldiers, he posted an ordinance almost wickedly sly in its attack on Southern gentility:

"As the officers and soldiers of the United States have been subject to repeated insult from the women (calling themselves ladies) of New Orleans," the law read, any woman who shows such disrespect "shall be regarded and held liable to be treated as a woman of the town plying her avocation."

The show has stretches of the mundane, but it fascinates: you can sense the tension between its enthusiasms and its dissents. It is wrestling with the past and so unsettles the present.

No such struggle takes place at a plantation museum I visited about 50 miles away, in Vacherie, La. The Oak Alley Plantation is renowned not only for its elegant 1839 mansion, but also for a stately lane of 300-year-old oaks. Hoop-skirted guides tell how the house was built by a loving husband for his wife, who after his death turned out to be so profligate that the plantation had to be sold. No slave quarters or work areas survive. So all that is left is elegance without context, nestled in a haze of fantasy.

There is less glamour but more substance in the nearby Laura Plantation in Vacherie. Its 1805 house, built on pillars to avoid flood damage, had also fallen on hard times, but its current owners, Norman and Sand Marmillion, engaged in extensive detective work. They discovered a cache of photographs, documents and a bound manuscript, "Memories of the Old Plantation Home," completed by Laura Locoul Gore in 1936. Gore was born in the house in 1861; her father named the plantation after her, and she ran it for a time in the matriarchal tradition established by her grandmother. More than 5,000 related documents were discovered in France, where members of her extended family had lived.

As it turns out, Gore herself is thoroughly likable. She anticipates the spirit of American modernity: she shunned the harsh, slave-driving temperament of her grandmother; defied Creole tradition by marrying a Protestant; and left the plantation at 29, eventually settling in St. Louis. Her home also fascinates because in the 1870s her friend Alcée Fortier visited the plantation's slave quarters (some are still standing) and transcribed residents' French Creole folk tales. Fortier published them as "Louisiana Folktales"; they are variations of what became known as the Br'er Rabbit stories.

All of this detail, some touched on in tours, means that the plantation has more resonance than its rooms provide on their own, revealing the density of the region's history, fraught with complexities, conflicts and cultural interactions.

It's enough to turn a visitor to drink, which is, apparently, what happens. That is one reason the Museum of the American Cocktail opened here last month inside the rather cursory Southern Food & Beverage Museum. There have been claims that the cocktail was invented in New Orleans, though the small museum informs us that the word was first used in an 1806 Hudson, N.Y., newspaper.

But since drinking is a strong New Orleans tradition, sugar cane a local product and French culture a strong influence, the city can make a plausible claim for cocktail primacy. Cocktails, after all, seem intended to surprise with their ingredients and ritualistic preparation; they are cultivated creations, hybrids, cleverly disguised concoctions: an alcoholic masque.

As for the museum itself, it is too compressed and omits much European influence. But its collections of tankards and bottles, its recipes and photos of barmen, its Prohibition memorabilia and its relics of '50s bachelor-pad paraphernalia do evoke a pleasant tipsiness. The museum would benefit from offering tastings, particularly since the now dominant New Orleans nighttime drink seems to be an alcoholic ice slush, slurped in the streets out of enormous plastic goblets.

In contrast, the National World War II Museum might seem almost sedate. Its account of D-Day is supple, smart and detailed, inspiring amazement at the event's scope and planning. The museum, which opened as the National D-Day Museum in 2000, was conceived by the historian Stephen E. Ambrose. It is here not just because Ambrose taught at the University of New Orleans, but because D-Day was made possible by boats designed and manufactured here by Andrew Higgins; President Dwight D. Eisenhower told Ambrose that Higgins "won the war for us." The pride is shared by the city.

But the 2006 name change embracing the entire war seems premature. Proportions are a bit off: the museum skimps on context and then devotes extensive attention to minute battles in the Pacific apparently because, as with Normandy, they involved amphibious landings. The institution's ambitions promise a fuller narrative. Indeed, plans are daring: $300 million is being raised to quadruple the museum's space on a nearby lot by 2015. A theater is scheduled to open next year.

Designs for other buildings almost suggest a World War II World's Fair, including a United States pavilion, a Great Campaigns pavilion, a Victory pavilion. Will that give us more spectacle than history? Will pavilions break up the past rather than reconstruct it? Time will tell, but right now, the dizzying dreams seem right at home in New Orleans.

Information on the National World War II Museum in New Orleans: ddaymuseum.org; the Louisiana State Museum at the Cabildo in New Orleans: lsm.crt.state.la.us/cabildo/cabildo; the Museum of the American Cocktail in New Orleans: museumoftheamericancocktail.org/NewOrleans; Oak Alley Plantation in Vacherie, La.: oakalleyplantation.com; Laura Plantation in Vacherie: lauraplantation.com.

http://www.nytimes.com/2008/08/16/arts/design/16muse.html?ref=design

A Not So Common Reader

By WALTER KIRN

HOW FICTION WORKS

By James Wood

265 pp. Farrar, Straus & Giroux. $24

In the second of two short prefaces to "How Fiction Works," an old-fashioned primer on literature that also functions as a timely primer on the art of modest self-marketing, the esteemed critic James Wood reaches out to assure "the common reader" (that good fellow from the club who tries to keep up with all things cultural but is forever slightly short on time) that his prose is as free as he can make it of what James Joyce termed "the true scholastic stink" of so much academic writing. After noting his intellectual debts to "the Russian formalist Viktor Shklovsky" and "the French formalist-cum-structuralist Roland Barthes," Wood goes on to compare his "little volume" to the Victorian critic John Ruskin's musings on the Renaissance painter Tintoretto. Finally, to make himself even less intimidating, even more approachable, Wood (who writes these days for The New Yorker) has us know that every passage he cites in demonstration of his theories comes from "the books at hand in my study" rather than, as the common reader might fear, the entire New York Public Library or, even more distressing, his memory.

Wood's study must be vast, with well-stocked shelves, judging by the inarguable erudition displayed in his compact vade mecum of short chapters and neatly numbered sections devoted to such topics as point of view, characterization, fictional detail and, toward the end, nothing less than "A Brief History of Consciousness." He drops his quotations and references as copiously, easily and freely as a man on a bench in Central Park scattering cups of birdseed. "In Book 22 of the 'Iliad,' " Wood writes in a discussion of wrinkles in narrative time, "Hector's wife is at home warming his bath though he has in fact died moments before; Auden praised Bruegel, in 'Musée des Beaux Arts,' for noticing that, while Icarus fell, a ship was calmly moving on through the waves, unnoticing. In the Dunkirk section of Ian McEwan's 'Atonement,' the protagonist, a British soldier retreating through chaos and death toward Dunkirk, sees a barge going by."

With the whole Western canon at his disposal, apparently, Wood begins to shape a general argument whose moderate, neoclassical simplicity and preference for precision and clarity over mere vigor and potency seem initially like the hard-nosed wisdom of someone who's read a million pages, seen all writerly tricks a thousand times and attained the detached, big-picture perspective of an orbiting critical satellite. His essential point is this: Novels and short stories succeed or fail according to their capacity (a capacity that has progressed over the centuries rather like the march of science) to represent, affectingly and credibly, the actual workings of the human mind as it interacts with the real world. The mind and the world, as Wood defines them, are dependable, fixed phenomena, for the most part, possessed of natural, intrinsic qualities that fiction writers in their ink-stained lab coats measure, prod, explore and seek to illustrate using a rather limited range of instruments that can be endlessly adjusted. The role of these researchers' prejudices and passions — as well as that of their social, psychological, geographic and

spiritual circumstances — is barely credited by Wood. The heroes of this great artistic labor tend to be semimonastic introverts who, like Wood's beloved Henry James and Gustave Flaubert, toil with the doors shut and locked, in soundproof splendid isolation, attentive to the subtle frictions among nouns and adjectival phrases. Conversely, the folks who spoil the experiment are David Foster Wallace types who let themselves be distracted and overwhelmed by the roar of the streets, the voices of the crowd. Wallace, to whom Wood grants the dubious honor of being one of his book's few aesthetic villains, is accused of "obliterating" his characters' voices in an unpleasing, "hideously ugly" attempt to channel cultural chaos rather than filter, manipulate or muffle it. For the vicarish Wood, sequestered in his chamber, part of the fiction writer's true vocation appears to be acoustic regulation — the engineering of a mental space in which literary whispers can be heard.

The grosser elements of fiction — story, plot and setting, as well as the powerful drive of certain authors to expand or alter perception by exalting the vernacular, absorbing the anarchic and ennobling the vulgar that has impelled such messy masterworks as "Huckleberry Finn," "On the Road" and Denis Johnson's "Jesus' Son" — intrude not at all on Wood's presentation, which proceeds in the steady, dark-gowned, unruffled manner of a high-court judge. Wood seems firm in his conviction that accounting for How Fiction Works needn't involve bewildering digressions into Why Writers Write or Why Readers Read. For him, that matter seems settled. They do it to perfect the union of Wood's vaunted "artifice and verisimilitude," two virtues he treats as though carved on a stone tablet, and thereby to promote the cause of civilization; not, as is so frequently the case outside the leathery environs of the private library, to escape the constrictions of civilization, redraw its boundaries, decalcify its customs, or revive the writer's or reader's own spirits by dancing on its debris.

Though Wood's precise, dialectical approach is well adapted to tracing the paradoxes behind standard literary conventions ("Actually, first-person narration is generally more reliable than unreliable; and third-person 'omniscient' narration is generally more partial than omniscient."), and while he makes many nuanced observations about the fetishes and habits that mark individual writers' styles ("Nabokov and Updike at times freeze detail into a cult of itself," "This roughened-up texture and rhythm is, for me at least, one of the reasons that I rarely find Bellow an intrusive lyricist"), he winds up restating more of what we do know than exposing what we don't, quite. Take his disquisition on detail, which comes down first to asserting its importance, then to questioning its all-importance, and then, after serving up a list of some of his very favorite fictional details, to defining the apt, exquisite detail much as a judge once defined obscenity: as something he knows when he sees it. He operates similarly in his discussions of verbal musicality and the craft of proper word choice, implying that his knowing and his seeing are of a peculiarly high degree and ought to prove persuasive and sufficient simply because he's known and seen so much.

Having been lashed by twice as many citations as even a formalist-cum-structuralist should require, and having been incrementally diminished by Wood's tone of genteel condescension (he flashes the Burberry lining of his jacket whenever he rises from his armchair to fetch another Harvard Classic), the common reader is likely to concede virtually anything the master wishes — except, perhaps, his precious time. For someone who professes to understand the fine machinations of characterization, Wood seems oblivious to the eminently resistible prose style of his donnish, finicky persona. "How Fiction Works" is a definitive title, promising much and presuming even more: that anyone, in the age of made-up memoirs and so-called novels whose protagonists share their authors' biographies and names, still knows what fiction is; that those who do know agree that it resembles a machine or a device, not a mess, a mystery or a miracle; and that once we know how fiction works, we'll still care about it as an art form rather than merely admire it as an exercise. But there is one question this volume answers conclusively: Why Readers Nap.

Walter Kirn is a regular contributor to the Book Review. His latest novel is "The Unbinding."

http://www.nytimes.com/2008/08/17/books/review/Kirn-t.html?8bu&emc=bua1

From Spider-Man to Ayn Rand

By DOUGLAS WOLK

STRANGE AND STRANGER

The World of Steve Ditko

By Blake Bell

Illustrated. 216 pp. Fantagraphics Books. $39.99

When an anonymous donor recently gave the Library of Congress Steve Ditko's original artwork from the 1962 comic book "Amazing Fantasy #15," the issue in which he created Spider-Man with the writer Stan Lee, barely anyone took notice. One of American comics' great visual stylists, Ditko also had a hand in the development of both Iron Man and the Hulk, but his characters' subsequent mass-media careers have made him neither rich nor particularly famous. He drew his greatest work for a flat page rate; Lee, his collaborator, was the grinning public face of Marvel Comics, while Ditko has refused all interviews and public appearances for decades. The comics scholar Blake Bell's overview of Ditko's career, illustrated on nearly every page, is anecdotal and critical rather than strictly biographical. Bell didn't have much of a choice: the endnotes reveal that he corresponded with Ditko for several years, but that in 2003 the cartoonist decided that both author and publisher were "anti-Ditko" and repudiated them.

Ditko drew his first comics as a professional in 1953, developing his haunted, alienated imagery in Z-grade horror and crime series. He quickly formed a longstanding affiliation with Charlton Comics, a Connecticut operation that published funnybooks to keep its presses running, paid the worst rates in the business and let artists draw more or less whatever they pleased.

By the early '60s, Ditko was doing his best work for Lee at Marvel, and the 40-odd Spider-Man stories he illustrated (and often plotted), built around images of frail, twisted bodies pirouetting through space, looked like no other comics before them. Neither did his magnificent tales of the "master of the mystic arts" Dr. Strange, avant-garde in every way except their unfailing narrative clarity — with a few squiggles, Ditko could evoke an alien dimension as surely as a Manhattan water tower.

He split with Lee and Marvel in 1966. By then, he'd fallen under the spell of Ayn Rand and Objectivism, and started producing an endless string of ham-fisted comics about how A is A and there is no gray area between good and evil and so on. "The Hawk and the Dove," for instance, concerns two superhero brothers who … oh, you've already figured it out. Ditko could still devise brilliantly disturbing visuals — the Question, one of his many Objectivist mouthpieces, is a man in a jacket, tie and hat, with a blank expanse of flesh for a face — and his drawing style kept evolving, even as his stories tediously parroted "Atlas Shrugged" and "The Fountainhead" at the expense of character, plot and ultimately bearability. By

the ’70s he was regarded as a slightly old-fashioned oddball; by the ’80s he was a commercial has-been, picking up wretched work-for-hire gigs. Bell suggests that, following the example of Rand’s John Galt, Ditko hacked out moneymaking work, saving his care for the crabbed Objectivist screeds he published with tiny presses. And boy, could Ditko hack: seeing samples of his Transformers coloring book and his Big Boy comic is like hearing Orson Welles sell frozen peas.

The portrait that emerges here is of an artist whose principles have ossified into bitter perversity. Bell relates stories of Ditko’s refusing to draw vampires because Objectivism rejects the supernatural; quitting a series because of a dispute over coloring production; and using a priceless old page of his original artwork as a cutting board. Ditko isn’t easy to love. As vivid as his work is, it’s never been pretty, and he’s never returned to his most famous creations for a victory lap or courted attention beyond acknowledgment of his work. The raw, nightmarish visions of his art are all he offers, and all he’s ever needed to offer.

Douglas Wolk writes regularly about comics for the Book Review. He is the author of “Reading Comics: How Graphic Novels Work and What They Mean.”

http://www.nytimes.com/2008/08/17/books/review/Wolk-t.html?8bu&emc=bua2

An Exercise in Empathy

By JANE GROSS

A participant in an exercise in simulated aging. (Kirk Irwin for The New York Times)

My colleague John Leland, who is older than he looks and younger than the 85-year-olds he wrote about in a story in Sunday's New York Times, encountered first-hand the physical and emotional losses that come with advanced age in the course of reporting on educational programs that simulate the experience.

The simulation program that Mr. Leland wrote about, Xtreme Aging, was created by the Macklin Intergenerational Institute, to raise the sensitivity of those who have regular professional contact with the elderly. Macklin's Xtreme Aging curriculum has also been featured on the Caring.com Web site , on NPR radio and in "The Smart Set,'' a publication of Drexel University. Some nursing schools, among them the one at Rutgers University, have courses that encourage this kind of empathy in health care professionals.

Many of us caring for elderly loved ones would surely benefit from an experience like Mr. Leland's, which he describes below.

I've always wanted to know what it is like to play shortstop for the Yankees. I never wondered what it is like to be 85. But odds are odds, let's face it. So it was with a sense of realistic premonitory curiosity that I joined a class of elder-care professionals in a program called Xtreme Aging, one of a number of aging simulation programs.

As I describe in the article, we put on Devo-type glasses and latex gloves, and tried to do ordinary things like count change or look up microscopic phone numbers in a directory – exactly the sort of things I get impatient over when someone at the supermarket or elsewhere is taking a long time doing it. What's taking so long? Now I know – brother, do I know.

Is it this premonition – that we will someday be the slow one ourselves – that accounts for some of the personal nastiness that comes up in impatience with the elderly? I think it's something slightly different, which could not be recreated in the simulation: the sense that the younger person's time is more valuable, and it is being consumed by the person for whom time is less valuable. Where these values come from is perhaps the subject for another blog post. But I suspect they are not shared by the person struggling to make change with stiff fingers, on a store outing that cost him or her significant effort.

But this is predictable stuff, and another limitation of the simulation was that it ignored all the strategies by which people compensate for their declining vision or dexterity. More moving for me, and for most of the class, was an emotional exercise in which we had to give up, one by one, all of our favorite people and freedoms, and all but two of our favorite possessions. Now we were ready to go into a nursing home. Parting with objects was easy. But how do you choose between your child and your spouse? I anguished over that, groaned – as did the others, all women who worked with the elderly – and then a minute later we all had to give up the other one as well.

If this is the new old age, I hope there's a newer one in the pipeline. Thanks to technology, so much of our lives now – creative, imaginative, intellectual, erotic, communicative, spiritual – involves little physical dexterity. The value judgments I describe above about the relative worth of time have less meaning than ever. But loss still registers as loss. Perhaps the grad school of Xtreme Aging can look at the things that are gained in old age.

To read Mr. Leland's story from the Sunday New York Times, "Simulating Age 85, With Lessons on Offering Care," click
http://www.nytimes.com/2008/08/03/us/03aging.html?scp=1&sq=leland%20xtreme%20aging&st=cse

http://newoldage.blogs.nytimes.com/2008/08/05/an-exercise-in-empathy/?ex=1233633600&en=b22b43da4b968764&ei=5087&WT.mc_id=HL-D-I-NYT-MOD-MOD-M056-ROS-0808-HDR&WT.mc_ev=cl

A Floating City With Junkyard Roots

By JULIE BLOOM

TROY, N.Y. — Three loud blasts from a steam whistle screamed out as the rain drizzled on the riverbank here. And the fleet of seven eclectic handmade ships slowly moved away.

Only minutes before their launching, on Friday around noon, a group of people, mostly in their 20s and 30s, was still preparing for the voyage down the Hudson River. In between bites of jelly doughnuts, the crew, dressed in hipster hillbilly chic, hustled to clean up pieces of scrap metal and ready the boats. In the middle stood the artist known as Swoon in a bright yellow rain poncho and jeans.

It is because of Swoon that this collection of artists, carpenters, musicians, filmmakers, seafarers and hangers-on was here. For the past year she has been preparing for this project, a floating trip that will take the group down the Hudson, from Troy through the harbor of New York to Long Island City, Queens, where the fleet will dock at the Deitch Studios and remain stationed as part of an exhibition beginning Sept. 7.

The project, “Swimming Cities of Switchback Sea,” Swoon’s latest large-scale work, is part floating artwork, part performance, part mobile utopia and seemingly part summer camp for grown-up artsy kids. For the work Swoon, 30, collaborated with musicians from the Minneapolis band Dark Dark Dark; the writer Lisa D’Amour, who contributed a play to be performed at stops along the way; the musician Sxip Shirey; and a host of others.

In the summers of 2006 and ’07 Swoon, known primarily as a street artist, did a similar project, “Miss Rockaway Armada,” in which she and a group of artists boated down the Mississippi on a large flotilla. It was essentially an experiment in communal life, and while many who took part are involved in “Swimming Cities,” the new work is more focused on the aesthetic aspect of the vessels.

Swoon said she began thinking about this voyage while working on the Mississippi trip. “From the first piece of plywood that we collected for the Rockaway, I knew that I would do this,” she said a week

before the launching, sitting on the dock near the Deitch outpost in Long Island City. Her red hair was pulled back from her face, and she was wearing a tank top, with black paint splattered across her shoulders, sea gulls squawking in the background. “The ‘Rockaway’ was this kind of experiment in all kinds of ideals,” she said. “And working collectively has its own beauties and nightmares, and so does working by yourself. I just thought I wanted a chance to take some of the same kinds of language of the ‘Rockaway’ and make it more of a guided artistic experience rather then a collective living experiment. I wanted to make something which really had the freedom of artistic expression, sculptural and aesthetic and all that stuff.”

She designed the exteriors of the seven vessels, and each reveals her sense of whimsy. Venice “was a big inspiration for this” she said, “the idea that there is this fantastical city perched on the water.” Other ideas that shaped the design included the romantic nature of the sea as well as the way cities form.

The materials were all salvaged: plywood from construction sites, old two-by-fours and packing plastic foam: “anything we could find or talk people into giving us instead of throwing away,” Swoon said. She has been ecologically conscious from the start. “Very early on from the first large installation,” she said, “I looked around, asked myself, Am I really going to clear cut half of a forest to make an installation, is that really conscionable? And of course the answer is no.”

The boats use recycled motors, one from a 1968 Mercedes, another from a Volkswagen Rabbit (itself recycled from “Miss Rockaway”). One uses a gasifier, which burns organic waste materials.

Each boat, which holds 9 to 13 people, has a captain, an engineer, a helmsman and first mate and a crew of deckhands. (A few passengers will be picked up along the way.) All the boats are named. Maria, made of wood and steel, looks like a mashed-up houseboat. During the performance a crew member will swing from a trapeze hanging from the bow.

There’s a canoe called Miss Cuttenclip, with delicately carved-out patterns resembling old lace. The skiff is Muh-he-kun-ne-tuk, the Mohican name for the Hudson. Looking like a large woman in a billowing skirt, Alice is the tall ship, made of wood and aluminum, with parts wrapped in bicycle tires, rope, bubble wrap and tape. Lucille, which primarily carries the band, has nonworking sails, floats on barrels and was modeled on junk boats in Asia. Althea, the steamboat, was built by Kinetic Steam Works in San Francisco, and is made of steel.

Swoon began working in May in New York. In early July a small group took over a gutted house in Troy and used the grounds as a building site, sleeping in the backyard at night.

Mounting a project of this scale is no small feat. Permits for both camping and performing had to be obtained at every stop along the river, including Kingston, Beacon, Nyack and Croton-on-Hudson. And for the trip through New York Harbor, a marine event permit was required. A’yen Tran, who helped coordinate the logistics along with Jeff Stark, said the group had to register the boats with the state. Safety training and a safety boat also had to be provided.

In the end, though, the piece is still a work of art, and the performance is what gives “Swimming Cities” its overarching narrative. On the day of the launching Ms. D’Amour said, “I’m realizing more and more what an amazing set I’m working with.”

For “Swimming Cities” the histories of the boats are recounted in a series of monologues, a structure tailored to the limitations of the situation. “I knew I had to write a performance for the crew, and I didn’t want to bring in a group of actors at the last minute,” Ms. D’Amour explained.

There’s a captain, who is the narrator, and six other characters, played by crew members, who tell conflicting stories about where the boats came from and where they’re going. As part of the action Maria

does a 360-degree turn, as the audience watches from the shore. The boats also perform a kind of lumbering elephant dance when they dock, a seemingly routine process transformed into a theatrical activity.

"I've never worked on something where the person who is welding the motors on one of the boats" is also a performer, Ms. D'Amour said, "and takes a break and comes and finds me upstairs with his hands filled with grease and says, 'I have a few minutes, can we rehearse?' "

Dark Dark Dark provides a live score, including a work sea shanty. A film crew is following the band for "Flood," a fictional piece that features the musicians as main characters on the Switchback Sea. The film is another example of how these artists, who come from the Bay Area, Minneapolis, Troy and Brooklyn, have created a kind of expanding collective in which one work grows and morphs into the next.

Though the group is adamant that its members are not hippies, on the day of the launching a retro feeling persisted. A Troy resident, Pete Stewart, 60, who had been watching the construction from his window, said: "This looks just like the '60s. It brings back old memories."

Shortly before setting off the group gathered in a circle. The men, in vests, trousers, beards and derby hats, seemed inspired by members of the Band. The women wore everything from light slips to purple jeans and orange crocs. Swoon thanked them for their help. "I'm a little dumbstruck," she said. A bottle of Champagne was uncorked, and Swoon ran around the circle dripping it into the mouths of her fellow travelers. More Champagne was gulped down, the boats were boarded, the steam whistle blew, and then they were off.

http://www.nytimes.com/2008/08/18/arts/design/18flot.html?th&emc=th

House Proud in Historic Enclave

By CELIA McGEE

OAK BLUFFS, Mass. — It serves no purpose except sea-air-scented confusion to look for Dorothy West's house on Dorothy West Avenue. Her cottage stands on Myrtle Avenue, in the part of Oak Bluffs known as the Highlands and since the early 20th century as a summer haven on Martha's Vineyard for an African-American social elite.

The street named for her more than a decade ago intersects with the one where she used to sit on her porch entertaining visitors — or, late in life, waited inside with manuscript pages and tiny scribbled notes for her Doubleday editor and friend, Jacqueline Kennedy Onassis, to arrive for their weekly work sessions on "The Wedding." That novel, her second and her first in 47 years, was finally published in 1995, when Miss West, as it was always important to address her, was 88.

But on Saturday it got a little easier to find her place.

Neighbors, friends, relatives and a passel of distinguished scholars, local officials and fellow authors gathered to dedicate the house as a site on the African American Heritage Trail of Martha's Vineyard. They unveiled a boulder solidly planted in West's front lawn and inset with a bronze plaque commemorating the youngest member of the Harlem Renaissance — "the Kid," as the Harvard law professor Charles J. Ogletree Jr. said in a speech, using the term of affection employed for her by Langston Hughes. Until she died in 1998 — also on Aug. 16 — Dorothy West was the final survivor of that cultural flowering.

Leonora Costanza, a friend who became West's caretaker and inherited the house that the author had moved into full time in 1943, stood nearby as Pat Bransford, a Vineyard friend of the West's, read a poem by the Harlem Renaissance poet Helene Johnson, who was West's cousin. Ms. Johnson and West, an only child, grew up like sisters in Boston. After they moved to New York in the 1920s, the writer Zora Neale Hurston lent the young ladies her apartment at 43 West 66th Street, where they were joined by West's beautiful, vivacious and complicated mother, Rachel, the model for Cleo, the central character in the novel West published in 1948, "The Living Is Easy," to much acclaim. Reissued in 1982 by the Feminist Press, it remains "an American masterpiece," said Cynthia Davis, an English professor at the University

of Maryland currently writing a biography of West with Verner D. Mitchell, an associate professor of English at the University of Memphis.

Dorothy West's father, Isaac Christopher West, a successful wholesale-fruit merchant nicknamed the Black Banana King, stayed behind in Boston, where Dottie, as she was called by those close to her, was raised in an imposing home, attended the prestigious Girls' Latin and, at 17, tied for second prize with Hurston in the short-story contest sponsored by Opportunity, the National Urban League magazine.

Her father, born into slavery in Virginia, first gave her mother a summer house on the Vineyard as a 21st birthday present. But that one, near the Oak Bluffs harbor, burned down.

"This is the first time we've had the house of an author included on the African American Heritage Trail, and it's fitting that it's Dorothy West's," said the Harvard professor Henry Louis Gates Jr., who rents a house every summer in Oak Bluffs. "I visited her there many times. She was so warm and charming. She would reminisce about people she knew — and people she didn't. She created a sort of English upper-class drawing-room effect that always made me want to have a cup of tea. There was definitely also that atmosphere to her writing."

In 1948, while working in the billing department at The Vineyard Gazette, West began a column on people, events and her beloved nature haunts in and around Oak Bluffs. "She was certainly the voice of black society on the Vineyard," said Mr. Gates. "I first came here in 1981, and it was only at the end of the summer that I realized that this was the same Dorothy West — who I had thought was long gone."

Another reason for West's unwanted obscurity, and her second novel's decades-long gestation, was the low profile she kept in the face of the militant or street-inflected African-American literature that emerged with the '60s.

But in the kind of twist with which West salted her writing, fame arrived in the 1990s when Oprah Winfrey produced a two-part television movie of "The Wedding." Many at the time were unaware that during the Depression, West worked as a welfare relief investigator and for the W.P.A. Federal Writers' Project, traveled to Britain with the cast of "Porgy and Bess" and joined other prominent black artists, activists and theater people on a trip to the Soviet Union to make the movie "Black and White." During the '30s she also founded and edited two magazines, The Challenge and, with Richard Wright, The New Challenge.

Halle Berry starred in "The Wedding," and "Dottie had Oprah on speed dial," said Abigail McGrath, the West niece whose wedding inspired the novel and who owns the cottage next door. "Once, she called Oprah when she thought someone had parked illegally in front of her house."

West stipulated in her will the creation of a writing and journalism scholarship at Martha's Vineyard Regional High School. Elaine Cawley Weintraub, co-founder of the African American Heritage Trail, teaches history there. "I started the trail because many of my students were African-Americans from the Vineyard," she said, "and there was almost nothing about the African-American presence, which goes back as far as whites'."

On a bus tour that followed the dedication ceremony Ms. Weintraub pointed out designated landmarks associated with historical figures like the Vineyard's only African-American whaling captain; the 18th-century preacher who brought Methodism to the island; Isabell and Adam Clayton Powell Jr., whose former house is at the corner of Myrtle and Dorothy West Avenues; and the family of Charles and Henrietta Shearer, who boarded many prominent artists, writers and musicians at their Shearer Cottage, where a celebratory reception was held late Saturday afternoon.

One of the many people pleased with the fresh attention that the new memorial plaque will bring to West and her work was her goddaughter, Blythe Coleman-Simmons, Ms. Costanza's daughter and the sixth generation of her family in the Highlands.

"Dorothy was like a grandmother to me," she said, "and a mother to my mother. When I was 2, I started to dress myself, with everything on backwards or inside out, and say, 'I'm going to Dottie's house.' Later we would talk about everything and take walks. She loved feeding the birds. She collected stray cats. I would practice my writing and reading with her. But the richness of her house should also come from other people seeing its richness. And seeing where that magnificent writing came from."

http://www.nytimes.com/2008/08/18/books/18west.html?th&emc=th

Redefining Suicide Risk — and Prevention Strategy

Six percent of undergraduates and 4 percent of graduate students seriously considered suicide within the last 12 months, according to a national survey released Sunday at the annual meeting of the American Psychological Association. More than half of those students never sought professional help or told anyone about their suicidal feelings.

The paper on the study called for colleges to rethink their suicide prevention strategies. While colleges do a good job of offering counseling to those who present themselves "in crisis," they need to focus more on the overall campus environment if they are going to have an impact on reducing the numbers of students who seriously consider suicide. The study was conducted by a research team at the University of Texas at Austin, and involved surveys of 26,000 students at 70 colleges and universities who were reached through the National Research Consortium of Counseling Centers in Higher Education.

Of all of the students, more than half reported at least one episode of suicidal thinking at some point in their lives. Five percent reported making a suicide attempt at least once in their lifetime.

Of those reporting suicidal thoughts, most described the period as "intense and brief," with more than half of the episodes lasting one day or less. But the researchers stressed that the brevity of these episodes did not suggest that they were not serious threats. More than half of these students engage in specific planning during the periods — plotting scenarios, figuring out how they might kill themselves, writing notes, etc.

Fourteen percent of the undergraduates who seriously considered suicide in the last year and 8 percent of graduate students made a suicide attempt. Of those who attempted suicide, 19 percent of undergraduates and 28 percent of graduate students required medical attention.

Students seriously considering suicide gave the following reasons (in order): wanting relief from emotional or physical pain, problems with romantic relationships, the desire to end their life and problems with college or academics.

David J. Drum, the lead author of the paper, is a professor of education psychology and former director of the counseling center at Texas. In an interview Sunday, he said that the research shows the need for "a new paradigm" in campus suicide prevention.

"When you have 6 percent of your undergraduates who can report that they seriously consider suicide, that tells you that it's a far more common phenomenon than you see when you just deal with students in crisis," he said.

Especially since so many of these students never seek help, he said, colleges need to look at the circumstances that create "suicide ideation" and confront those — while continuing to serve those who seek counseling.

Given clear patterns between relationship violence, sexual assault, and substance abuse with suicide, efforts to reduce their prevalence can reduce the number of people who think about suicide. Further, he said that more depression awareness programs, as well as efforts to promote "campus inclusion" so students are less likely to feel "isolated and alone," may have an impact.

While counseling centers need more resources to help those who seek assistance, Drum said that colleges must focus on the factors that "predispose people to suicide" and address them. Ultimately, he said, "we have to do things that strengthen the health of the entire student body."

— Scott Jaschik

The original story and user comments can be viewed online at
http://insidehighered.com/news/2008/08/18/suicide.

Olympic Swimmers Shattering Records In NASA-Tested Suit

Olympic swimmer Michael Phelps helped develop the swimsuit that used materials tested at NASA Langley. (Credit: Speedo)

ScienceDaily (Aug. 18, 2008) — Swimmers from around the world are setting world and Olympic records in Beijing this month and most are doing it wearing a swimsuit made of fabric tested at NASA.

Among the Olympic gold medalists wearing Speedo's LZR Racer are Americans Michael Phelps -- who has now won more Olympic gold medals than any athlete in the modern era -- and Natalie Coughlin.

Both had a hand in developing the skintight body suit.

So did aerospace engineer Steve Wilkinson from NASA's Langley Research Center in Hampton, Va.

Wilkinson, who says he's not much of a swimmer himself, is watching this summer's Olympics with enthusiasm.

"I'm paying very close attention to the swimmers' times," said Wilkinson. "I'm amazed that so many athletes are wearing a fabric I tested in a laboratory in Hampton, Virginia."

Researcher Wilkinson has tested dozens of swimsuit fabrics in NASA Langley's 7- by 11-Inch Low Speed Wind Tunnel.

"This is a fundamental research facility," said Wilkinson. "What we look at are concepts for reducing drag on otherwise smooth surfaces. This is more directed toward fundamental physics … the interactions between the flow AND THE SURFACE."

The fabric that made it through Wilkinson's wind tunnel analysis has already caused a big splash since the LZR Racer swimsuit was introduced in February. Even before the Olympics swimmers wearing the skin-tight body suit set 48 world records.

But how did NASA get involved in what is probably the most talked-about swimsuit since the bikini? Warnaco Inc., the U.S. licensee of the Speedo swimwear brand, approached NASA Langley to test fabric samples, since NASA Langley has researched drag reduction for aircraft and even boats for decades.

"We evaluated the surface roughness effects of nearly 60 fabrics or patterns in one of our small low speed wind tunnels," said Wilkinson. "We were assessing which fabrics and weaves had the lowest drag. The tests have generally shown the smoother the fabric, the lower the drag."

Just like reducing drag helps planes fly more efficiently, reducing drag helps swimmers go faster. Studies indicate viscous drag or skin friction is almost one-third of the total restraining force on a swimmer. Wind tunnel tests measure the drag on the surface of the fabrics.

"The fabric comes in the form of fabric tubes, a small diameter fabric tube," Wilkinson added. "We pull that over our smooth flat model, which is an aluminum plate underneath. We prepare the edges so they're straight and square with no protruding corners or edges to interfere with the drag on the surface."

The plate goes into the small wind tunnel test section. With a flip of a switch, air flows over it. Wilkinson runs the tunnel through a number of wind speeds and, with the help of sensors, measures drag on the surface. He records the data and then sends it on to Speedo researchers.

Speedo's research and development team, Aqualab, takes the results and uses them to help create advanced "space-age" swimsuit designs.

Wilkinson says he never expected that he would test swimsuit fabric when he started at NASA 30 years ago. He adds he gets a lot of chuckles from his colleagues. As he's watching the Olympics, knowing that he played a small part in swimming history, Wilkinson may be having the last laugh.

Adapted from materials provided by NASA/Langley Research Center.

http://www.sciencedaily.com:80/releases/2008/08/080817231406.htm

Prototype Test For Predicting Clinical Outcome For Melanoma Patients

ScienceDaily (Aug. 18, 2008) — Investigators from the Melbourne Center of the international Ludwig Institute for Cancer Research (LICR) and Pacific Edge Biotchnology Ltd today reported that they have developed a test to predict whether a patient will progress rapidly from Stage III melanoma to metastatic Stage IV cancer and death.

More than 70% of patients with Stage III melanoma — melanoma that has spread to the lymph nodes — will typically have a rapid time to progression (TTP) to Stage IV melanoma, and pass away within five years of their diagnosis. However, the remaining <30% of patients will have a slow TTP to Stage IV and will have prolonged survival. Not being able to distinguish between these patient subtypes means that some patients might undergo aggressive, often toxic, treatments unnecessarily. The unpredictable and significant discrepancies in TTP and survival could also cloud the interpretation of results from clinical trials of new melanoma therapies.

The LICR Melbourne team, together with collaborators from Pacific Edge Biotechnology Limited in New Zealand, has developed a prototype test that can distinguish between these two patient subtypes with 85-90% accuracy. However, the team cautions that these findings must be validated in a larger number of patients before the test can be applied routinely as a prognostic tool.

According to the senior author of the study, LICR's Professor Jonathan Cebon, M.D., the predictive test could assist patients and their health care teams in making treatment decisions. Perhaps most importantly, being able to distinguish between the subtypes could have a tremendous impact on the development of new melanoma therapies.

"One of the major problems we have in clinical trials for new melanoma therapies is that we can't identify the people who are going to have a slower disease progression no matter what they receive in a clinical trial," says Professor Cebon. "When new treatments are tested it is necessary to show clinical benefit by comparing patients who receive the new therapy with those who do not. Although patients might all have the same type of cancers, there can be big differences in their survival simply because their cancers behave differently - and this may have nothing to do with the treatment. If we are able to identify the good players and the bad players up-front, it becomes a whole lot easier figuring out whether good results are due to the new treatment or not. Most importantly far fewer patients would be needed for the clinical trials. It's partly because we can't clinically identify subtypes of patients that we have to do very large and very expensive trials. And, of course, this increases the time it takes to test the clinical benefit of potential new therapies."

The joint Australian/New Zealand team used microarrays to measure the expression of more than 30,000 genes in lymph node sections taken from 29 patients with Stage III melanoma. There were 2,140 genes differentially expressed in the sections from people who had already had a "poor" outcome (average TTP of just four months) and patients that had had a "good" outcome (average TTP of 40+ months). Using statistical analyses, the team identified 21 genes that could be used to differentiate between the two subtypes of patients in the retrospective analysis.

This gene signature was then used to prospectively analyze another 10 patients, with the clinical outcome for nine of the 10 (90%) patients proving to be predicted accurately. The one patient who was incorrectly predicted to have a "good" prognosis did have a rapid TTP to Stage IV. However, this patient went on to have a prolonged survival of six years. The team also applied the test to published data sets and showed they could get a prediction accuracy of 85%, event though data was not available for all 21 genes in the published literature.

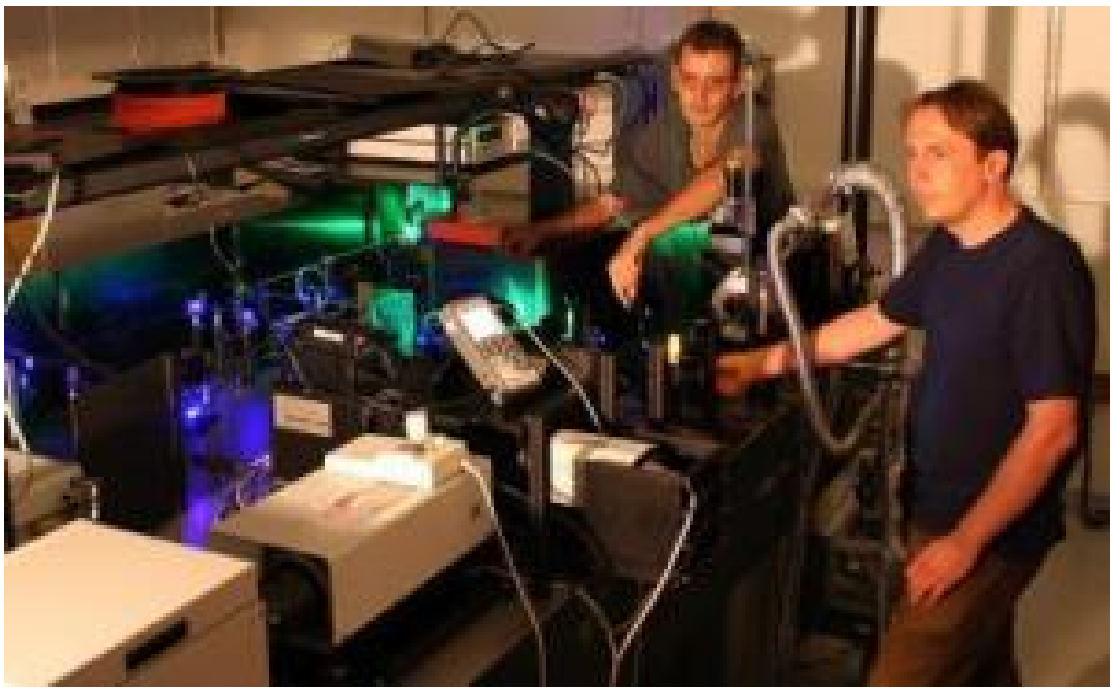
This study was conducted under the auspices of the Hilton – Ludwig Cancer Metastasis Initiative. It was led by investigators from: LICR Melbourne Center Austin Health, Melbourne, Australia; Department of

Biochemistry, University of Otago, Otago, New Zealand; Pacific Edge Biotechnology Limited, Dunedin, New Zealand, and; Department of Statistics, University of Auckland, Auckland, New Zealand.

Adapted from materials provided by Ludwig Institute for Cancer Research, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2008/08/080815072152.htm

Toward Plastic Spin Transistors: Ultrafast Computers And Electronics On The Horizon?



University of Utah physicists John Lupton and Christoph Boehme use green and blue laser beams to "excite" a small piece of an organic or "plastic" polymer (glowing orange near Boehme's right hand) that may serve as a light-emitting diode for computer and TV displays and perhaps lighting. A new study by Boehme, Lupton and colleagues sheds light on the maximum possible efficiency of organic LEDS. The physicists also found they could use the "spin" within electrons to control an electrical current -- a step toward developing "spin transistors" for a future generation of computers and electronics. (Credit: Nick Borys, University of Utah)

ScienceDaily (Aug. 18, 2008) — University of Utah physicists successfully controlled an electrical current using the "spin" within electrons – a step toward building an organic "spin transistor": a plastic semiconductor switch for future ultrafast computers and electronics.

The study also suggests it will be more difficult than thought to make highly efficient light-emitting diodes (LEDs) using organic materials. The findings hint such LEDs would convert no more than 25 percent of electricity into light rather than heat, contrary to earlier estimates of up to 63 percent.

Organic semiconductor or "plastic" LEDs are much cheaper and easier to fabricate than existing inorganic LEDs now used in traffic signals, some building lighting and as indicator lights on computers, TVs, cell phones, DVD players, modems, game consoles and other electronics.

The study – published online Sunday, Aug. 17 in the journal Nature Materials – was led by Christoph Boehme and John Lupton, assistant and associate professors of physics, respectively, at the University of Utah.

The promising news about spin transistors and sobering news about organic LEDs (OLEDs) both stem from an experiment that merged organic semiconductor electronics and spin electronics, or spintronics, which is part of quantum mechanics – the branch of physics that describes the behavior of molecules, atoms and subatomic particles.

"This is the first time anyone has done really fundamental, hands-on quantum mechanics with an organic LED," Lupton says. "This is tough stuff."

Lupton and Boehme conducted the study with postdoctoral researcher Dane McCamey and four University of Utah physics doctoral students: Heather Seipel, Seo-Young Paik, Manfred Walter and Nick Borys.

The Spin on Spintronics

An atom includes a nucleus of protons and neutrons, and a shell of orbiting electrons. In addition to an electrical charge, some nuclei and all electrons have a property known as "spin," which is like a particle's intrinsic angular momentum. An electron's spin often is described as a bar magnet that points up or down.

Computers and other electronics work because negatively charged electrons flow as electrical current. Computerized information is reduced by transistors to a binary code of ones or zeroes represented by the presence or absence of electrons in semiconductors.

Researchers also hope to develop even smaller, faster computers by using electrons' spin as well as their electrical charge to store and transmit information; the up and down spins of electrons also can represent ones and zeroes in computing.

Lupton says that physicists already have shown that spins can carry information in nonorganic materials. In 2004, other Utah physicists reported building the first organic "spin valve" to control electrical current.

In the new study, the researchers showed that information can be carried by spins in an organic polymer, and that a spin transistor is possible because "we can convert the spin information into a current, and manipulate it and change it," says Lupton. "We are manipulating this information and reading it out again. We are writing it and reading it."

Boehme says spin transistors and other spin electronics could make possible much smaller computer chips, and computers that are orders of magnitude faster than today's.

"Even the smallest transistor today consists of hundreds of thousands of atoms," says Boehme. "The ultimate goal of miniaturization is to implement electronics on the scale of atoms and electrons."

Shedding Light on Organic LEDs

LED semiconductors using compounds of gallium, arsenic, indium and other inorganic materials have made their way into traffic signals, vehicle brake lights and home electronics in recent years. Some inorganic LEDs can convert 47 percent to 64 percent of incoming electricity into white light rather than waste heat. But efforts to replace incandescent and even compact fluorescent light bulbs with LEDs have been hindered by costs exceeding $100 per LED bulb.

LEDs made of electrically conducting organic materials are cheaper and easier to manufacture, but their efficiency long was thought to have an upper limit of 25 percent.

A 2001 Nature paper by other University of Utah physicists suggested it might be possible to make organic LEDs that converted 41 percent to 63 percent of incoming electricity into light. But the new study suggests 25 percent efficiency may be correct – at least for the organic polymer studied – pure MEH-PPV – and possibly for others.

"Doping" organic semiconductors with other chemicals someday might lead to organic LED efficiencies above 25 percent, but Boehme says he is skeptical.

Even if organic LEDs are less efficient and have a shorter lifespan than inorganic LEDs, they still may be more economical because their cost is so much less, he adds.

Boehme says organic LEDs' greatest promise is not in lighting, but to replace the LCD (liquid crystal display) technology in modern televisions and computer screens. Organic LEDs will be much cheaper, can be made on flexible materials, have a wider viewing angle and color range and will be more energy efficient than LCDs, he says.

Flip-Flopping on Flipping and Flopping

LEDs produce light when incoming negative and positive electrical charges – electrons and "holes" – combine. The spins of each electron-hole pair can combine in four quantum states, which in turn can combine in two different ways to form:

- A "singlet," with a net spin of zero (up-down minus down-up).
- A "triplet," with net spin one (up-up, down-down or up-down plus down-up).

In some organic materials, singlets emit light when they decay, and triplets do not. So the efficiency of an organic LED depends on the relative production of singlets and triplets. The fact that a singlet is only one of four quantum states suggests the maximum efficiency of an organic LED can be 25 percent – something the new study supports.Lupton, Boehme used a plastic semiconductor LED in the form of a piece of the polymer MEH-PPV measuring about one-twelfth-inch long by one-eighth-inch wide. It was mounted on a piece of glass about 2 inches long and one-sixth inch wide.

Electrodes were attached, and the apparatus was bombarded by a microwave pulse for a few nanoseconds (billionths of a second) to turn and align the spins of electron-hole pairs in the LED. The electrodes also were used to measure the strength of the electrical current from the device.

"Just like a mass on a spring, the pulse produces an oscillation of the spins [of singlets and triplets] in the organic LED," Lupton says. "That was unexpected."

The 2001 study indicated that some triplets randomly, unpredictably "lose their memory," changing spin orientation or "flipping" to become singlets, boosting possible organic LED efficiencies as high as 63 percent. The new study, however, found triplets "flip" into singlets too slowly to produce much light, Boehme says.

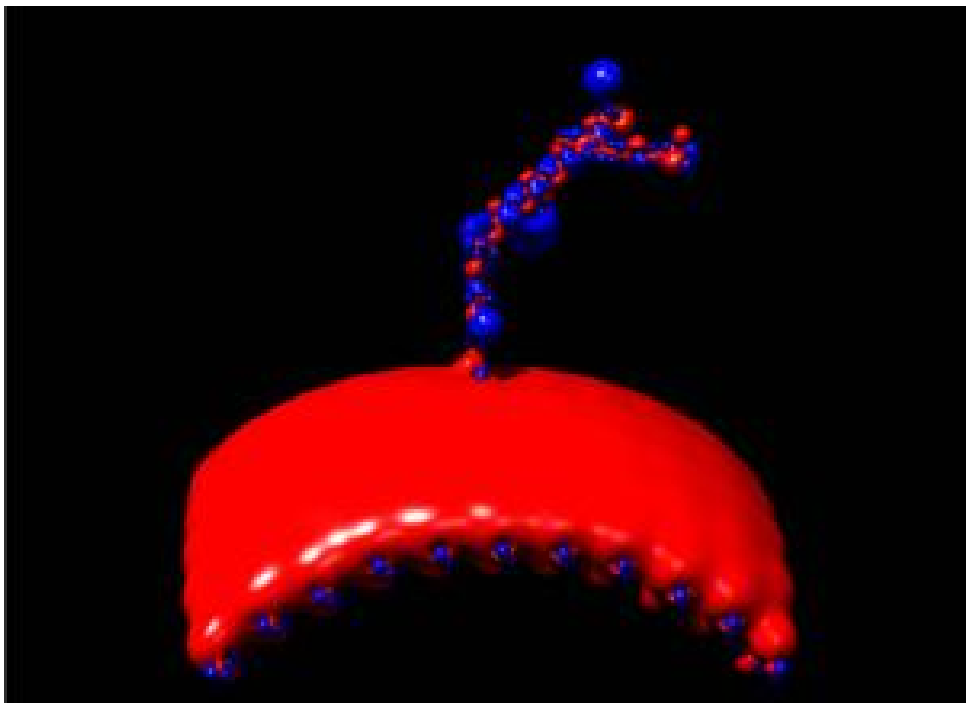
Instead, the study showed electron spin quantum states can rhythmically and predictably oscillate or "flop" between triplets and singlets and back again for one-half microsecond (millionths of a second) when excited by microwaves.

Because the combination of electrons and holes that produces light happens faster than that, "flipping likely isn't involved in producing light" from the LED, and thus it will be difficult to make organic LEDs with efficiencies above 25 percent, Lupton says.

Adapted from materials provided by University of Utah.

http://www.sciencedaily.com/releases/2008/08/080817223534.htm

Scientists Overcome Nanotechnology Hurdle



An image from a molecular dynamics simulation showing negatively (red) and positively (blue) charged areas of the nanoparticle. Part of the peptide is shown in the lower half of the frame and the reactive molecule attached in the middle (Credit: Duschesne et al: Supramolecular Domains in Mixed Peptide Self-Assembled Monolayers on Gold Nanoparticles. ChemBioChem. DOI: 10.1002/cbic.200800326. Copyright Wiley-VCH Verlag GmbH & Co. KGaA.)

ScienceDaily (Aug. 18, 2008) — When you make a new material on a nanoscale how can you see what you have made? A team lead by a Biotechnology and Biological Sciences research Council (BBSRC) fellow has made a significant step toward overcoming this major challenge faced by nanotechnology scientists.

With new research published August 13 in ChemBioChem, the team from the University of Liverpool, The School of Pharmacy (University of London) and the University of Leeds, show that they have developed a technique to examine tiny protein molecules called peptides on the surface of a gold nanoparticle. This is the first time scientists have been able to build a detailed picture of self-assembled peptides on a nanoparticle and it offers the promise of new ways to design and manufacture novel materials on the tiniest scale - one of the key aims of nanoscience.

Engineering new materials through assembly of complex, but tiny, components is difficult for scientists. However, nature has become adept at engineering nanoscale building blocks, e.g. proteins and RNA. These are able to form dynamic and efficient nanomachines such as the cell's protein assembly machine (the ribosome) and minute motors used for swimming by bacteria.

The BBSRC-funded team, led by Dr Raphaël Lévy, has borrowed from nature, developing a way of constructing complex nanoscale building blocks through initiating self-assembly of peptides on the surface of a metal nanoparticle. Whilst this approach can provide a massive number and diversity of new materials relatively easily, the challenge is to be able to examine the structure of the material.

Using a chemistry-based approach and computer modelling, Dr Lévy has been able to measure the distance between the peptides where they sit assembled on the gold nanoparticle. The technique exploits the ability to distinguish between two types of connection or 'cross-link' - one that joins different parts of the same molecule (intramolecular), and another that joins together two separate molecules (intermolecular).

As two peptides get closer together there is a transition between the two different types of connection. Computer simulations allow the scientists to measure the distance at which this transition occurs, and therefore to apply it as a sort of molecular ruler. Information obtained through this combination of chemistry and computer molecular dynamics shows that the interactions between peptides leads to a nanoparticle that is relatively organized, but not uniform. This is the first time it has been possible to measure distances between peptides on a nanoparticle and the first time computer simulations have been used to model a single layer of self-assembled peptides.

Dr Lévy said: "As nanotechnology scientists we face a challenge similar to the one faced by structural biologists half a century ago: determining the structure with atomic scale precision of a whole range of nanoscale materials. By using a combination of chemistry and computer simulation we have been able to demonstrate a method by which we can start to see what is going on at the nanoscale.

"If we can understand how peptides self-assemble at the surface of a nanoparticle, we can open up a route towards the design and synthesis of nanoparticles that have complex surfaces. These particles could find applications in the biomedical sciences, for example to deliver drugs to a particular target in the body, or to design sensitive diagnostic tests. In the longer term, these particles could also find applications in new generations of electronic components."

Professor Nigel Brown, BBSRC Director of Science and Technology, said: "Bionanotechnology holds great promise for the future. We may be able to create stronger, lighter and more durable materials, or new medical applications. Basic science and techniques for working at the nanoscale are providing the understanding that will permit future such applications of bionanotechnology."

Journal reference:

1. Duchesne et al. **Supramolecular Domains in Mixed Peptide Self-Assembled Monolayers on Gold Nanoparticles**. *ChemBioChem*, 2008; NA DOI: 10.1002/cbic.200800326

Adapted from materials provided by Biotechnology and Biological Sciences Research Council.

http://www.sciencedaily.com/releases/2008/08/080813095718.htm

'Virtual Archaeologist' Reconnects Fragments Of An Ancient Civilization

This is one of the reassembled wall mosaics from the ancient Greek civilization Thera, which was buried under volcanic ash more than 3,500 years ago. (Credit: Princeton Graphics Group)

ScienceDaily (Aug. 17, 2008) — For several decades, archaeologists in Greece have been painstakingly attempting to reconstruct wall paintings that hold valuable clues to the ancient culture of Thera, an island civilization that was buried under volcanic ash more than 3,500 years ago.

This Herculean task -- more than a century of further work at the current rate -- soon may get much easier, thanks to an automated system developed by a team of Princeton University computer scientists working in collaboration with archaeologists in Greece.

The new technology "has the potential to change the way people do archaeology," according to David Dobkin, the Phillip Y. Goldman '86 Professor in Computer Science and dean of the faculty at Princeton.

Dobkin and fellow researchers report on their work in a paper to be presented Aug. 15 in Los Angeles at the Association of Computing Machinery's annual SIGGRAPH conference, widely considered the premier meeting in the field of computer graphics.

"This approach really brings in the computer as a research partner to archaeologists," said Dobkin, who got the inspiration for the project after a 2006 visit to the archaeological site of Akrotiri on the island of Thera, which in present-day Greece is known as Santorini.

To design their system, the Princeton team collaborated closely with the archaeologists and conservators working at Akrotiri, which flourished in the Late Bronze Age, around 1630 B.C.E.

Reconstructing an excavated fresco, mosaic or similar archaeological object is like solving a giant jigsaw puzzle, only far more difficult. The original object often has broken into thousands of tiny pieces -- many

of which lack any distinctive color, pattern or texture and possess edges that have eroded over the centuries.

As a result, the task of reassembling artifacts often requires a lot of human effort, as archaeologists sift through fragments and use trial and error to hunt for matches.

While other researchers have endeavored to create computer systems to automate parts of this undertaking, their attempts relied on expensive, unwieldy equipment that had to be operated by trained computer experts.

The Princeton system, by contrast, uses inexpensive, off-the-shelf hardware and is designed to be operated by archaeologists and conservators rather than computer scientists. The system employs a combination of powerful computer algorithms and a processing system that mirrors the procedures traditionally followed by archaeologists.

"We mimic the archaeologists' methods as much as possible, so that they can really use our system as a tool," said Szymon Rusinkiewicz, an associate professor of computer science whose research team led the Princeton effort. "When fully developed, this system could reduce the time needed to reconstruct a wall from years to months. It could free up archaeologists for other valuable tasks such as restoration and ethnographic study."

In 2007, a large team of Princeton researchers made a series of trips to Akrotiri, initially to observe and learn from the highly skilled conservators at the site, and later to test their system. During a three-day visit to the island in September 2007, they successfully measured 150 fragments using their automated system.

Although the system is still being perfected, it already has yielded promising results on real-world examples. For instance, when tested on a subset of fragments from a large Akrotiri wall painting, it found 10 out of 12 known matches. Further, it found two additional matches that were previously unknown.

"This showed that the system could work in a real-life situation," said Tim Weyrich, a postdoctoral teaching fellow in computer science at Princeton who is the technical lead researcher on the project and who designed many of its components. The team is planning another trip to the site this fall to permanently install the system for the archaeologists' use, said Weyrich, who in September will become an assistant professor of computer science at University College London.

The setup used by the Princeton researchers consists of a flatbed scanner (of the type commonly used to scan documents and which scans the surface of the fragment), a laser rangefinder (essentially a laser beam that scans the width and depth of the fragment) and a motorized turntable (which allows for precise rotation of the fragment as it is being measured). These devices are connected to a laptop computer.

By following a precisely defined and intuitive sequence of actions, a conservator working under the direction of an archaeologist can use the system to measure, or "acquire," up to 10 fragments an hour. The flatbed scanner first is used to record several high-resolution color images of the fragment. Next, the fragment is placed on the turntable, and the laser rangefinder measures its visible surface from various viewpoints. The fragment is then turned upside down and the process is repeated.

Finally, computer software, or algorithms, undertake the challenging work of making sense of this information. The Princeton researchers have dubbed the software that they have developed "Griphos," which is Greek for puzzle or riddle.

One algorithm aligns the various partial surface measurements to create a complete and accurate three-dimensional image of the piece. Another analyzes the scanned images to detect cracks or other minute surface markings that the rangefinder might have missed.

The system then integrates all of the information gathered -- shape, image and surface detail -- into a rich and meticulous record of each fragment.

"This in itself is extremely useful information for archaeologists," said Weyrich.

Once it has acquired an object's fragments, the system begins to reassemble them, examining a pair of fragments at a time. Using only the information from edge surfaces, it acts as a virtual archaeologist, sorting through the fragments to see which ones fit snugly together.

"Having this ability to really exhaustively try everything very quickly could potentially be quite helpful," said Benedict Brown, whose doctoral thesis, completed recently under the direction of Rusinkiewicz, is devoted in large part to the fresco project.

Analyzing a typical pair of fragments to see whether they match is very fast, taking only a second or two. However, the time needed to reassemble a large fresco may be significant, as the system must examine all possible pairs of fragments. To make the system run faster, the researchers are planning to incorporate a number of additional cues that archaeologists typically use to simplify their searching for matching fragments. These data include information such as where fragments were found, their pigment texture and their state of preservation.

However, Weyrich noted, Princeton's system will never replace the experience, contextual knowledge and "soft skills" that conservators and archaeologists bring to the table. "Reconstructing these frescoes is incredibly complex, given the condition of the fragments and the sheer number of fragments," said Weyrich. "The computer takes over the laborious parts of the process while leaving the important, intuitive decisions to the humans."

http://www.sciencedaily.com/releases/2008/08/080815130417.htm

Old Growth Giants Limited By Water-pulling Ability

David Woodruff of the USDA Forest Service climbing high into an old-growth Douglas fir forest. (Credit: Image courtesy of Oregon State University)

ScienceDaily (Aug. 17, 2008) — The Douglas-fir, state tree of Oregon, towering king of old-growth forests and one of the tallest tree species on Earth, finally stops growing taller because it just can't pull water any higher, a new study concludes.

This limit on height is somewhere above 350 feet, or taller than a 35-story building, and is a physiological tradeoff between two factors in the tree's wood - a balance between efficiency and safety in transporting water to the uppermost leaves.

The findings are being published this week in Proceedings of the National Academy of Sciences, by a team of scientists from Oregon State University and the U.S.D.A. Forest Service. The research was funded by grants from the U.S. Department of Agriculture and the Forest Service.

"People have always been fascinated by how some trees, such as Douglas-fir or redwoods, can grow so tall," said Barb Lachenbruch, a professor of wood science at Oregon State University. "This is not an easy thing to do. Think about trying to drink water through a narrow, 350-foot-long straw. It takes a lot of suction."

Douglas-fir wood consists mostly of dead cells called "tracheids" that function in water transport and physical support, the researchers said. These tracheids have pits on their sides that function as valves, allowing water to go from one tracheid to the next, and the pits have a membrane with an impermeable middle. Normally, water flows through the porous edges of the membrane, but if there's an air bubble in one tracheid, the membrane moves to the side and blocks off the pit so air bubbles can't spread.

Although it's important to allow water to pass efficiently from one wood cell to the next, air bubbles would block water movement altogether. Because water is pulled through a tree by the forces of evaporation from the leaf surfaces, the water is in "tension," like a pulled rubber band. If an air bubble gets in, it's like the rubber band breaking and water can no longer be transported. With a 350-foot-long water column, there's a lot of tension on the water in the cells at the top of the tree, and a lot of force trying to get errant air bubbles to enter.

"Higher and higher in the tree, the valves are able to withstand more pulling force from the long heavy column of water before air bubbles can be sucked through," Lachenbruch said. "But the problem is that the valves become less efficient at letting water pass. The height at which no water would pass at all, according to our models, coincides the tallest records for Douglas-fir, about 350 to 400 feet."

Trees of that height were discovered in Washington and British Columbia in the late 19th and early 20th centuries. The tallest Douglas-fir today is a 326-foot-tall tree in Coos County, Oregon.

"As you go higher and higher in a Douglas-fir tree, it's almost like experiencing a drought," said Rick Meinzer, a Forest Service scientist at the Pacific Northwest Research Station. "And that's what we see at the tops of very tall trees. The foliage is struggling to get enough water and seems to be under drought stress. It's not unusual to see periodic die-back at the tops of very tall Douglas-fir trees that are near their height limits."

At a specific height determined by the physical structure of these pits and their membranes, the scientists discovered, the fierce resistance put up by the Douglas-fir to prevent any spread of air bubbles also prevents water from being pulled any higher. That is where it finally stops growing in height, no matter how favorable any other conditions might be, such as climate, soil or water availability.

The studies, Meinzer said, may improve our understanding of how trees grow in height and may be able to adapt to different environments, including their ability to deal with droughts or climate change.

Although height can be important in a competition for sunlight and photosynthesis, natural selection has not favored a wood structure in Douglas-fir that facilitates water transport at even greater tensions and allows for greater height, the scientists noted in their study.

Apparently 350 feet is tall enough.

Adapted from materials provided by Oregon State University.

This research by the Princeton Graphics Group was funded by the Kress Foundation, the Seeger Foundation, the Thera Foundation, the Cotsen Family Foundation and the National Science Foundation.

Paper citation: "A System for High-Volume Acquisition and Matching of Fresco Fragments: Reassembling Theran Wall Paintings" by Benedict Brown, Corey Toler-Franklin, Diego Nehab, Michael Burns, David Dobkin, Andreas Vlachopoulos, Christos Doumas, Szymon Rusinkiewicz and Tim Weyrich. ACM Transactions on Graphics (Proc. SIGGRAPH), 27(3) 2008.

Adapted from materials provided by Princeton University, Engineering School, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2008/08/080811195319.htm

Dying Frogs Sign Of A Biodiversity Crisis

Carcasses of Southern Yellow-legged Frogs in Sixty Lake Basin in Sierra Nevada, California. The frogs died of chytridiomycosis, an amphibian disease caused by a particularly virulent fungus. (Credit: Vance Vredenburg)

ScienceDaily (Aug. 17, 2008) — Devastating declines of amphibian species around the world are a sign of a biodiversity disaster larger than just frogs, salamanders and their ilk, according to researchers from the University of California, Berkeley.

In a new article published online in the journal Proceedings of the National Academy of Sciences, the researchers argue that substantial die-offs of amphibians and other plant and animal species add up to a new mass extinction facing the planet.

"There's no question that we are in a mass extinction spasm right now," said David Wake, professor of integrative biology at UC Berkeley. "Amphibians have been around for about 250 million years. They made it through when the dinosaurs didn't. The fact that they're cutting out now should be a lesson for us."

The study, co-authored by Wake and Vance Vredenburg, research associate at the Museum of Vertebrate Zoology at UC Berkeley and assistant professor of biology at San Francisco State University, will appear in a special supplement to the journal featuring papers based on presentations from the December 2007

Arthur M. Sackler Colloquium of the National Academy of Sciences, "In the Light of Evolution II: Biodiversity and Extinction."

New species arise and old species die off all the time, but sometimes the extinction numbers far outweigh the emergence of new species. Extreme cases of this are called mass extinction events, and there have been only five in our planet's history, until now.

The sixth mass extinction event, which Wake and others argue is happening currently, is different from the past events. "My feeling is that behind all this lies the heavy hand of Homo sapiens," Wake said.

There is no consensus among the scientific community about when the current mass extinction started, Wake said. It may have been 10,000 years ago, when humans first came from Asia to the Americas and hunted many of the large mammals to extinction. It may have started after the Industrial Revolution, when the human population exploded. Or, we might be seeing the start of it right now, Wake said.

But no matter what the start date, empirical data clearly show that extinction rates have dramatically increased over the last few decades, Wake said.

The global amphibian extinction is a particularly bleak example of this drastic decline. In 2004, researchers found that nearly one-third of amphibian species are threatened, and many of the non-threatened species are on the wane.

Our own backyard provides a striking example, Wake said. He and his colleagues study amphibians in the Sierra Nevada, and the picture is grim there, as well.

"We have these great national parks here that are about as close as you can get to absolute preserves, and there have been really startling drops in amphibian populations there, too," Wake said.

Of the seven amphibian species that inhabit the peaks of the Sierra Nevada, five are threatened. Wake and his colleagues observed that, for two of these species, the Sierra Nevada Yellow-legged Frog and the Southern Yellow-legged Frog, populations over the last few years declined by 95 to 98 percent, even in highly protected areas such as Yosemite National Park. This means that each local frog population has dwindled to 2 to 5 percent of its former size. Originally, frogs living atop the highest, most remote peaks seemed to thrive, but recently, they also succumbed.

There are several frog killers in the Sierra Nevada, Wake said. The first hint of frog decline in this area came in the 1990s, and researchers originally thought that rainbow trout introduced to this area were the culprits - they like to snack on tadpoles and frog eggs. The UC Berkeley team did experiments in which it physically removed trout from some areas, and the result was that frog populations started to recover.

"But then they disappeared again, and this time there were carcasses," Wake said.

The culprit is a nasty pathogenic fungus that causes the disease chytridiomycosis. Researchers discovered the fungus in Sierra Nevada frogs in 2001. Scientists have documented over the last five years mass die-offs and population collapses due to the fungus in the mountain range.

But the fungus is not unique to California. It has been wiping out amphibians around the world, including in the tropics, where amphibian biodiversity is particularly high.

"It's been called the most devastating wildlife disease ever recorded," Wake said.

Global warming and habitat constriction are two other major killers of frogs around the world, Wake said. And the Sierra Nevada amphibians are also susceptible to poisonous winds carrying pesticides from Central Valley croplands. "The frogs have really been hit by a one-two punch," Wake said, "although it's more like a one-two-three-four punch."

The frogs are not the only victims in this mass extinction, Wake emphasized. Scientists studying other organisms have seen similarly dramatic effects.

"Our work needs to be seen in the context of all this other work, and the news is very, very grim," Wake said.

The National Science Foundation and National Institutes of Health helped support this study.

Audio files and slides of presentations from the Arthur M. Sackler Colloquium on biodiversity and extinction are available online.

Adapted from materials provided by University of California - Berkeley.

http://www.sciencedaily.com/releases/2008/08/080812135654.htm

Young Children's 'Theory Of Mind' Linked To Subsequent Metacognitive Development In Adolescence

ScienceDaily (Aug. 17, 2008) — Metacognition refers to the awareness of one's knowledge in different areas. The more comprehensive and accurate this metacognitive knowledge, the better one is able to reflect about his or her own actions and behaviors. "Theory of Mind" (ToM) deals with very young children's understanding of mental life and the ability to estimate mental states.

A new study in the journal Mind, Brain, and Education detects a systematic link between children's "theory of mind" as assessed in kindergarten and their metacognitive knowledge in elementary school.

Wolfgang Schneider, Ph.D., of the University of Wurzburg examined 174 children who were either three or four years of age at the beginning of the study in order to investigate the relationship between early ToM and subsequent metacognitive development. Children were tested at four measurement points, separated by a testing interval of approximately half a year.

Language abilities assessed at the ages of three or four years made significant contributions to the prediction of metamemory scores at the age of five. ToM facilitated the acquisition of metacognitive knowledge. Early ToM competencies also affected the acquisition of metacognitive vocabulary, which in turn had an impact on developmental changes in metacognitive knowledge.

ToM development is characterized by a growing insight into inferential and interpretive mental processes. Declarative metacognitive knowledge is usually scarce in young elementary children but increases considerably over the school years, predicting academic performance.

"An important reason to study metacognitive monitoring processes is because monitoring is supposed to play a central role in directing how people study," Schneider notes. "Our research affects issues of cognitive intellectual development and can be used to develop training programs, particularly for young children, to ensure adequate metacognitive processing in educational contexts."

Journal reference:

1. Wolfgang Schneider. **The Development of Metacognitive Knowledge in Children and Adolescents: Major Trends and Implications for Education**. *Mind Brain and Education*, 2008; 2 (3): 114 DOI: 10.1111/j.1751-228X.2008.00041.x

Adapted from materials provided by Wiley-Blackwell.

http://www.sciencedaily.com/releases/2008/08/080814154429.htm

Potatoes May Hold Key To Alzheimer's Treatment

Necrotic ringspots on a potato tuber (cultivar Nicola) due to Potato virus Y infection. (Credit: Karine CHARLET-RAMAGE & Camille KERLAN Laurent GLAIS & Camille KERLAN INRA-ENSA, Rennes, France)

ScienceDaily (Aug. 16, 2008) — A virus that commonly infects potatoes bears a striking resemblance to one of the key proteins implicated in Alzheimer's disease (AD), and researchers have used that to develop antibodies that may slow or prevent the onset of AD.

Studies in mice have demonstrated that vaccinations with the amyloid beta antibodies canβprotein (believed to be a major AD contributor) to produce A slow disease progression and improve cognitive function, possibly by promoting the destruction of amyloid plaques. Some early human trials have likewise been promising, but had to be halted due to the risk of autoimmune encephalitis.

One way to make Alzheimer's vaccinations safer would be to use a closely-related, but not human, protein as the vaccine, much like cowpox virus is used for smallpox immunizations.

In the August 15 Journal of Biological Chemistry, Robert Friedland and colleagues used this concept on an amyloid-like protein found in potato virus (PVY). They injected PVY into mice followed by monthly boosters for four months. The researchers found that the mice produced strong levels of antibodies that could attach to amyloid beta protein both in both solution and in tissue samples of Alzheimer's patients. And although the levels were lower, mice also developed antibodies if given injections of PVY-infected potato leaf as opposed toβA purified PVY.

Friedland and colleagues note that potato virus is a fairly common infection that poses no risk to humans (many people have probably eaten PVY infected potatoes). While tests of PVY antibodies will ultimately determine how useful they can be, they may be a promising lead to treating this debilitating disease.

Journal reference:

1. Robert P. Friedland, Jonathan M. Tedesco, Andrea Wilson, Craig Atwood, Mark Smith, George Perry and Michael Zagorski. **Antibodies to Potato Virus Y Bind the Amyloid Beta Peptide**. *Journal of Biological Chemistry*, August 15, 2008 [link]

Adapted from materials provided by American Society for Biochemistry and Molecular Biology, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2008/08/080815170629.htm

Antarctic Climate: Short-term Spikes, Long-term Warming Linked To Tropical Pacific

When a strong El Niño develops across the tropical Pacific, it can influence weather and climate as far away as the southern polar region. This occurs via a "wave train" of areas with unusually high or low pressure in the upper atmosphere (H's and L's) that leads to warmer-than-normal temperatures in West Antarctica. Bright reds near the equator show the unusually warm sea-surface temperatures (SSTs) associated with an El Niño during 1940-41. There are no SST data for that period for the portions of the Southern Ocean shown here. Analysis of ice cores drilled in West Antarctica (red dots) reveals that air temperatures there warmed by as much as 10° Fahrenheit as this three-year-long El Niño unfolded, then dropped by as much as 13° F afterward. (Credit: Image by Steve Deyo, Copyright UCAR)

ScienceDaily (Aug. 15, 2008) — Dramatic year-to-year temperature swings and a century-long warming trend across West Antarctica are linked to conditions in the tropical Pacific Ocean, according to a new analysis of ice cores conducted by scientists at the National Center for Atmospheric Research (NCAR) and the University of Washington (UW).

The findings show the connection of the world's coldest continent to global warming, as well as to periodic events such as El Niño.

"As the tropics warm, so too will West Antarctica," says NCAR's David Schneider, who conducted the research with UW's Eric Steig. "These ice cores reveal that West Antarctica's climate is influenced by atmospheric and oceanic changes thousands of miles to the north."

Scientists are keenly interested in whether warming will destabilize the West Antarctic ice sheet over a period of decades or centuries. The ice sheet covers an area the size of Mexico, averages about 6,500 feet deep, and, if melted, would raise global sea levels by about 8 to 16 feet (2.5-5 meters).

Antarctica's climate is difficult to study, partly because there are few observations of this vast and remote region and partly because the cold, dry atmosphere is unlike that of the other six continents. Scientists previously determined that Antarctica overall probably warmed by about 0.4 degrees Fahrenheit (0.2 degrees Celsius) in the last century. But it has not been apparent until now that low-lying West Antarctica is more responsive to global warming trends than East Antarctica, where wind patterns have largely kept out comparatively warm air.

Schneider and Steig estimate that West Antarctica warmed about 1.6 degrees F (0.9 degrees C) over the 20th century. That is slightly more than the global average of about 1.3 degrees F (0.7 degrees C). Because of the large swings in annual temperature during the 1930s and 1940s, there is a considerable margin of uncertainty in the century-long estimate, says Schneider. He notes that there is increased confidence that warming has occurred since 1950, averaging about 0.8 degree F (0.4 degrees C) per decade.

The new set of cores analyzed by Schneider and Steig comes from a relatively snowy part of the continent. This provides enough detail for scientists to infer year-to-year temperature changes. The data show that the Antarctic climate is highly responsive to changes in the Pacific. For example, during a major El Niño event from 1939 to 1942, temperatures in West Antarctica rose by about 6 to 10 degrees F (3-6 degrees C), and then dropped by an estimated 9 to 13 degrees F (5-7 degrees C) over the next two years. El Niño is a periodic shift in air pressure accompanied by oceanic warming in the tropical Pacific.

Although the heart of El Niño's oceanic warming is in the tropical Pacific, it often fosters a circulation pattern that pushes relatively mild, moist air toward West Antarctica, where it can temporarily displace much colder air. As a result, West Antarctica has one of the world's most variable climates.

"These results help put Antarctica's recent climate trends into a global context," says Schneider.

Steig adds that while the influence of tropical climate on West Antarctica climate was not unknown, "these results are the first to demonstrate that we can unambiguously detect that influence in ice core records."

Decoding the climate record

Ice-core analysis is critical for understanding the climate of West Antarctica. Few weather stations existed before the 1950s, and even satellite readings can be unreliable because of the difficulty in distinguishing clouds from snow cover.

To reconstruct climate trends over the last century, Schneider and Steig analyzed ice cores collected from eight locations across West Antarctica. They measured heavy and light stable isotopes of oxygen and hydrogen, the elements that make up the ice itself. During warm episodes, the heavy isotopes are more common because of a number of processes, such as a reduction in condensation that would otherwise remove them.

The ice cores for the study were collected from 2000 to 2002 during the U.S. International Trans-Antarctic Scientific Expedition, which Schneider and Steig participated in. The expedition and subsequent ice core analysis was sponsored by the National Science Foundation's Office of Polar Programs.

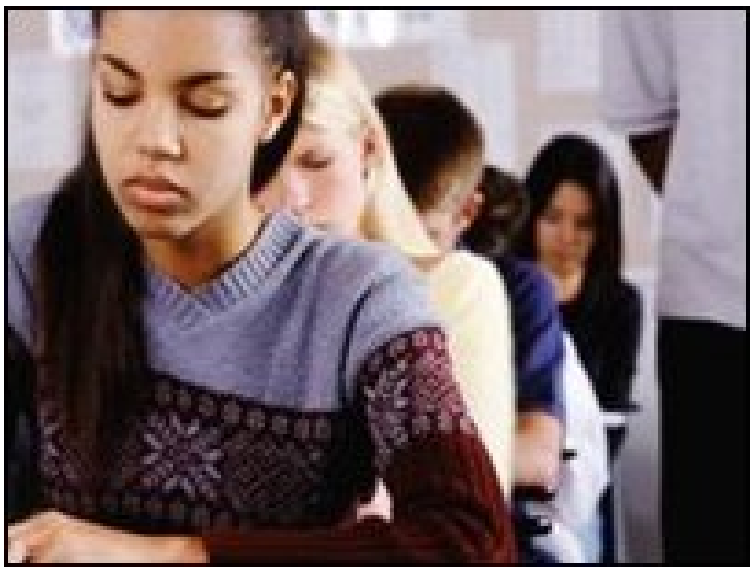
The research appeared recently in the online Early Edition of Proceedings of the National Academy of Sciences. The work was supported by the National Science Foundation, NCAR's sponsor.

Adapted from materials provided by National Center for Atmospheric Research/University Corporation for Atmospheric Research.

http://www.sciencedaily.com/releases/2008/08/080812160619.htm

'Bravest' students do not cheat

Students who are bravest are least likely to cheat, say US researchers.



Two studies of more than 400 students at Ohio State University found those who did not cheat scored highest in tests of courage and empathy.

They also, perhaps unsurprisingly, scored higher than cheaters on tests of honesty.

Presenting the findings at the American Psychological Association conference, the researchers said the "academic heroes" were in the minority.

In the studies, students were asked if they had cheated in classes in the past 30 days and in the past year and whether they would be likely to cheat in the future.

The students also completed measures that examined their bravery, honesty and empathy.

> **Students who don't cheat seem to be in the minority, and have plenty of opportunities to see their peers cheat and receive the rewards with little risk of punishment**
> Professor Sara Staats

Those who scored in the top half - the so-called "academic heroes" - were less likely to have reported cheating in the past 30 days and were less likely to intend to cheat in the future.

They also reported they would feel more guilt if they cheated and did not rationalise cheating the way others did.

In addition they struggled to believe that their fellow students regularly committed academic dishonesty.

Personality

The honest students "have a more positive view of others", said study leader Professor Sara Staats.

She added: "Students who don't cheat seem to be in the minority, and have plenty of opportunities to see their peers cheat and receive the rewards with little risk of punishment.

"We see avoiding cheating as a form of everyday heroism in an academic setting."

The researchers added that other studies had shown that more than half - and sometimes up to 80% - of university students report that they have cheated.

Dr Paul Seagar, spokesperson for the British Psychological Society and lecturer at the University of Central Lancashire, said the findings were to be expected.

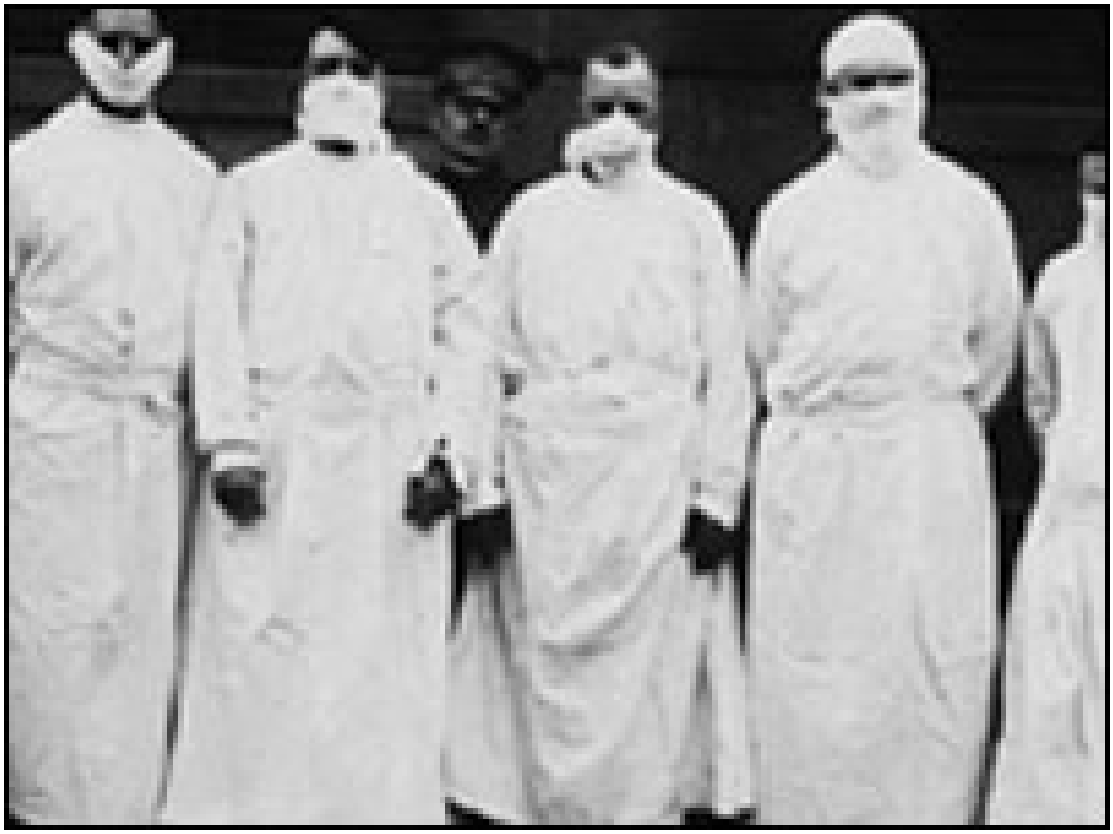
"These people probably have stronger personalities and are less likely to give into temptation."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/7562938.stm

Published: 2008/08/17 23:08:42 GMT

Bird flu hopes from 1918 victims

By Oliver Conway
BBC News



Survivors of the devastating 1918 influenza pandemic are still protected from the virus, according to researchers in the US.

American scientists found that people who lived through the outbreak can still produce antibodies that kill the deadly strain of the H1N1 flu.

The study, published in the journal Nature, could help develop emergency treatments for future outbreaks.

The Spanish flu outbreak of 1918 killed an estimated 50 million people.

Elderly volunteers

Some experts say it was the most devastating epidemic in history, affecting even healthy adults.

Scientists do not fully understand why it was so lethal - but they fear a new pandemic, once again triggered by bird flu, could be just as deadly.

But now researchers have come up with a new way of tackling such an outbreak.

They studied 32 people who lived through the 1918 flu, and found all still had antibodies in their blood to destroy the virus.

Some of the volunteers - aged from 91 to 101 - even had the cells which produce the antibodies.

The researchers used the antibodies to cure infected mice - showing, they said, that 90 years on, the survivors of the epidemic were still protected.

The antibodies were particularly powerful - so that only a small amount was needed to kill off the virus.

Dr James Crowe, of Vanderbilt University, who helped lead the study, said similar antibodies could be developed to destroy new strains of bird flu.

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/7567219.stm

Published: 2008/08/17 23:38:32 GMT

At School, Technology Starts to Turn a Corner

By STEVE LOHR

COUNT me a technological optimist, but I have always thought that the people who advocate putting computers in classrooms as a way to transform education were well intentioned but wide of the mark. It's not the problem, and it's not the answer. Yet as a new school year begins, the time may have come to reconsider how large a role technology can play in changing education. There are promising examples, both in the United States and abroad, and they share some characteristics. The ratio of computers to pupils is one to one. Technology isn't off in a computer lab. Computing is an integral tool in all disciplines, always at the ready.

Web-based education software has matured in the last few years, so that students, teachers and families can be linked through networks. Until recently, computing in the classroom amounted to students doing Internet searches, sending e-mail and mastering word processing, presentation programs and spreadsheets. That's useful stuff, to be sure, but not something that alters how schools work. The new Web education networks can open the door to broader changes. Parents become more engaged because they can monitor their children's attendance, punctuality, homework and performance, and can get tips for helping them at home. Teachers can share methods, lesson plans and online curriculum materials.

In the classroom, the emphasis can shift to project-based learning, a real break with the textbook-and-lecture model of education. In a high school class, a project might begin with a hypothetical letter from the White House that says oil prices are spiking, the economy is faltering and the president's poll numbers are falling. The assignment would be to devise a new energy policy in two weeks. The shared Web space for the project, for example, would include the White House letter, the sources the students must consult, their work plan and timetable, assignments for each student, the assessment criteria for their grades and, eventually, the paper the team delivers. Oral presentations would be required.

The project-based approach, some educators say, encourages active learning and produces better performance in class and on standardized tests.

The educational bottom line, it seems, is that while computer technology has matured and become more affordable, the most significant development has been a deeper understanding of how to use the technology. "Unless you change how you teach and how kids work, new technology is not really going to make a difference," said Bob Pearlman, a former teacher who is the director of strategic planning for the New Technology Foundation, a nonprofit organization. The foundation, based in Napa, Calif., has developed a model for project-based teaching and is at the forefront of the drive for technology-enabled reform of education. Forty-two schools in nine states are trying the foundation's model, and their numbers are growing rapidly.

Behind the efforts, of course, are concerns that K-12 public schools are falling short in preparing students for the twin challenges of globalization and technological change. Worries about the nation's future competitiveness led to the creation in 2002 of the Partnership for 21st Century Skills, a coalition whose members include the Department of Education and technology companies like Apple, Cisco Systems, Dell and Microsoft.

The government-industry partnership identifies a set of skills that mirror those that the New Technology Foundation model is meant to nurture. Those skills include collaboration, systems thinking, self-direction and communication, both online and in person. State officials in Indiana took a look at the foundation's model and offered travel grants for local teachers and administrators to visit its schools in California. Sally Nichols, an English teacher, came away impressed and signed up for the new project-based teaching program at her school, Decatur Central High School in Indianapolis.

Last year, Ms. Nichols and another teacher taught a biology and literature class for freshmen. (Cross-disciplinary courses are common in the New Technology model.) Typically, half of freshmen fail biology, but under the project-based model the failure rate was cut in half. "There's a lot of ownership by the kids in their work instead of teachers lecturing and being the givers of all knowledge," Ms. Nichols explained. "The classes are just much more alive. They don't sleep in class."

IN Indiana, the number of schools using the foundation model will increase to six this year, and an additional dozen communities have signed up for the next year, said David Shane, a member of the state board of education. "It's caught fire in Indiana, and we've got to have this kind of education to prepare our young people for the future in a global economy that is immersed in technology."

The extra cost for schools that have adopted the New Technology model is about $1,000 per student a year, once a school is set up, says Mr. Pearlman of the foundation.

In England, where the government has promoted technology in schools for a decade, the experiment with technology-driven change in education is further along.

Five years ago, the government gave computers to students at two schools in high-crime neighborhoods in Birmingham. For the students, a Web-based portal is the virtual doorway for assignments, school social activities, online mentoring, discussion groups and e-mail. Even students who are suspended from school for a few days beg not to lose their access to the portal, says Sir Mark Grundy, 49, the executive principal of Shireland Collegiate Academy and the George Salter Collegiate Academy. Today, the schools are among the top in the nation in yearly improvements in students' performance in reading and math tests.

Sir Mark says he is convinced that advances in computing, combined with improved understanding of how to tailor the technology to different students, can help transform education.

"This is the best Trojan horse for causing change in schools that I have ever seen," he said.

http://www.nytimes.com/2008/08/17/technology/17essay.html?th&emc=th

Art classes improve diagnostic skills of medical students

CBC News

It seems that seeing is a skill that the world of art can lend to the world of medicine.

Doctors-in-training who took art classes while in medical school appear to have better skills of observation than their colleagues who have never studied art, according to a research from Harvard Medical School.

'You can look at a face and observe certain aspects of it, like lines on a face, the colour of it, the colour of the eyelids, the colour of the lips.'—*Dr. Shah Khoshbin*

Dr. Joel Katz and Dr. Shah Khoshbin started a program of elective art classes for medical students at the Boston-based school in 2005.

They released research last week that shows studying art can help students make up to 38 per cent more accurate observations.

"The assumption in the past was that either you know how to look or you don't," Dr. Khoshbin told CBC's *Q* cultural affairs show on Monday. "This is not true. You can train people to look, educators as well as artists know that."

Dr. Khoshbin, who had a background in art analysis himself before taking a medical degree, said art classes seem to help train students in what he calls "visual literacy."

"Quite often, when students miss a diagnosis, they tell us they didn't look," Dr. Khoshbin said.

"We trained students to become literate in talking to patients but we didn't have a way to make them be visually literate," until this course was developed, he said.

The course is taught by two art educators, who introduce students to art and use the resources of the nearby Boston Museum of Fine Arts to test their analytical and visual skills.

Abstract art helps, too

The course, taught early in medical school, seems to make students better at diagnosing patients in their graduating year, according to Dr. Khoshbin's research.

"You can look at a face and observe certain aspects of it, like lines on a face, the colour of it, the colour of the eyelids, the colour of the lips — these are all things once you are trained to look for it, you do better at it," Khoshbin said.

Even modern art can help students improve their powers of observation.

"Not only how to look at body and face but to look at patterns. The work of Jackson Pollock has no face and no body, so what is important is pattern recognition," he said.

Pattern recognition teaches students to observe more about, for example, a rash, than just the colour of the skin.

The result is a group of doctors who are more confident in their own powers of observation and thus more confident in their own skills of diagnosis.

"They have to be able to look at the human being, they have to be able to pick up cues that are not necessarily communicated verbally. So much is not communicated verbally," Khoshbin said.

Results quieted early critics

He says the program initially had its critics, but they have come around as students trained in art proved to be more observant.

"The common factor here, which is the human, is so subjective, the science that we practise is so subjective that you have to train the physician to be good at both. The human brings the science and the art together," he said.

And the side effect is a group of doctors who have a heightened appreciation of visual art, some of them becoming lifelong fans.

"A lot of them pick it up as an avocation," he said.

http://www.cbc.ca/arts/artdesign/story/2008/08/18/art-medicine.html?ref=rss

Green Project in B.C. Burns Sawdust, Treats Sewage in Backyard

Review by James S.
Russell

Aug. 15 (Bloomberg) -- If you think energy efficiency can't do much to beat high fuel prices and tackle global warming, consider a 15-acre neighborhood under construction in Victoria, British Columbia. Your view will include a heating plant fed by waste wood chips, and water from a sewage treatment plant trickles gently outside the back door. Dockside Green is no architectural hair shirt. Residents do indeed gaze upon a stream partly fed by the outfall of a tiny, on-site sewage-treatment plant. Yet the water is almost clean enough to drink. It burbles among rocks, driftwood and native vegetation between town houses with private planted terraces and apartment buildings that rise as high as 10 stories.

Runoff from roofs and driveways also feeds the stream, which tumbles through reed-planted basins among stairs and walks. A long-legged egret may drop by for breakfast. The woodland stream is the centerpiece of what will become a 26-building, 1.3-million-square-foot (120,000-square-meter) mix of apartments, restaurants, stores and offices at completion, perhaps six years from now. Victoria-based Windmill Development and Vancity, a local Canadian credit union, have rescued a close- in, industrial site near the edge of the Inner Harbor in this picturesque city of blue ocean inlets and fir-covered ridges on Vancouver Island. On a recent visit, builders were assembling a biomass gasification plant about the size of a tractor trailer. It will accelerate the decomposition of wood waste, creating gas that is burned for low-cost, soot-free heat and hot water.

Value Creation

Few developers are interested in treating sewage and burning lumber leftovers, though Windmill's co-chairman, Joe Van Belleghem, sees what's called ``natural capitalism" as ``a new lens for creating value."

He offered to pay the city of Victoria $1 million if the project doesn't achieve a platinum award (the highest) from the Canada Green Building Council's LEED rating system.

``That got everyone's attention," Van Belleghem said by telephone. The 108,000-square-foot first phase scored higher than any other development rated by LEED. While politicians and lobbyists debate massive, years-long investments to increase North American energy supplies, Dockside Green dramatically cuts energy use now. Conservation and efficiency have generally been treated condescendingly in the U.S. energy debate, like the bright but annoying student whose hand always shoots up first.

Experts argue about what truly constitutes ``carbon neutral," though Dockside Green certainly comes close without using unproven technologies or promising to plant trees in Brazil. The development avoids the self-conscious display of its eco-tactics. If anything, it's too blandly, reassuringly pleasant.

Natural Breezes

Vancouver architecture firm Busby Perkins & Will has calibrated the depth of apartment balconies to shade the units from excess sun, augmented by sensor-driven awnings that unfurl automatically. The rooms are arranged so that most ventilate naturally -- a necessary feature in the days before air conditioning yet now largely a lost art. The care taken in the building's configuration means air conditioning isn't needed. The biomass boiler supplies a radiant heating system in the floor and hot water for bathing and washing. With these and other measures, bills for heating and hot water -- among a homeowner's largest expenses -- are almost eliminated, along with the greenhouse gases that would be generated by conventional heating. Residents also save because the development puts almost nothing into the city's sewage stream. That means a great deal to cities hitting their sewage-treatment limit just as floods worsen.

Buses, Ferries

Dockside Green also shows how community design can reduce reliance on cars. The close-in location links residents to four bus lines, a tiny passenger ferry that chugs to various locations around the bay, and the Galloping Goose bike path, which is fast becoming a commuting artery, not just a road for weekend excursions. A car-sharing service may permit some families to sell one of their vehicles.

A recent analysis of similar communities designed to reduce auto use suggested that a one-third reduction in miles driven is achievable. That's huge compared with the gains that will come from the 35-miles-per-gallon U.S. ``fleet average" mandated by Congress for 2020. According to Van Belleghem, one family moved from a suburb to Dockside Green because they wanted to trade long commutes and house maintenance for a short bike commute that allows more time at home with children. I think of this when people tell me we cannot cut America's energy profligacy because it will require radical lifestyle changes and politically unpalatable sacrifice.

Dockside Green's appeal suggests that we need an attitude change: Let's start thinking about how to make lemonade (a shorter commute) out of lemons (higher gas prices).

(James S. Russell is Bloomberg's U.S. architecture critic. The opinions expressed are his own.)

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Wrinkle Removers, Backed by Science

By NICHOLAS BAKALAR

Nostrums that promise to smooth wrinkled skin are a staple of snake-oil salesmen everywhere, but now there is strong evidence that certain kinds of treatment are effective. Over the past decade, researchers have been learning which treatments work, and why.

The key is a growing understanding of the skin's connective tissue, called the dermal collagen, and a recognition that damage to the mechanical properties of the collagen outside the skin cells, and not necessarily genetic damage to the cells themselves, causes wrinkled skin.

A recent review in The Archives of Dermatology concludes that three anti-aging treatments are proven clinically effective: the topical application of retinol; carbon dioxide laser resurfacing; and injection of hyaluronic acid, a moisture-retaining acid that occurs naturally in the skin. Each depends on the same mechanism, the interaction of skin cells called fibroblasts with the collagen they produce.

"This is an area where there's a lot of hype and not much substance," said David J. Leffell, a professor of dermatology and surgery at Yale who was not involved in the review. But, he said, this study is "good science."

Theory and experiment back these treatments, the authors write. Fibroblasts — connective tissue cells — secrete a complex group of polysaccharides and proteins that creates collagen, which gives the skin shape and elasticity and supports the blood vessels that permeate it. The network of collagen tissue is maintained by its mechanical tension with these skin cells.

Skin deteriorates as it ages, but its exposure to sunlight inhibits the ability of fibroblasts to produce collagen. The hands, face, neck and upper chest all suffer more than unexposed skin, and light-pigmented people wrinkle more readily than others. This damage, the authors write, is essentially an accelerated version of chronological aging. Ultraviolet radiation induces production of the same enzymes that degrade collagen with age.

Collagen fibers last as long as 30 years. But with age and ultraviolet exposure, they deteriorate and fragment, and fragmented collagen impairs the collagen-producing function of the fibroblasts that created it. As the fragmented collagen accumulates, new collagen production declines, the connections between the fibroblasts and the collagen weaken, and the skin, now lacking support, begins to wrinkle.

But there are treatments that counter this process. Topical application of retinol, a form of vitamin A, was the first to be proved useful. Although the molecular pathways are not well understood, retinol causes new collagen to form in chronologically aged skin and in skin damaged by ultraviolet light.

Skin creams with retinol are available over the counter, but many do not indicate the concentration of the active ingredient. "Many products just refer to retinol or vitamin A as a buzzword," said Gary J. Fisher, the lead author of the review and a professor of dermatology at the University of Michigan.

Concentrations of 0.2 to 0.6 percent are enough, Dr. Fisher said, but preparations strong enough to have an effect can also have a side effect, a rash called retinoid dermatitis. Dr. Fisher's advice is to stop using it if a rash occurs. The rash can sometimes be avoided if the concentration is increased gradually.

Retinol also makes the skin more sensitive to damage from ultraviolet light, so protection from the sun while using it is essential. "O.T.C. products tend to try to walk the line between effects and side effects," Dr. Fisher said. "But many intentionally keep the concentration too low to have any benefit."

Dr. Robyn S. Gmyrek, an assistant professor of dermatology at Columbia University, is also skeptical of over-the-counter wrinkle creams. "If something shows true biological activity, it's regulated as a drug," she said. "A cream bought over the counter is certainly not going to do what prescription-strength retinol will do." Dr. Gmyrek was not involved in the study.

Carbon dioxide laser resurfacing is another well-tested treatment for wrinkles. The laser removes thin layers of skin without damaging surrounding tissue. As the wound heals, new collagen is produced. The treatment works first by inducing high levels of matrix metalloproteinase, or MMP, an enzyme that destroys fragmented collagen. Then it reduces MMP and the production of new and undamaged replacement material. The procedure is also used for removing scars, warts and birthmarks.

Healing takes two to three weeks, and the wound has to be cleaned with saline or diluted vinegar and treated with ointments to prevent scarring. In most cases, the procedure is done only once, Dr. Fisher said, and lasts many years.

There are now some less invasive laser procedures, the authors write, but their effectiveness is doubtful.

The third effective treatment is injecting a form of hyaluronic acid, similar to a substance the skin normally produces, into the dermis that underlies the wrinkles. This was originally designed as a space filler, with no intended physiological effect. But as the injection stretches the dermis, the fibroblasts respond by producing more collagen and less MMP. The authors cite studies that have demonstrated that increased collagen production is visible within a month after the injection. The benefit lasts about six months, Dr. Fisher said.

This type of hyaluronic acid, he said, should not be confused with hyaluronic acid in some topical cosmetic products. Rubbing such products on the skin will not stimulate collagen production.

Do the benefits of these treatments outweigh the risks?

"It's a matter of the kind of problem a person perceives and how he wants to deal with it," Dr. Fisher said. "For these treatments, which have sound research behind them, and for people who want to improve their appearance, the benefits far outweigh any problems."

The authors have no ties to companies that make skin care products, but the University of Michigan, where they teach, has patents on the use of matrix metalloproteinase inhibitors in the treatment and prevention of aging skin.

http://www.nytimes.com/2008/08/19/health/19skin.html?_r=1&nl=8hlth&adxnnl=1&oref=slogin&emc=hltha2&adxnnlx=1219169196-gKzFaXdbzcukZK06HkJRPA

The Painter and the City: Parallel Tales of Growth

By KAREN ROSENBERG

NEW HAVEN — If you can't make it in the big city, try a smaller one.

In 1768 the 18th-century British painter Joseph Wright of Derby (1734-97) exhibited a painting in London, "An Experiment on a Bird in the Air Pump," a magnificent group-portrait reflecting Enlightenment values. While the work received favorable reviews, it failed to find a buyer; later that year Wright was snubbed by the newly founded Royal Academy.

On the advice of his friend and fellow artist Peter Perez Burdett, Wright moved north to the burgeoning port center of Liverpool. There he found scores of newly wealthy merchants who wished to cement their status by commissioning artworks. Wright lived and worked there from 1768 to 1771, making valuable connections and developing a reputation as the city's leading portraitist. He was so successful that a rival painter accused him of "swallowing up all the business." In his busiest year, 1769, he produced a portrait every 9 or 10 days.

An exhibition in its final weeks at the Yale Center for British Art, "Joseph Wright of Derby in Liverpool," is the first to focus on this period of Wright's career. The 80 works on view tell two stories: that of a young painter finding his niche, and that of a fast-growing northern city asserting itself as a cultural and economic hub.

The show is part of a two-year celebration of culture in Liverpool (the city marked the 800th anniversary of its charter last year). It was organized by the Yale Center for British Art in conjunction with the Walker Art Gallery in Liverpool, where it made its debut in November.

"Wright in Liverpool" has a fascinating subplot. As one of Britain's major port cities, Liverpool was a capital of the slave trade. Many of Wright's patrons amassed fortunes by shipping Africans across the Atlantic. The abolitionist movement was beginning to make inroads, however, and Wright made at least one painting that suggests his views on slavery were not necessarily aligned with those of his subjects.

The first gallery is filled with portraits of socially prominent Liverpudlians. Several have fanciful costumes and gestural affectations that reflect the younger generation's tastes of the day. "Anna Ashton, Later Mrs. Thomas Case" is dressed as a shepherdess; "Fleetwood Hesketh," in a jaunty red coat, sits cross-legged in a classical landscape.

Wright's older patrons, the focus of the next gallery, have more gravitas. Sarah Clayton, an important land developer, rests her finger on an architectural plan of the Acropolis. Wright was a master of physical as well as intellectual flattery; he softened Clayton's features while depicting her ruffled sleeves and black lace shawl in crisp detail.

Another remarkable painting shows Richard Gildart, the merchant and sometime mayor of Liverpool, at 95 yet not the least bit feeble-looking. The portrait is flanked by two paintings of ostentatiously accessorized young beauties: Mary Hunt, wearing a velvet ribbon choker, and an unidentified "Seated Woman" who cradles one of her pearlescent drop earrings in her left hand.

Hanging not far from several portraits of slave traders — John Tarleton, Thomas Staniforth — is a painting of a prominent abolitionist, Erasmus Darwin, the grandfather of Charles Darwin and a doctor, poet and inventor. He appears flushed, with a red and yellow complexion.

If the issue of slavery lurks in the background of Wright's portraits, it is unavoidable in "A Conversation of Girls" (1770). In this painting three girls — two white, one black — surround an urn on a pedestal. The black girl, differentiated by her striped dress and cropped hair as well as her skin tone, kneels before the others with an offering of flowers and jewels. One of her companions, brown-haired, keeps her distance; the other, a redhead, grasps the bouquet and gives the viewer a searching look.

In a catalog essay, the scholar Sarah Parsons suggests that the painting was Wright's way of stirring discussion on slavery without going so far as to take a position that would threaten his livelihood. Her interpretation seems plausible, but the girls' oddly adult features — compared with contemporaneous portraits of children in the next gallery — make them seem more like figures in an allegory.

A pair of paintings featuring children at play, "Two Boys Blowing a Bladder by Candlelight" and "Two Girls Decorating a Cat by Candlelight," contrast the amusements of young men and women. The boys, with scientific purposefulness, inflate their balloon; the mischievous-looking girls dress a horrified-looking cat in doll's clothing.

The dramatic candlelight of the playtime scenes is typical of the paintings Wright made in Liverpool for exhibition in London. Several show bearded, robed hermit-saint figures in caves or grottoes, a prevalent theme in the 17th-century Dutch paintings and prints that were popular with Liverpool collectors. The importance of classical reproductions in the training of British artists is reinforced by early paintings and drawings depicting Italian sculptures in an academic context.

Two monumental scenes from 1771, "A Blacksmith's Shop" (in two versions) and "The Alchymist," round out the show. Both paintings are exhaustively heroic. The blacksmiths rush to reshoe a horse for a family traveling at night; the alchemist, in his cathedral-like laboratory, kneels in prayer upon his discovery of phosphorus. These paintings also reflect Wright's keen interest in artificial light; in the earliest version of "A Blacksmith's Shop," he sandwiched gold leaf in between layers of paint.

"The Alchymist," as the catalog suggests, can be seen as a makeover of "The Air Pump," Wright's early commercial failure. It romanticizes ancient science rather than modern experiments, with a figure and setting seemingly transposed from old master paintings. During four years in Liverpool, Wright established his talent for portraiture and honed his methods for conveying nocturnal illumination. He also clearly learned how to market himself.

"Joseph Wright of Derby in Liverpool" continues through Aug. 31 at the Yale Center for British Art, 1080 Chapel Street, New Haven; (203) 432-2800, ycba.yale.edu.

http://www.nytimes.com/2008/08/19/arts/design/19wrig.html?th&emc=th

Are 4-Day Workweeks the Future?

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Sure, it sounds like a great idea. But how well does it work in practice?

With energy prices skyrocketing, a number of colleges tried longer day, four-day schedules this summer, letting commuting students and employees save on gas, while also cutting utility costs, since some offices could be shuttered an extra day. Now with a few months of experience and institutional data under their belts, some college administrators are convinced that the four-day workweek is the shape of things to come in higher education.

Others, however, are not nearly as certain, arguing that the approach limits student access to valuable resources. The trend appears more popular with community colleges — many of which don't have residential populations and enroll many students who have never been on campus five days every week — but some four-year colleges also went four-day. Generally, colleges switched three-day-a-week course schedules to longer time periods two days a week, so students had Monday/Wednesday and Tuesday/Thursday courses.

If there is a model of the four-day workweek in higher education, it may be Brevard Community College in Florida. The four-campus institution, located midway between Miami and Jacksonville, made headlines last week when it adopted a year-round four-day workweek, after successfully implementing the schedule for two summers and a four-and-one-half-day workweek last fall and spring semester. The college says it saved almost $268,000 on energy costs this summer — while seeing online enrollments rise 24.5 percent.

According to Brevard, it has consumed almost 1.7 million fewer kilowatt-hours this year than last, and it spent $474,000 less than was budgeted for energy costs. The benefits, however, do not stop at the college's bottom line. It reported a 50 percent reduction in the number of sick hours used by its employees and noted a 44 percent reduction in annual staff turnover, when comparing this fiscal year to last. Also — there must be something in the water at Brevard — its job applicant pool grew by 51 percent in the six months after the college's initial pilot program of the shortened workweek last summer

as compared to the six months before it. Though Brevard's state support has been cut by $2.3 million this year, it has managed to increase the number of full-time faculty members and double the number of tutors and learning lab assistants with the energy savings.

Not all colleges, however, have Brevard's detailed institutional data to justify a year-round use of the four-day workweek yet. As this summer was the first attempt for many colleges using this unorthodox scheduling, they will have to wait and crunch the numbers for themselves to see if they saved any money or work for their employees or students. For the moment, these institutions can only note what they saw anecdotally from the summer.

Delta College, a two-year institution in University Center, Mich., adopted the four-day workweek this summer. Leanne Govitz, the college's marketing and public relations director, said the idea blossomed out of an institution-wide sustainability summit. When faculty and staff members floated the idea during meetings, she said, the administration thought it might be a simple way for the college to reduce its carbon emissions and save on utility costs. Still, not every aspect of the college shut its doors Fridays. Govitz said the institution's fitness center, library and public broadcasting station were among those departments that stayed open during the pilot program due to student demand. Though the college is still evaluating the benefits of the pilot program, Govitz noted initial comments about the program have been positive. No decision has been made on repeating the four-day schedule.

While Delta College introduced to program to reduce its carbon footprint, other institutions were more interested in helping their employees and students save at the gas pump. Northwest Florida State College, in Niceville, Fla., formerly Okaloosa-Walton Community College, attempted a four-day workweek for eight weeks this summer. Most of the college's professors travel an average of 40 miles round trip to and from work, said Sylvia Bryan, a spokeswoman. Though students probably did not notice much difference this summer, as the university offers few Friday classes, the institution's support staff appreciated the three-day weekend, said Jill White, the college's vice president. As with most four-day workweek schedules, employees worked longer hours to fulfill their 40 hours a week.

"For most administrators, what the Friday off meant was that we actually got to have a two-day weekend," White said, adding that she often takes work home during the weekends to keep up around the office. "It was a side benefit for administrators, as we're already used to working until six or seven in the evening anyway. I worked normal on Friday, and then I had two days off like normal. We don't have a lot of chances to be creative. Having the ability to have such a change in the summer is a bit like the old adage, a change is as good as a vacation."

Though White anticipates that the college will save several thousand dollars in energy costs from this summer's pilot program, she does not expect it to adopt the shortened workweek for the regular academic year. She said the smaller summer enrollment made a four-day workweek practical, but she also noted that it would not be possible to provide classroom space for the college's full enrollment with such a schedule during the fall and spring semesters. Additionally, she noted that a few faculty members with younger children expressed concerns about the longer hours resulting from the pilot program. It was more difficult for these employees to find child support and day care centers that would accommodate their late working schedules, she said.

Instead of designating a specific day off for most employees, typically Friday, some colleges took a staggered approach to the four-day workweek. Eastern Kentucky University, in Richmond, Ky., implemented its summer pilot program primarily to give more flexibility to its staff, said President Doug Whitlock. Some employees worked Monday through Thursday and others worked Tuesday through Friday.

The only major problem the university encountered this summer, Whitlock said, was accommodating this staggered workload in some of its smaller departments and offices. Additionally, he noted that some supervisors were less than enthusiastic about the program. Still, for those who were able to participate, he said the schedule had its intended effect and the average employee saved about $80 a month in gas. The university is currently awaiting the full results of a faculty and staff survey to judge whether it should consider the four-day workweek in the future. So far, the university has received more than 700

responses to its survey, a majority of them with positive feedback about the pilot program, said Marc Whitt, an Eastern Kentucky spokesman.

"While it was in place and what we've seen so far has been positive [enough] that I would be very surprised if we didn't try it for the full school year," Whitlock said. "During the registration and fee payment rush in the early part of the semester when you're trying to serve the student body, it might be difficult to do in there. Still, I won't rule out doing something within the semester."

In the push to adopt the four-day workweek, some administrators argue that colleges and universities should not forget their primary mission: to serve students. Potentially shutting the doors to some student services on Fridays, for example, might reflect negatively on a university.

Northwestern State University in Natchitoches, La., adopted a shortened schedule that actually might have given its students more access to services. Typically, under the five-day workweek, university offices would be open from 8 a.m. until 4:30 p.m., said President Randall Webb. Under the four-day workweek, Webb said, the offices are open from 7 a.m. to 5:30 p.m. As individual employees must have their shortened workweek approved by their supervisors, and they are not all eligible for the same day off (nor would they choose it), the university now has its administrative doors open for a longer period during the business week and can serve its students even more. Even though some are working a shorter week, Webb said others at the university are working more than ever.

"I've been in some situations where we'd try a four-day workweek to preserve energy consumption," said Webb, recalling a time when he was a registrar at another institution that did not have formal Friday office hours. "I would go out to work on Fridays, to be around, and there were prospective students showing up with their parents. There would be no one there to serve them. I don't want to cast aspersions on the four-day workweek, but that does not always work because you don't serve your clientele, in my opinion. I much prefer the five-day workweek and allowing, in certain circumstances, some staff to work a four-day week."

The university has left open the option for some employees to consider the four-day workweek during the fall semester, but Webb said he expects fewer people to take part. Though his main goal is to serve students, Webb said he would revisit the workweek debate informally with other administrators as the university gathers more data. Some people may choose to work four days a week, but Webb maintained that his university would be open five.

— David Moltz

The original story and user comments can be viewed online at
http://insidehighered.com/news/2008/08/19/fourday.

A Future of Less

Miller-McCune magazine exclusive: Here's how government can help curb America's seemingly endless appetite for "more."

- By: David Villano | August 15, 2008

On a sunny weekday morning late last spring at the Mall at 163 St. in North Miami Beach, Fla., in the parking lot outside The Home Depot, Hector Portillo is loading an LG Electronics window air conditioner into his Ford F-150 pickup. Portillo, a 34-year-old who emigrated from Cuba 12 years ago, says the $279 unit (on sale) will replace a smaller one in his family's two-bedroom apartment.

The rest of the tax rebate check he just received — a tiny part of the $152 billion economic stimulus Congress approved this year — will soften the blow of high gasoline prices and other day-to-day expenses, including new clothes for his two children and, perhaps, a necklace for his wife. "We're supposed to spend it, right?" he says, smiling.

Inside the mall at the discount clothing retailer Steve & Barry's, Janice Jenkins is shopping for a new outfit. She used part of her $600 tax rebate to pay down credit card debt, but now she's holding two pairs of backless shoes and a blouse; three flower-print sundresses designed by Sarah Jessica Parker are draped over her shoulder. Each item — like nearly everything in the store — is just $8.98. "I needed a new dress," says Jenkins, a 26-year-old nursing assistant. "For that price, why not three?"

A good deal, indeed, and perhaps a short-term boost to the economy. But as designer sundresses fill our closets, the world drifts deeper into what environmental economists are calling "ecological deficit." Simply put, too much of the Earth's biosphere is engaged in production and not enough is set aside to regenerate and to accommodate the resultant waste.

By any measure, America consumes a disproportionately high share of global resources. While accounting for just 5 percent of the world's population, the U.S. burns nearly 25 percent of the world's energy and is the No. 1 user of virtually all traded commodities like corn, copper and rubber. Americans consume, on average, three times more meat than the rest of the world. The U.S. uses about one-third of the world's paper. In the end, the U.S. produces 30 percent of the world's waste (including 25 percent of global carbon dioxide emissions) and throws out a staggering 96 billion pounds of edible food each year. By one estimate, if all 6.7 billion people on Earth raised their living standards so they consumed like Americans, the present population would feel like 72 billion.

And the consumption imbalance may increase: While populations of other industrialized nations are leveling or declining, the U.S. is growing — about 10 percent over the last decade compared with 1 percent in Europe.

To be sure, there's no general consensus that America's appetite for world resources is cause for alarm. Spending keeps our economy robust, generating jobs and new business investments. Indeed, consumer spending — that second iPod (for the office), new Reeboks for the kids, a night out with the boys — accounts for roughly two-thirds of all economic activity in the U.S. After 9/11, President Bush famously urged Americans to keep on shopping.

"Nobody really wants to talk about consumption, itself, as the issue," says Michael Maniates, co-editor of *Confronting Consumption*, a scholarly dissection of the origin and politics of America's consumer society. "We talk about ways to save, ways to conserve, ways to be more efficient, but when we do, we don't get at the heart of the problem: Our demand is simply too high." Only when the question is placed directly on the table, he says, will government consider measures to reduce consumption. And only then, he says, will Americans confront the fundamental assumptions of economic policy that underlie their consumer behavior.

Can low consumption and high prosperity coexist? In theory, yes, Maniates says, but in practice, it won't happen until U.S. policymakers begin pondering how it might, in the real world. "The world is looking at how forcefully and effectively we respond to these challenges," he says. "If not us, then who? If not now, then when?"

If there's one thing Michael Maniates wants you to know, it's this: "After a point, life is not better when you have more stuff." Not that he scorns the good life, he's all for it; he enjoys fine California wines and the time it takes to fully appreciate a glass with friends. Yet if we opt to live with less, he argues, the world can be saved, one consumer at a time. "We are chewing through the planet, destroying it, and we know, empirically, that we're not better off; we are not happier for it," Maniates says.

Maniates, 50, a joint professor of political science and environmental science at Allegheny College in Pennsylvania, may be the nation's leading authority on the politics of consumption. On funded leave this past year, Maniates spent much of his time writing and speaking to academic audiences around the country, making the case that the battle against climate change (and the related challenges of resource depletion and environmental degradation) will be won or lost not through government edict but when people choose lifestyles that lead to real reductions in how much they spend, acquire, drive and, in general, consume. And those reductions, he insists, must be substantive, not superficial symbols like recycling newspapers or switching to low-watt light bulbs. He's trying to shift the public discourse away from these baby steps of conservation and toward what is, to many, the unthinkable: steep, absolute declines in per-capita consumption of oil, food, minerals, timber products, fresh water and other finite resources.

There is ample reason to think current consumption patterns are unsustainable. Using a complex set of data compiled in 2003, scientists with the California-based Global Footprint Network have quantified an impressive imbalance: Total worldwide human demand on the environment — through farming, fishing, harvesting and the ensuing pollution and waste production — exceeds the planet's regenerative

capabilities by 23 percent. That figure, at present growth levels, could reach 100 percent by midcentury, meaning we'd be consuming resources at twice the rate at which the Earth can recover. To see it in financial terms, the human population has been living off the Earth's interest income and is now drawing down its capital.

To be sure, some countries are drawing down much more than their share. While most countries (even relatively industrialized ones like China) consume at levels below the per-capita threshold of ecological regeneration, a handful of countries vastly exceed it. The U.S. (surpassed in appetite only by the oil-rich United Arab Emirates) impacts the biosphere at a rate more than four times the world average and more than five times the rate at which the Earth can regenerate.

The clearest example of this impact, and the most widely reported, is the accumulation of greenhouse-gas emissions — the principal contributor to global warming. To stabilize the concentration of such gases in the atmosphere, scientists say, overall global reductions in emissions of carbon dioxide and other harmful pollutants must drop at least 50 percent by midcentury, with the largest decrease coming from the U.S. But at present levels, overall world emissions could increase 90 percent by 2030, precipitating cataclysmic change: rising sea temperature, mass extinctions of plant and animal species, shifting weather patterns, drought, famine and the human conflict spawned by such dramatic disruption to our ecosystems. Meanwhile, resource scarcity will further degrade the environment. As demand for meat rises, for instance, tropical rainforests give way to farmland for raising (and feeding) cattle; and pollution, climate change and unregulated fishing threaten a key source of food for many of the world's people. (One recent study predicts the collapse of virtually all commercial fisheries by 2048.)

Maniates points out that many of the world's most intractable environmental challenges can be directly linked to resource demand in the U.S. and a handful of other high-consuming nations. According to the most recent United Nations Human Development Report, the world's wealthiest 20 percent account for 86 percent of total private consumption; the poorest 20 percent account for 1.3 percent.

Such disparities come as no surprise to Moses Nkhoma, an urban planner in Kitwe, Zambia, who recently completed a two-year stint in the U.S. as a Fulbright scholar. The consumptive contrasts were dramatic, he says — daily water and energy rationing back home; in America, an endless landscape of suburban malls and SUVs parked outside them. "The American lifestyle is just so wasteful," he says, fully accepting the notion that he may have had a greater impact on the environment during his two years in the U.S. than he did his entire lifetime back home in Zambia.

Ecologists are quick to attribute the gap between human demand on the biosphere and Earth's regenerative capacity as a measurable foundation for both environmental challenges, such as global warming, and economic ones, like rising food and energy prices. "We have been living beyond our means, and the consequences are evident all across the planet," says Global Footprint Network Executive Director Mathis Wackernagel, the 45-year-old, Swiss-born economist who helped design the group's consumption metric. "As we move deeper into ecological deficit, the risks are tremendous — prices go up, supplies collapse, conflicts arise and the environment's ability to recover greatly diminishes." Wackernagel points to recent food riots in Haiti, Egypt, Bangladesh and elsewhere and ever-rising gas prices in the U.S. as examples of the political and economic disruption that sudden, rising demand can precipitate.

Most economists agree that unprecedented demand for raw materials in the developing world — China, India, Thailand, Brazil and other fast-growing economies — is driving up food and energy prices across the planet. "The Chinese are tired of rice; they want beef and pork," says Fariborz Ghadar, professor of global management policies at Penn State University and director of its Center for Global Business Studies. "The rest of the world is getting wealthier, and that's good. I'd rather have a world where everybody is fat, not one where only (Americans) are fat and the rest of the people are hungry."

And therein lies the rub: The world fancies our waistlines: "People all across the globe see what we have, and they want it, too," Maniates says. "How can you blame them? But we've realized there is not enough, and never will be enough, to go around." The Washington, D.C.-based Worldwatch Institute reports that if China and India, for example, consumed as much per capita as the United States, by 2030, those two countries alone would require one additional planet Earth to meet their needs.

But such doomsaying focuses debate on future consumption patterns of the developing world while avoiding a more immediate problem: present consumption by the world's most affluent nations. "Sustainable development" — the vague environmental cure-all of op-ed punditry — is only half the equation. The other half lies in economic models and their supporting policies that will allow high-consuming societies to reduce their appetites for energy and raw materials now.

Do such models and policies exist? Maniates says they do but questions whether our public officials here in the U.S. have the backbone to encourage meaningful sacrifice. Thus far they have not, he says, allowing marketers to co-opt the debate, framing the challenge, paradoxically, as one of consumer choice — consuming less through smarter consuming: energy-saving appliances, hybrid vehicles, shopping bags made from recycled ... shopping bags.

Maniates calls these proposals "eco-efficiencies" — small steps to consumer savings that do nothing to stifle demand or change lifestyles and that, in the end, may have little or no net effect on consumption levels. For example, studies show that when people switch to more fuel-efficient vehicles, they often increase their driving, offsetting any reduced consumption. Among his pet peeves, Maniates often tells audiences, are the ubiquitous lists promising "10 Simple Things to Save the Planet." There are no simple things, he insists, unless you care to consider these: 1) Get rid of your car; 2) consume only locally grown organic foods; and 3) stop buying stuff you don't need.

With rising concern for the global environment, Maniates believes the time is right for government leaders to acknowledge the long-term threats to American ecological well-being — and national security — posed by over-consumption. Wackernagel agrees, noting that while some European countries are openly debating across-the-board declines in energy and resource use, America keeps its head deep in the

consumer sand. (The Netherlands and Japan, despite living standards among the world's highest, consume at barely half the U.S. per-capita rate.)

"When our leaders acknowledge the problem and engage us all in finding a solution, there will be no shortage of ideas and innovation," Maniates suggests. We must recycle more, invest in alternative energies and commit to public transportation, he says. Also, the government could tax consumption, rather than income — and the list goes on. But Maniates and others believe a lasting solution requires more than simply taxing undesirable choices (like SUVs and luxury goods) and offering incentives for desirable ones (like solar energy and organic farming). Real change — steep declines in per-capita consumption of energy and raw materials — will occur when Americans are allowed to choose lifestyles that initiate low-consumption patterns of behavior. Invariably, those lifestyles are the consequence of trading a degree of work (and pay) for time — a tradeoff that Maniates and others say plenty of Americans are willing to make. The equation is simple: Less work = less money = less consumption. Maniates says government must make it easier for workers to make those choices: "We need to allow people to do the right thing — policy measures that allow them to follow their noses to happiness and satisfaction."

John de Graff, co-author of the book and PBS documentary *Affluenza: The All-Consuming Epidemic*, is national coordinator of "Take Back Your Time," a Seattle-based advocacy group that promotes flexible work options and employee benefits like guaranteed vacation time and maternity leave. He speaks to audiences around the country, arguing that Americans have fallen into a high-consumption trap, working more, acquiring more but reporting declining levels of satisfaction. It's no surprise, he says, that people are recognizing the so-called "simplicity movement" — less work and money, more family and leisure time — as a convenient intersect with America's growing environmental consciousness. "The message is this: You can trade your stuff for time," he says. "By making that decision yourself, there is no apparent sacrifice. It's all by choice, but the outcomes are positive — for the environment and the individual."

De Graff, who's lobbying for a bill that will make it easier for part-time workers to receive health insurance and other employee benefits, notes that countries with the most progressive worker-benefit laws — Iceland, Denmark and the Netherlands — also rank the highest in surveys of happiness and satisfaction. (The U.S. ranks 13th, just behind the Philippines.) "I think it's pretty clear that a higher quality of life — as measured by far more than just income — will actually reduce the desire to spend and consume," de Graff says.

That's the argument of Barry Schwartz, professor of psychology at Swarthmore College and author of *The Costs of Living: How Market Freedom Erodes the Best Things in Life* and *The Paradox of Choice: Why More Is Less*. He says Americans are caught in a work/consume spiral — the more they work, the more they feel a need to spend their way to happiness and satisfaction. "If you can't have the things in life that really matter, like time with friends and family, you look for a substitute," Schwartz says. That emptiness (and the urge to consume) is compounded, he argues, by the well-documented civic disconnect taking place in American life in recent decades. "Spending becomes like a drug," he says, "a quick and easy fix to make you feel better."
Like Maniates, Schwartz sees folly in "government-directed behavioral change" aimed at curbing consumption. Individual expression and personal choice are woven tightly within the fabric of the American character. The only lasting cure, he says, is case by case, in 12-step fashion, when people *choose* to alter their lifestyles and their consumptive behavior.

Not everybody is convinced that droves of Americans will sign up for the less-is-more club, living without the comforts of consumer choice that have become deeply identified with personal well-being. Penn State's Ghadar says Americans naturally will look first to greater efficiencies and increased production to offset resource scarcity and the effects of pollution. Others say that mass, self-imposed shifts in the work/play balance may require a generation or two of distance from the postwar work ethos that defines baby boomers and their depression-scarred parents. Andy Hines is an analyst with Social Technologies, a global research and consulting firm that helps corporate clients identify emerging trends

in social attitudes and behaviors. Hines says conscripts to the work-and-spend-less army — more popularly termed the Voluntary Simplicity Movement — may seem likely to appear within blue state pockets of aging hippies but in reality are more likely to arrive from the ranks of the über-indulged Generation Y crowd. "For them, raised with plenty of security, money is not the key," Hines says. "They want a cool job with interesting people, and they want to be doing something that will make a difference in the world. They collect experiences, not material possessions. And yes, for them, choosing a less-demanding, less-consumptive lifestyle is not unthinkable."

Of course, it's easy to take a vow of poverty when your parents are covering your broadband bill and making payments on your Scion tC. What about America's less-privileged classes, for whom stuff still trumps making a difference? With them in mind, some scientists argue, it's easy to see how the less-is-more lifestyle may fly in the face of human nature. Jay Phelan is an evolutionary biologist at the University of California, Los Angeles and the author of *Mean Genes: From Sex to Money to Food, Taming Our Primal Instincts*. Phelan believes the human urge to shop, eat, spend and consume in general is deeply embedded in our DNA. Yes, he acknowledges, we can opt for less-consumptive lifestyles, but we'll be battling millions of years of evolution. The formative millennia that produced modern humans were ones of great peril and unpredictability. "The early humans who had a predisposition to consume, consume, consume were more likely to survive disease and famine and, thus, more likely to pass on their genes." In essence, it paid to be fat and greedy. Phelan adds: "You'll never get rid of your instinct to consume."

Others who study evolutionary psychology attribute "excessive consumption" to our desire for acquiring group status and, similarly, for attracting a mate — a lesson rarely overlooked on Madison Avenue. Gad Saad is an associate professor of marketing at Montreal's Concordia University and the author of *The Evolutionary Bases of Consumption*. He says numerous studies illustrate that the drive for social status often trumps bedrock urges, like eating or sleeping. He tells of a study in Chile that found many "low-status males" would drive with their car windows up, in blazing hot temperatures, rather than signal their inability to afford air conditioning. In another study, researchers found that low-income American teenagers often were willing to forgo food in exchange for the latest name-brand sneakers. "America is an affluent country," Saad says. "People have money, and they use it to display high social status. It's ridiculous to assume that as humans we are impervious to millions of years of evolutionary forces."

Nevertheless, Phelan believes we can outmaneuver evolution. As with other intrinsic, biology-driven impulses (like cheating on your spouse or enslaving your enemies), the consumptive itch can be suppressed by manipulating the environment. On a personal level, Phelan enlists a host of "out-of-sight-out-of-mind" strategies to reduce his urge to spend: His paycheck is direct deposited; he has no ATM card; and he uses credit cards for emergencies only. Government, he argues, can do the same, adopting laws that make it harder to spend and easier to save. In his book, Phelan proposes tighter credit requirements, greatly limiting consumer borrowing through credit cards, home-equity loans and other consumer-lending vehicles. He'd also like an increase in contributions to Social Security and new government programs (and institutions) to encourage thrift. (In Italy and Japan, where per-capita consumption is barely half that of the U.S., personal savings has hovered around 10 percent of annual income. In the U.S., the savings rate, for only the second time since the Great Depression, is in negative figures — meaning as a nation it is spending more than it earns.)

Saad, too, remains hopeful of overcoming what he calls "maladaptive consumption." Humans may be hardwired to impress others with consumptive prowess, he says, but they're also biologically conditioned to cooperate when times are tough. Evolutionary psychologists call this "reciprocal altruism," which means humans (and other animals) will lend assistance — sharing food or battling a common enemy, for instance — with the expectation of payback, if needed one day. Although the world is a patchwork of tribal conflict and nationalism, Saad believes the whole of humanity is not beyond cooperation on profoundly menacing issues like global warming and resource scarcity. "American consumer behavior may change when Americans begin viewing other people throughout the world as their kin," Saad says. "But it won't be easy — I'm not sure we can just sing a John Lennon song and suddenly all start sharing."

Indeed, the '60s are over and measures of civic connectedness in the U.S. are lower than ever. How can Aunt Millie in Paducah feel that fuzzy bond with, say, a pig farmer from Montevideo when she barely knows the name of her next-door neighbor? Maniates, ever the optimist, says the connections are happening. Environmental consciousness — spawned by fears of $5-a-gallon gasoline and global warming — is providing American political leaders with the unprecedented opportunity to place the consumption question on the national agenda.

But Maniates is also a realist, recognizing the entrenched assumptions framing economic thought in the U.S.; principal among them is the gross domestic product indicator as the undisputed barometer of national well-being. GDP is the market value of all goods and services sold in a given period, typically a fiscal quarter or year. When the value is up, the economy is considered strong; when it's down, everybody panics. About two-thirds of the GDP is calculated from consumer spending — those window A/Cs and designer sundresses — leaving regulators and public officials worried that policy measures to reduce consumption may drive down the GDP, sending the country into recession or worse. Keep in mind, our government *pays* us to go shopping; why would it suddenly encourage parsimony?

Calls to shelve the GDP are not new. Shortly after its introduction in the 1930s, one of its creators, economist Simon Kuznets, cautioned that "the welfare of a nation can scarcely be inferred from a measurement of national income."

But, of course, the GDP will never disappear; it's just a number. The challenge is in developing alternative indicators and elevating their importance at the public policy table. A few float about, like the Human Development Index, which includes such factors as life expectancy and education levels, and the government of Bhutan's Gross National Happiness, which calculates things like ecosystem diversity, cultural vitality, good governance and psychological well-being.

Another candidate, and perhaps the most vetted by the academic community, is the Genuine Progress Indicator, which takes into account not only economic activity but the costs it incurs, such as pollution, the loss of cropland and resource depletion. It also factors in non-monetary transactions like volunteerism. John Talberth, an economist with Redefining Progress, an Oakland, Calif.-based economics think tank that touts the GPI, says these kinds of holistic measurements allow a look beyond consumer spending as the principal driver of the nation's economic strength. "It's very possible that as a nation we can reduce overall consumption but still show positive growth in our GPI," he says.

Nova Scotia and Alberta, Canada, have adopted the GPI for regional policy initiatives, and, earlier this year, the Alaska Legislature agreed to measure the short- and long-term impact of a proposed $30 billion gas pipeline project using a modified Gross Progress Indicator model. Rick Steiner, the professor and conservation specialist at the University of Alaska Fairbanks who leads that effort, believes the GPI and similar indicators can help reveal the hidden costs of over-consumption. "Traditional economics got us into this mess," Steiner says. "We'll need something new and different to help us out of it."

Indeed, economists across the political spectrum accept the shortcomings of the gross domestic product measure, often laying blame with the media or elected officials for oversimplifying a complicated science. "The GDP is a useful number, but it's only one of many that you need to gauge how well things are going," says economist Desmond Lachman of the American Enterprise Institute. He notes that China, for example, has notched impressive gains in GDP, but nowhere does the growth, as measured, reflect the costs in the form of pollution or income disparity. Like many economists, he likes the idea behind the GPI — a broad measure of welfare — but he prefers policymaking the old-fashioned way: after careful review of a variety of data. Obsession with GDP often prevents that from happening. "There's a lot of value judgments to be drawn — education, satisfaction, for example," Lachman says. "Why not lay out all the numbers and let people draw their own conclusions?"

According to the World Bank, more than 400 million Chinese climbed out of poverty between 1990 and 2004. Each day, many more join them, across the planet. Even countries once considered among the most

desperate — Uganda and Mozambique, for instance — are taking strides toward meeting the United Nations' ambitious Millennium Project goals for vastly improving global living conditions by 2015. Yet continued economic growth will place new pressures on an already overtaxed biosphere.

The urgency to deal fundamentally and globally with consumption is growing with each new factory and office tower built in India or China. Lan Xia, a 39-year-old assistant professor of marketing at Bentley College near Boston, moved here from Beijing in 1996. She returns each year to visit friends and family and is increasingly shocked by the consumptive frenzy on display. "I think my friends and colleagues back in China act more like Americans than I do," she says. "The Chinese culture, like America's, is becoming defined by consumption."

http://www.miller-mccune.com/article/586

New Reasons To Avoid Grapefruit And Other Juices When Taking Certain Drugs

Drinking grapefruit juice with certain drugs could lower their effectiveness, researchers say. (Credit: The Florida Department of Citrus)

ScienceDaily (Aug. 20, 2008) — Scientists and consumers have known for years that grapefruit juice can increase the absorption of certain drugs — with the potential for turning normal doses into toxic overdoses. Now, the researcher who first identified this interaction is reporting new evidence that grapefruit and other common fruit juices, including orange and apple, can do the opposite effect by substantially decreasing the absorption of other drugs, potentially wiping out their beneficial effects.

The study provides a new reason to avoid drinking grapefruit juice and these other juices when taking certain drugs, including some that are prescribed for fighting life-threatening conditions such as heart disease, cancer, organ-transplant rejection, and infection, the researcher says. These findings — representing the first controlled human studies of this type of drug-lowering interaction — were described today at the 236th National Meeting of the American Chemical Society.

"Recently, we discovered that grapefruit and these other fruit juices substantially decrease the oral absorption of certain drugs undergoing intestinal uptake transport," says study leader David G. Bailey, Ph.D., a professor of clinical pharmacology with the University of Western Ontario in London, Ontario. "The concern is loss of benefit of medications essential for the treatment of serious medical conditions."

Bailey and colleagues announced almost 20 years ago the unexpected finding that grapefruit juice can dramatically boost the body's levels of the high-blood-pressure drug felodipine, causing potentially dangerous effects from excessive drug concentrations in the blood. Since then, other researchers have identified nearly 50 medications that carry the risk of grapefruit-induced drug-overdose interactions. As a result of the so-called "Grapefruit Juice Effect," some prescription drugs now carry warning labels against taking grapefruit juice or fresh grapefruit during drug consumption.

In the most recent research, Bailey's group had healthy volunteers take fexofenadine, an antihistamine used to fight allergies. The volunteers consumed the drug with either a single glass of grapefruit juice, water containing only naringin (substance in grapefruit juice that gives the juice its bitter taste), or water. When fexofenadine was taken with grapefruit juice, only half of the drug was absorbed compared to

taking the drug with water alone, Bailey says. Loosing half of the amount of drugs taken into the body can be critical for the performance certain drugs, he points out.

They also showed that the active ingredient of grapefruit juice, naringin, appears to block a key drug uptake transporter, called OATP1A2, involved in shuttling drugs from the small intestine to the bloodstream. Blocking this transporter reduces drug absorption and neutralizes their potential benefits, the researchers say. By contrast, drugs whose levels are boosted in the presence of grapefruit juice appear to block an important drug metabolizing enzyme, called CYP3A4, that normally breaks down drugs.

"This is just the tip of the iceberg," Bailey says. "I'm sure we'll find more and more drugs that are affected this way."

To date, grapefruit, orange and apple juices have been shown to lower the absorption of etoposide, an anticancer agent; certain beta blockers (atenolol, celiprolol, talinolol) used to treat high blood pressure and prevent heart attacks; cyclosporine, a drug taken to prevent rejection of transplanted organs; and certain antibiotics (ciprofloxacin, levofloxacin, itraconazole). But additional drugs are likely to be added to the list as physicians become more aware of this drug-lowering interaction, Bailey says.

Orange and apple juices also appear to contain naringin-like substances that inhibit OATP1A2, Bailey says. The chemical in oranges appears to be hesperidin, but the chemical in apples has not yet been identified, the researchers notes.

Bailey advises patients to consult with their doctor or pharmacist before taking any medications with grapefruit juice or other fruits and juices. Unless it is known to be a problem, he recommends taking most medications only with water. This research was funded by grants from the Canadian Institutes of Health Research and the United States Public Health Service.

Adapted from materials provided by American Chemical Society, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2008/08/080819160050.htm

Obesity Raises Risks Of Serious Digestive Health Concerns: Incidence Of GERD, Colorectal Cancer Increase With Body Mass

ScienceDaily (Aug. 20, 2008) — The prevalence of obesity and overweight in the United States coupled by the increased risk of gastrointestinal diseases related to obesity raises serious implications for the health of Americans. Several scientific studies in the August issue of The American Journal of Gastroenterology examine the association between obesity and the risk of colorectal cancer and gastroesophageal reflux disease, or GERD.Dr. Frank K. Friedenberg and colleagues from Temple University School of Medicine in Philadelphia provide an extensive overview of scientific research on the epidemiologic and pathophysiologic associations between obesity and GERD.

Several studies featured in the article highlight the correlation between increasing body mass index (BMI) and the frequency and severity of acid reflux symptoms. One particular study found that accumulation of abdominal fat, as measured by the waist-to-hip ratio, may be the most important risk factor for the development of acid reflux and related complications such as Barrett's esophagus and esophageal adenocarcinoma.The authors also examined data on the effects of weight loss through diet or surgical methods on acid reflux disease. Several studies suggest weight loss through caloric restriction was beneficial in reducing GERD symptoms. When the authors compared the different surgical approaches for weight loss, a surgical technique called "Roux-en-Y" gastric bypass appeared to be the best method, and was most consistently associated with improvement in the symptoms and findings of GERD. "The mechanism of action through which this surgery is successful at improving GERD may be independent of weight loss and needs further examination," said Dr. Friedenberg.

High Body Mass Index Increases Risk of Colorectal Adenomas

Researchers at the University of Tokyo and Kameda General Hospital in Japan examined the effect of body weight on the incidence of colorectal adenoma in 7,963 Japanese patients who underwent colonoscopy between 1991 and 2003. Patients who had a family history of colorectal cancer, colorectal polyps, inflammatory bowel disease, colorectal surgery or who took NSAIDS were excluded from the study.In this cross-sectional study, patients were classified into four groups according to their body mass index (BMI). Researchers found 20.7 percent of patients had at least one colorectal adenoma. Importantly, as the BMI increased, so did the prevalence of colorectal adenomas.

In a separate cohort analysis, 2,568 patients from the initial study underwent a second colonoscopy after one year to compare the effect of body weight changes on the development of new colorectal adenomas. The incidence rates of colorectal adenoma were 9.3 percent in patients who lost 5 percent or more in body weight; 16.2 percent in patients who gained 5 percent or more in body weight; and 17.1 percent in patients who neither gained nor lost weight.Weight loss was associated with lowered incidence of adenoma, independent of gender, age, initial colonoscopic findings, and initial BMI. Based on their findings, the authors suggest that controlling body weight may decrease the risk of developing colorectal adenomas.

According to ACG President Amy E. Foxx-Orenstein, D.O., FACG, "The magnitude of the obesity epidemic adds a staggering burden to our current health care system. These studies point to the serious potential risks of GI disease for individuals who are overweight or obese."

Adapted from materials provided by American College of Gastroenterology, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2008/08/080819160237.htm

Discovery Of Plant Protein Holds Promise For Biofuel Production

Corn and soybean crops on the MSU campus. (Credit: Photo by Kurt Stepnitz)

ScienceDaily (Aug. 20, 2008) — Scientists at Michigan State University have identified a new protein necessary for chloroplast development. The discovery could ultimately lead to plant varieties tailored specifically for biofuel production.

Chloroplasts, which are specialized compartments in plant cells, convert sunlight, carbon dioxide and water into sugars and oxygen ("fuel" for the plant) during photosynthesis. The newly discovered protein, trigalactosyldiacylglycerol 4, or TGD4, offers insight into how the process works.

"Nobody knew how this mechanism worked before we described this protein," said Christoph Benning, MSU professor of biochemistry and molecular biology. "This protein directly affects photosynthesis and how plants create biomass (stems, leaves and stalks) and oils."

Benning also is a member of the Great Lakes Bioenergy Research Center, a partnership between MSU and the University of Wisconsin-Madison funded by the U.S. Department of Energy to conduct basic research aimed at solving some of the most complex problems in converting natural materials to energy.

The research, published in the August 2008 issue of journal The Plant Cell, shows how TGD4 is essential for the plant to make chloroplasts. Plants that don't have the protein die before they can develop beyond the embryonic stage.

Understanding how TGD4 works may allow scientists to create plants that would be used exclusively to produce biofuels, possibly making the process more cost-effective. Most plants that are used to produce oils – corn, soybeans and canola, for example – accumulate the oil in their seeds.

"We've found that if the TGD4 protein is malfunctioning, the plant then accumulates oil in its leaves," Benning said. "If the plant is storing oil in its leaves, there could be more oil per plant, which could make production of biofuels such as biodiesel more efficient. More research is needed so we can completely understand the mechanism of operation."

Other members of the MSU research team are: Changcheng Xu, research assistant professor of biochemistry and molecular biology; Jilian Fan, research technician; and Adam Cornish, biochemistry undergraduate student at the time of the research and current graduate student.

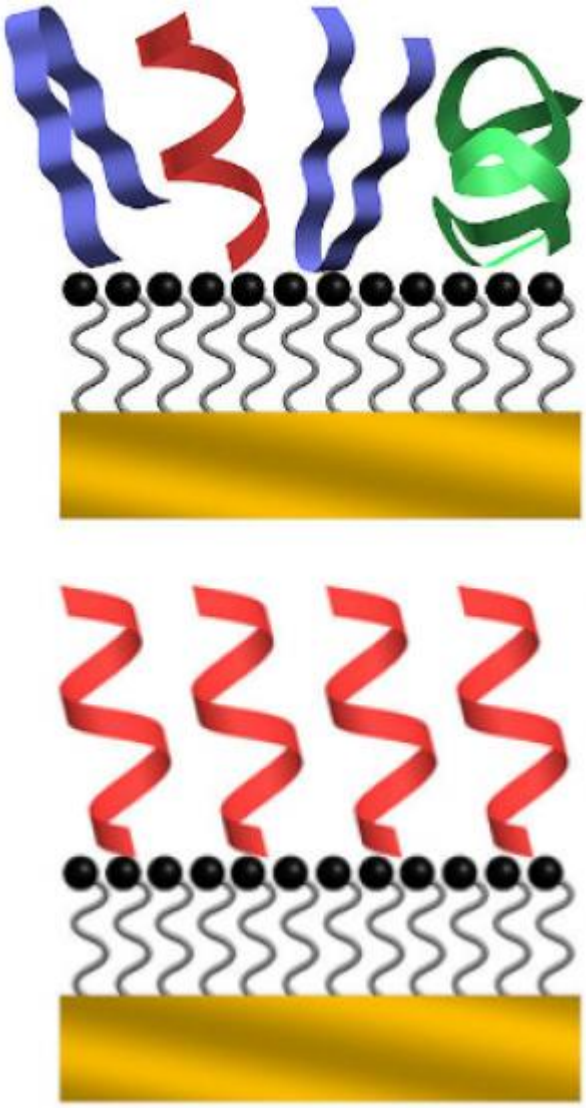
The research was funded by the Energy Department and the National Science Foundation. Benning's research also is supported by the Michigan Agricultural Experiment Station.

For more information on MSU's biofuel and bioenergy research, visit: http://www.bioeconomy.msu.edu.

Adapted from materials provided by Michigan State University.

http://www.sciencedaily.com/releases/2008/08/080815170633.htm

Chemists Make Beds With Soft Landings: Researchers Create Stable, Highly Pure Helical Peptide Arrays



Sprung Out: Short bits of protein called peptides form various shapes (top, in red, blue and green) when deposited on a specially prepared surface by an electrospray method. With soft-landing techniques, the peptides fashion themselves into stable helices (bottom, in red). (Credit: Julia Laskin/Pacific Northwest National Laboratory)

ScienceDaily (Aug. 20, 2008) — Bedsprings aren't often found in biology. Now, chemists have succeeded in making a layer of tiny protein coils attached to a surface, much like miniature bedsprings in a frame. This thin film made of stable and very pure helices can help researchers develop molecular electronics or solar cells, or to divine the biology of proteins.

Physical chemists at the Department of Energy's Pacific Northwest National Laboratory pulled off this design trick using a "soft-landing" technique that disperses the tiny protein coils onto a waiting surface. The small proteins called peptides are of a variety that normally take the shape of a coiled spring or helix in gas phase. The method used by PNNL's Julia Laskin and Peng Wang delivered ultra-pure helical peptides to the surface and trapped them there, they report in July 29 and will appear in print in an upcoming issue of Angewandte Chemie.

"Controlling the conformation of peptides is not easy," said Laskin. "Our previous studies showed that soft-landing can be used to prepare ultrapure peptide layers on substrates. The question we faced was, in addition to controlling purity, can we also control the structure of the molecules? We showed we could."

Researchers have been trying to make thin films of helical peptides for many years. Because the peptides line up in an orderly fashion, the overall chemical nature of the thin films make them useful for a variety of technological applications. They can be modified with light sensitive molecules and turned into components of solar cells; or designed to change shape when a current is applied for molecular electronics. Also, the helices themselves can be used to elicit cues about how proteins function.

After making the thin films out of generic peptides previously, Laskin and Wang wanted to use this method to make a film out of helical peptides, and compare it with a more common method called electrospray.

To do so, Laskin and Wang began with peptides made almost entirely of the amino acid alanine. Due to alanine's chemical nature, long chains of it naturally form so-called α helices. The researchers ended the alanine chain with the amino acid lysine, which stabilizes the helix and allows the coiled chain to be chemically attached to the surface.

Working with a specially designed mass-selected ion deposition instrument at DOE's Environmental Molecular Sciences Laboratory on the PNNL campus, they deposited the peptides on the support layer in one of two ways, starting either from a liquid form for electrospray or from a gaseous mixture for soft-landing. In each case, the chemists began with the peptides (either in liquid or gas), zapped them to give them a slight electrical charge and blew them onto the surface.

When the chemists examined the peptide shapes in the solution and the resulting thin film, they found, unexpectedly, that most of the peptides failed to form helices. Instead, the majority of peptides took on a flat shape known as a β sheet. The dearth of helices in liquid form surprised the researchers.

When the researchers next used soft-landing to form thin layers, they didn't know if the peptides would form helices before landing on the surface. "Because we were starting from something that wasn't α-helical in solution, we were a little pessimistic whether it would work at all," Wang said.

But work it did. Depositing the peptides with soft-landing, the chemists found that nearly all of them alighted as helices. In addition, they could chemically connect the helices to the surface using a related technique called reactive-landing. When the chemists treated the thin layer with sound waves to test how easily the peptides fell off or changed shape, they found that some loosely bound peptides fell off, but those remaining maintained their helical forms.

"They formed a nicely organized, beautiful layer," says Wang.

Next, the team would like to create thin peptide layers using different support surfaces and a different mix of peptide shapes, to learn how to control the design of the thin films precisely.

"We found an interesting pathway to conduct different types of chemical reactions between complex molecules and substrates that will potentially enable us to prepare materials that cannot be made by standard methods," said Laskin.

"We hope to conduct lots of chemistry on the thin films," said Laskin -- chemistry that will let them spring forward into understanding biology and developing new materials.

This work was supported by PNNL discretionary funding and DOE's Office of Basic Energy Sciences, part of the Office of Science.

Journal reference:

1. P. Wang and J. Laskin. **Helical Peptide Arrays on Self-Assembled Monolayer Surfaces through Soft and Reactive Landing of Mass-Selected Ions**. *Angewandte Chemie*, Published online July 29, 2008 DOI: 10.1002/anie.200801366

Adapted from materials provided by DOE/Pacific Northwest National Laboratory.

http://www.sciencedaily.com/releases/2008/08/080818082559.htm

New 52-city Report Examines Use Of Wastewater In Urban Agriculture

ScienceDaily (Aug. 20, 2008) — As developing countries confront the first global food crisis since the 1970s as well as unprecedented water scarcity, a new 53-city survey conducted by the International Water Management Institute (IWMI) indicates that most of those studied (80 percent) are using untreated or partially treated wastewater for agriculture.

In over 70 percent of the cities studied, more than half of urban agricultural land is irrigated with wastewater that is either raw or diluted in streams.

The conclusions of the study, released today at 2008 World Water Week in Stockholm, are based on data gathered from a diverse sample of developing country cities, chosen on the basis of factors such as water scarcity and income levels. Local experts selected by an independent panel completed survey questionnaires, drawing on secondary data as well as interviews with local water management experts and detailed country studies.

"Irrigating with wastewater isn't a rare practice limited to a few of the poorest countries," said IWMI researcher Liqa Raschid-Sally and lead author of a report on survey results. "It's a widespread phenomenon, occurring on 20 million hectares across the developing world, especially in Asian countries, like China, India and Vietnam, but also around nearly every city of sub-Saharan Africa and in many Latin American cities as well."

Wastewater is most commonly used to produce vegetables and cereals (especially rice), according to this and other IWMI reports, raising concerns about health risks for consumers, particularly of vegetables that are consumed uncooked. But at the same time, wastewater agriculture contributes importantly to urban food supplies and helps provide a livelihood for the urban poor, especially women, and recent migrants from the countryside.

"The negative and positive implications of wastewater agriculture have only recently received attention," noted Colin Chartres, director general of IWMI, which is supported by the Consultative Group on International Agricultural Research (CGIAR). "This study offers the first comprehensive, cross-country analysis of the conditions that account for the practice and the difficult tradeoffs that arise from it."

Accra, Ghana's capital city (with an urban population of nearly 2 million), illustrates those tradeoffs particularly well. An estimated 200,000 of the city's inhabitants daily purchase vegetables produced on just 100 hectares of urban agricultural land irrigated with wastewater, says the IWMI report. "That gives you an idea," remarked Raschid-Sally, "of the large potential of wastewater agriculture for both helping and hurting great numbers of urban consumers."

"And it isn't just affluent consumers of exotic vegetables whose welfare is at stake," she added. "Poor consumers of inexpensive street food also depend on urban agriculture." Moreover, in Asia, rice-based farming systems, irrigated mainly with wastewater, figure importantly in urban food production, Raschid-Sally explained.

Across regions, poor women benefit most from farming within and around urban areas, according to survey results. They play especially prominent roles in certain cities of Africa, Central Asia and Latin America, accounting for more than 70 percent of urban farmers. In many cities, they also dominate the wholesale and retail sale of vegetables, often making more money than their farming husbands.

Survey results on the forces driving wastewater use in urban agriculture suggest that it is not only widespread but practically inevitable. As long as developing countries lack suitable transport for delivering large quantities of perishable produce to urban areas, vegetable production in urban agriculture

will remain important. And in the face of water scarcity generally and a lack of access to clean water, urban farmers will have no alternative except to use diluted or untreated wastewater or polluted river water.

Consumers across the 53 cities said they would prefer to avoid wastewater produce. But most of the time, they have no way of knowing the origin of the products they buy. Farmers too are aware that irrigating with wastewater may pose health risks both for themselves and the consumers of their produce, but they simply have little choice, since safe groundwater is seldom an accessible alternative, according to the IWMI report.

Few developing countries reported having official guidelines for the use of wastewater in agriculture. And even if they do, monitoring and enforcement rarely happen and may not be realistic, especially where irrigation with polluted water occurs on a large scale. As a result, though the practice may be theoretically forbidden or controlled, it is in fact "unofficially tolerated."

Under those conditions, the report asserts, extreme measures, like banning the use of polluted water, or even stricter water quality guidelines are of no avail. In fact, they could adversely affect urban consumers, farmers and others who depend on urban agriculture.

The report praises new guidelines established by the World Health Organization (WHO), which replace often unachievable water quality thresholds with more realistic health-based targets. As a result, countries lacking the means to treat wastewater adequately can still reduce health risks through low-cost interventions, such as the use of drip irrigation and correct washing of fresh produce. Current sanitation methods, though often inadequate, still offer entry points for introducing strategies to reduce health risks, according to the IWMI report.

Another option is to build on a wide range of innovative indigenous practices that can greatly reduce the health risks from wastewater agriculture. In Indonesia, Nepal, Ghana and Vietnam, for example, farmers store wastewater in ponds to allow suspended solids to settle out. Inadvertently, this practice also permits worm eggs to settle out, possibly reducing bacteria in the water.

In Ouagadougou, Burkina Faso, farmers using water from a brewery build storage basins for wastewater and fill them only when they judge the quality of the wastewater to be acceptable (that is, not acidic), based on its appearance, odor and even taste.

"A key aim of IWMI research is to find feasible approaches whereby wastewater irrigation can continue strengthening food security and generating economic benefits but without major health risks for urban consumers and farmers," said Chartres.

The IWMI study on wastewater use was funded primarily by the governments of the Netherlands and Switzerland as part of the Comprehensive Assessment of Water Management in Agriculture (CA).

Adapted from materials provided by International Water Management Institute, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2008/08/080817223536.htm

Algae: Biofuel Of The Future?

Environmental engineering professors Andres Clarens (center) and Lisa Colosi (right) have teamed up with commerce professor Mark White to investigate how algae may offer the biofuel of the future. (Credit: Melissa Maki)

ScienceDaily (Aug. 19, 2008) — In the world of alternative fuels, there may be nothing greener than pond scum.

Algae are tiny biological factories that use photosynthesis to transform carbon dioxide and sunlight into energy so efficiently that they can double their weight several times a day.

As part of the photosynthesis process algae produce oil and can generate 15 times more oil per acre than other plants used for biofuels, such as corn and switchgrass. Algae can grow in salt water, freshwater or even contaminated water, at sea or in ponds, and on land not suitable for food production.

On top of those advantages, algae — at least in theory — should grow even better when fed extra carbon dioxide (the main greenhouse gas) and organic material like sewage. If so, algae could produce biofuel while cleaning up other problems.

"We have to prove these two things to show that we really are getting a free lunch," said Lisa Colosi, a professor of civil and environmental engineering who is part of an interdisciplinary University of Virginia research team, recently funded by a new U.Va. Collaborative Sustainable Energy Seed Grant worth about $30,000.

With the grant, the team will try to determine exactly how promising algae biofuel production can be by tweaking the inputs of carbon dioxide and organic matter to increase algae oil yields.

Scientific interest in producing fuel from algae has been around since the 1950s, Colosi said. The U.S. Department of Energy did pioneering research on it from 1978 to 1996. Most previous and current research on algae biofuel, she said, has used the algae in a manner similar to its natural state — essentially

letting it grow in water with just the naturally occurring inputs of atmospheric carbon dioxide and sunlight. This approach results in a rather low yield of oil — about 1 percent by weight of the algae.

The U.Va. team hypothesizes that feeding the algae more carbon dioxide and organic material could boost the oil yield to as much as 40 percent by weight, Colosi said.

Proving that the algae can thrive with increased inputs of either carbon dioxide or untreated sewage solids will confirm its industrial ecology possibilities — to help with wastewater treatment, where dealing with solids is one of the most expensive challenges, or to reduce emissions of carbon dioxide, such as coal power-plant flue gas, which contains about 10 to 30 times as much carbon dioxide as normal air.

"The main principle of industrial ecology is to try and use our waste products to produce something of value," Colosi said.

Research partner Mark White, a professor at the McIntire School of Commerce, will help the team quantify the big-picture environmental and economic benefits of algae biofuel compared to soy-based biodiesel, under three different sets of assumptions.

White will examine the economic benefits of algae fuel if the nation instituted a carbon cap-and-trade system, which would increase the monetary value of algae's ability to dispose of carbon dioxide. He will also consider how algae fuel economics would be impacted if there were increased nitrogen regulations (since algae can also remove nitrogen from air or water), or if oil prices rise to a prohibitive level.

The third team member is Andres Clarens, a professor of civil and environmental engineering with expertise in separating the oil produced by the algae.

The team will experiment on a very small scale — a few liters of algae at a time. They will seek to optimize the oil output by using a pragmatic engineering approach, testing basic issues like whether it makes a difference to grind up the organic material before feeding it to the algae.

Wastewater solids and algae, either dead or alive, are on the menu. "We're looking at dumping the whole dinner on top of them and seeing what happens," Colosi said.

Some of these pragmatic issues may have been tackled already by the various private companies, including oil industry giants Chevron and Shell, which are already researching algae fuel, but a published scientific report on these fundamentals will be a major benefit to other researchers looking into algae biofuel.

Published evidence of improved algae oil output might spur significant follow-up efforts by public and private sectors, since the fundamentals of this technology are so appealing, Colosi said. Research successes would also open the door to larger grants from agencies like the U.S. Department of Energy, and could be immediately applicable to the handful of pilot-scale algae biofuel facilities recently funded by Shell and start-up firms.

Adapted from materials provided by University of Virginia.

http://www.sciencedaily.com/releases/2008/08/080818184434.htm

2007 Hurricane Forecasts Took Blow From Winds And Dry, Dusty Air From Sahara Desert

A dust plume from Northern Africa moves over the Atlantic on July 20, 2007. The westward extent of such dust could have contributed to the relatively quiet 2007 hurricane season. (Credit: NASA)

ScienceDaily (Aug. 19, 2008) — A new analysis of environmental conditions over the Atlantic Ocean shows that hot, dry air associated with dust outbreaks from the Sahara desert was a likely contributor to the quieter-than-expected 2007 hurricane season.

Factors known to influence the number and intensity of hurricanes in a season, including El Niño, sea surface temperatures, wind, and sea level pressure, led to NOAA forecasts for an above-average 2007 hurricane season. However, the season, which runs from June through November, turned up six hurricanes – a near normal number, but less than the 10 expected and far fewer than the record-breaking 15 hurricanes in 2005.

The difference between the 2007 and 2005 seasons could be due in part to the westward reach of Saharan dry air and dust over the North Atlantic, according to researchers, including Bill Lau of NASA's Goddard Spaceflight Center in Greenbelt, Md., and co-author of a study on this finding published Aug. 14 in the American Geophysical Union's Geophysical Research Letters. The study also confirms the possible role of Saharan dust in shattering predictions for the 2006 hurricane season, and has implications for more accurate predictions for future hurricane seasons.

Lau and colleagues previously reported that the presence of dust could have contributed to a weaker 2006 hurricane season than forecasters expected. Dust over the North Atlantic blocked some sunlight from reaching the ocean, accounting for 30 to 40 percent of the drop in sea surface temperatures measured

between June 2005 and June 2006. The cooler sea surface increases atmospheric stability and also reduces the transfer of heat from ocean to atmosphere – a major source of fuel that drives hurricanes.

Now, the team found that hurricane formation in 2007 was also hampered by Saharan dry air. They go further, however, to describe the extent to which the dry air and associated dust spread across the tropical North Atlantic, as seen by instruments aboard NASA satellites such as the Moderate Resolution Imaging Spectroradiometer. They created a "wind-stretch index," based on the east-west difference in wind speed over the tropical Atlantic. The index is connected to relative humidity over the tropical western Atlantic, and is a perfect measure of how far west dry air and dust from Africa extends over the North Atlantic.

The team found that instances of Saharan dry air and dust extending far west over the Caribbean were in sync with conditions that contributed to fewer hurricanes in both 2007 and 2006, including lower sea surface temperatures. They also found that the far-reaching western extent of dust in 2006 and 2007 was associated with less-than-normal humidity over the western North Atlantic.

"This index hasn't been looked at before," said Lau. "We introduce a way to relate wind stretch to dry air and dust, which correlate very well with humidity in the western tropical Atlantic."

The link between dust and humidity, the researchers say, could aid future forecasts. As dust outbreaks occur most often in early summer prior to peak hurricane season, researchers could use a measure of humidity in the western tropical Atlantic to gauge the extent of dust transport, possibly providing an additional parameter to estimate the following month's hurricane activity.

"The index we proposed may provide practical implications for the prediction of Atlantic hurricane activities," says Donglian Sun of George Mason University in Fairfax Va., and lead author of the study. "Further studies are needed to discern the general prediction capability of our results."

If the index is on target, the team believes it could also describe dust's role in past hurricane seasons. Records of historical wind data from ground stations could be applied to the index to infer the westward extent of dry air and dust long before satellites existed to "see" dust from above.

Adapted from materials provided by NASA/Goddard Space Flight Center.

http://www.sciencedaily.com/releases/2008/08/080818184428.htm

New Technology Silences Genes: Suppressing Disease-causing Genes Is Now Within Reach

ScienceDaily (Aug. 19, 2008) — Mount Sinai researchers have developed a new gene silencing technology that could be used to target genes that can lead to the development of certain diseases. This technology could pave the way for preventing diseases where gene dysfunction plays a role.

The groundbreaking research was led by Ming-Ming Zhou, Ph.D., Professor and Chairman of the Department of Structural and Chemical Biology at Mount Sinai School of Medicine. The findings, which will be published in the September issue of Nature Cell Biology, are available on the magazine's web site as of today.

"By being able to silence certain genes, we may be able to suppress genes that can cause diseases such as HIV/AIDS, cancer, inflammation and diseases of the central and peripheral nervous systems. We now know we can focus on these genes and potentially change the ultimate course of many diseases that have a major impact on people's lives," says Dr. Zhou.

In the study, Dr. Zhou, Shiraz Mujtaba, Ph.D., Assistant Professor of Structural and Chemical Biology at Mount Sinai and their colleagues discovered that Paramecium bursaria chlorella virus uses a viral protein to modify host DNA packing chromatin and switch host transcription machinery for viral replication.

Based on this finding, researchers were able to develop a new gene targeting technology that effectively suppresses transcriptional expression of targeted genes in human cells, including genes that are linked to the onset of a number of diseases.

Adapted from materials provided by The Mount Sinai Hospital / Mount Sinai School of Medicine, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2008/08/080818101333.htm

Computer Users Are Digitizing Books Quickly And Accurately With New Method

Carnegie Mellon computer scientist Luis von Ahn. (Credit: Image courtesy of Carnegie Mellon University)

ScienceDaily (Aug. 19, 2008) — Millions of computer users collectively transcribe the equivalent of 160 books each day with better than 99 percent accuracy, despite the fact that few spend more than a few seconds on the task and that most do not realize they are doing valuable work, Carnegie Mellon University researchers reported recently in Science Express.

They can work so prodigiously because Carnegie Mellon computer scientists led by Luis von Ahn have taken a widely used Web site security measure, called a CAPTCHA, and given it a second purpose — digitizing books produced prior to the computer age. When Web visitors solve one of the distorted-letter puzzles so they can register for email or post a comment on a blog, they simultaneously help turn the printed word into machine-readable text.

More than a year after implementing their version, called reCAPTCHA, http://recaptcha.net/ on thousands of Web sites worldwide, the researchers conclude that their word deciphering process achieves the industry standard for human transcription services — better than 99 percent accuracy. Their report, published online today, will appear in an upcoming issue of the journal Science.

Furthermore, the amount of work that can be accomplished is herculean. More than 100 million CAPTCHAs are solved every day and, though each puzzle takes only a few seconds to solve, the aggregate amount of time translates into hundreds of thousands of hours of human effort that can potentially be tapped. During the reCAPTCHA system's first year of operation, more than 1.2 billion reCAPTCHAs have been solved and more than 440 million words have been deciphered. That's the equivalent of manually transcribing more than 17,600 books.

"More Web sites are adopting reCAPTCHAs each day, so the rate of transcription keeps growing," said von Ahn, an assistant professor in the School of Computer Science's Computer Science Department. "More than 4 million words are being transcribed every day. It would take more than 1,500 people working 40 hours a week at a rate of 60 words a minute to match our weekly output."

Von Ahn said reCAPTCHAs are being used to digitize books for the Internet Archive and to digitize newspapers for The New York Times. Digitization allows older works to be indexed, searched, reformatted and stored in the same way as today's online texts.

Old texts are typically digitized by photographically scanning pages and then transforming the text using optical character recognition (OCR) software. But when ink has faded and paper has yellowed, OCR sometimes can't recognize some words — as many as one out of every five, according to the Carnegie Mellon team's tests. Without reCAPTCHA, these words must be deciphered manually at great expense.

Conventional CAPTCHAs, which were developed at Carnegie Mellon, involve letters and numbers whose shapes have been distorted or backgrounds altered so that computers can't recognize them, but humans can. To create reCAPTCHAs, the researchers use images of words from old texts that OCR systems have had trouble reading.

Helping to make old books and newspapers more accessible to a computerized world is something that the researchers find rewarding, but is only part of a larger goal. "We are demonstrating that we can take human effort — human processing power — that would otherwise be wasted and redirect it to accomplish tasks that computers cannot yet solve," von Ahn said.

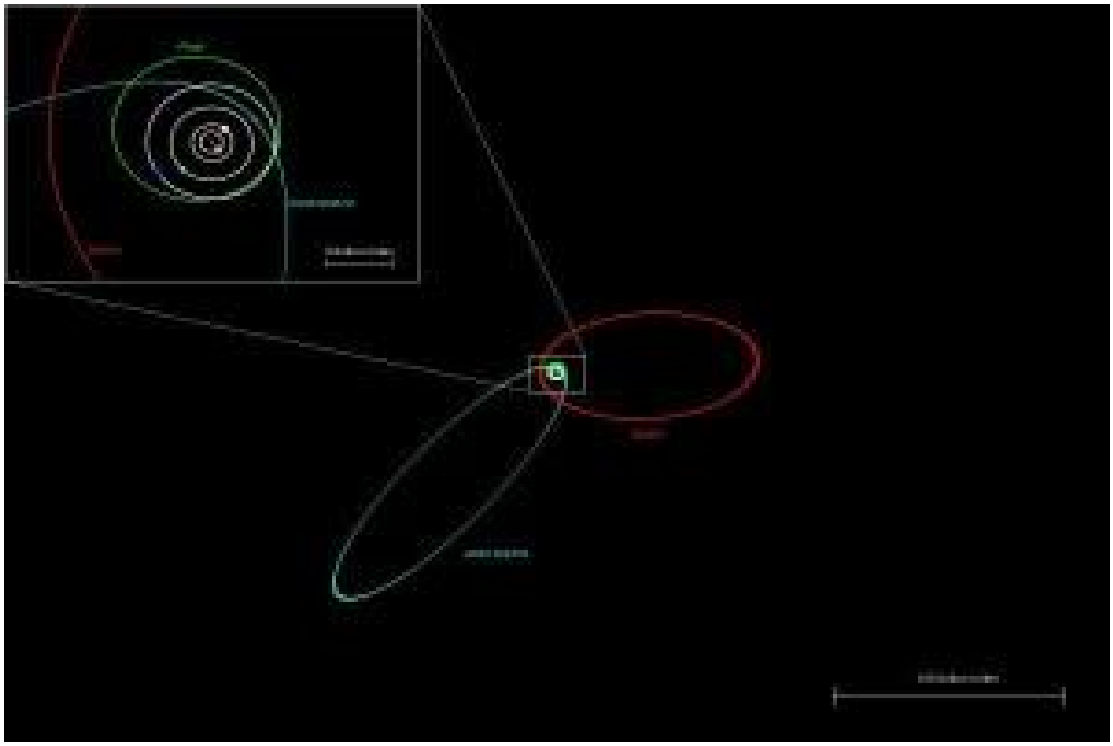
For instance, he and his students have developed online games, available at http://www.gwap.com, that analyze photos and audio recordings — tasks beyond the capability of computers. Similarly, University of Washington biologists recently built Fold It, http://fold.it/, a game in which people compete to determine the ideal structure of a given protein.

In addition to von Ahn, authors of the new report include computer science undergraduate Benjamin Maurer, graduate students Colin McMillen and David Abraham, and Manuel Blum, professor of computer science.

Adapted from materials provided by Carnegie Mellon University.

http://www.sciencedaily.com/releases/2008/08/080814154329.htm

Astronomers Find Unusual New Denizen Of The Solar System



The orbit of the newly discovered solar system object SQ372 (blue), in comparison to the orbits of Neptune, Pluto, and Sedna (white, green, red). The location of the Sun is marked by the yellow dot at the center. The inset panel shows an expanded view, including the orbits of Uranus, Saturn, and Jupiter inside the orbit of Neptune. Even on this expanded scale, the size of Earth's orbit would be barely distinguishable from the central dot. (Credit: N. Kaib)

ScienceDaily (Aug. 19, 2008) — A "minor planet" with the prosaic name 2006 SQ372 is just over two billion miles from Earth, a bit closer than the planet Neptune. But this lump of ice and rock is beginning the return leg of a 22,500-year journey that will take it to a distance of 150 billion miles, nearly 1,600 times the distance from the Earth to the Sun, according to a team of researchers from the Sloan Digital Sky Survey (SDSS-II).

The discovery of this remarkable object was reported today in Chicago, at an international symposium titled "The Sloan Digital Sky Survey: Asteroids to Cosmology." A paper describing the discovery technique and the properties of 2006 SQ372 is being prepared for submission to The Astrophysical Journal.

The orbital paths of the major planets are nearly circular, but the orbit of 2006 SQ372 is an ellipse that is four times longer than it is wide, said University of Washington astronomer Andrew Becker, who led the discovery team. The only known object with a comparable orbit is Sedna -- a distant, Pluto-like dwarf planet discovered in 2003 -- but 2006 SQ372's orbit takes it more than one-and-a-half times further from the Sun, and its orbital period is nearly twice as long.

The new object is much smaller than Sedna, Becker said, probably 30-60 miles across instead of nearly 1,000. "It's basically a comet, but it never gets close enough to the Sun to develop a long, bright tail of evaporated gas and dust."

Becker's team found 2006 SQ372 by applying a specialized computer searching algorithm to data taken for a completely different purpose: finding supernova explosions billions of light years away to measure the expansion of the universe. The SDSS-II supernova survey scanned the same long stripe of sky, an area 1,000 times larger than the full moon, every clear night in the fall of 2005, 2006, and 2007.

"If you can find things that explode, you can also find things that move, but you need different tools to look for them," said team member Lynne Jones, also of the University of Washington. The only objects close enough to change position noticeably from one night to the next are in our own solar system, Jones explained.

SQ372 was first discovered in a series of images taken between September 27 and October 21, 2006. Team member Andrew Puckett, of the University of Alaska Anchorage, then searched the supernova survey's Fall 2005 observations to find earlier detections, thus securing the discovery. Subsequent SDSS detections of SQ372 have been found in data from the 2006 and 2007 observing seasons.

University of Washington graduate student Nathan Kaib, another member of the discovery team, has been running computer simulations to try to understand out how 2006 SQ372 might have acquired its unusual orbit. "It could have formed, like Pluto, in the belt of icy debris beyond Neptune, then been kicked to large distance by a gravitational encounter with Neptune or Uranus," said Kaib. "However, we think it is more probable that SQ372 comes from the inner edge of the Oort Cloud."

In 1950, Kaib explained, the Dutch astronomer Jan Oort hypothesized that most comets come from a distant reservoir of icy, asteroid-like bodies, which were ejected from the inner solar system by gravitational kicks from the giant planets as the planets themselves were forming four and a half billion years ago. Most objects in the Oort cloud orbit the Sun at distances of several trillion miles, but the gravity of passing stars can alter their orbits, flinging some into interstellar space and deflecting others to the inner solar system where they "light up" as comets.

Even at its most distant turning point, 2006 SQ372 will be ten times closer to the Sun than the supposed main body of the Oort Cloud, said Kaib. "The existence of an 'inner' Oort cloud has been theoretically predicted for many years, but SQ372 and perhaps Sedna are the first objects we have found that seem to originate there. It's exciting that we are beginning to verify these predictions."

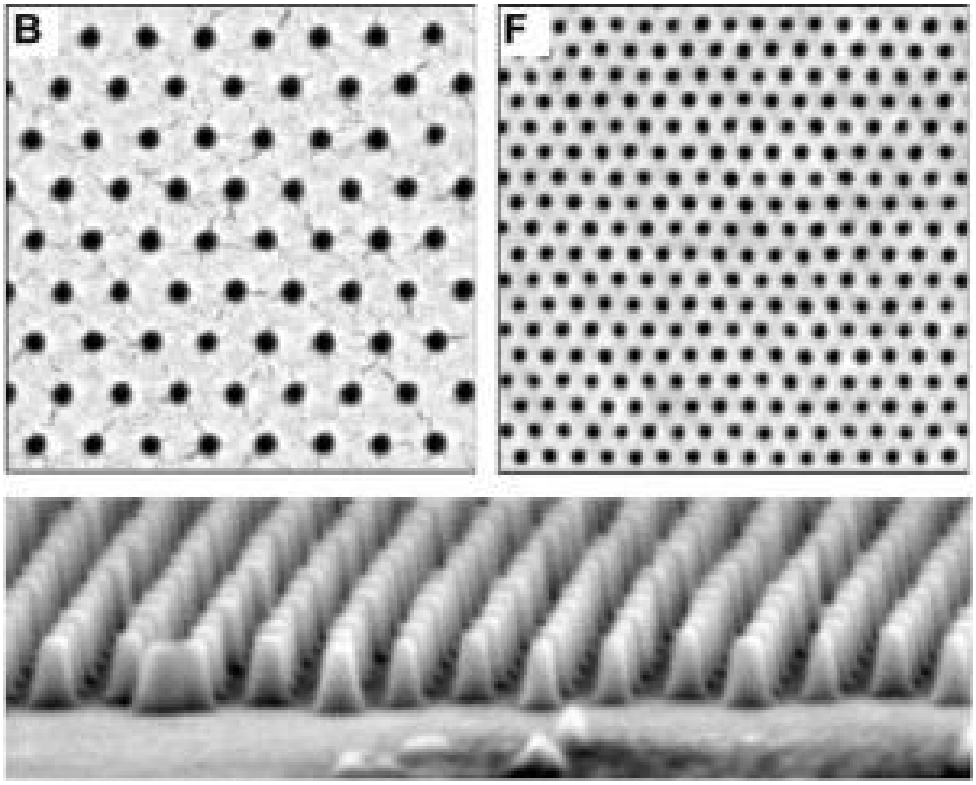
Becker noted that 2006 SQ372 was bright enough to find with the SDSS only because it is near its closest approach to the Sun, and that the SDSS-II supernova survey observed less than one percent of the sky. "There are bound to be many more objects like this waiting to be discovered by the next generation of surveys, which will search to fainter levels and cover more area," said Becker. "In a decade, we should know a lot more about this population than we do now."

"One of our goals," said Kaib, "is to understand the origin of comets, which are among the most spectacular celestial events. But the deeper goal is to look back into the early history of our solar system and piece together what was happening when the planets formed."

Adapted from materials provided by Sloan Digital Sky Survey.

http://www.sciencedaily.com/releases/2008/08/080819085858.htm

Self-assembling Polymer Arrays Improve Data Storage Potential



Researchers from the University of Wisconsin-Madison and Hitachi Global Storage Technologies have reported a way to improve the quality and resolution of patterned templates such as those used to manufacture hard drives and other data storage devices. When added to lithographically patterned surfaces such as those shown in the upper left panel of this composite image, specially designed materials called block copolymers self-assemble into structures, shown in the upper right panel, with improved quality and resolution over the original patterns. These structures can be used to make templates with nanoscale elements like the silicon pillars shown in the bottom panel, which may be useful for manufacturing higher capacity hard disk drives. (Credit: Courtesy of Paul Nealey)

ScienceDaily (Aug. 19, 2008) — A new manufacturing approach holds the potential to overcome the technological limitations currently facing the microelectronics and data-storage industries, paving the way to smaller electronic devices and higher-capacity hard drives.

"In the past 20 to 30 years, researchers have been able to shrink the size of devices and the size of the patterns that you need to make those devices, following the use of the same types of lithographic materials, tools and strategies, only getting better and better at it," says Paul Nealey, director of the University of Wisconsin-Madison Nanoscale Science and Engineering Center (NSEC).

Now, those materials and tools are reaching their fundamental technical limits, hampering further performance gains. In addition, Nealey says, extrapolating lithography — a process used to pattern manufacturing templates — to smaller and smaller dimensions may become prohibitively expensive. Further advances will require a new approach that is both commercially viable and capable of meeting the demanding quality-control standards of the industry.

In a collaborative effort between academic and industry, chemical and biological engineering professors Nealey and Juan de Pablo, and other colleagues from the UW-Madison NSEC partnered with researchers

from Hitachi Global Storage Technologies to test a promising new twist on the traditional methods. In the Aug. 15 issue of the journal Science, the team demonstrates a patterning technology that may revolutionize the field, offering performance improvements over existing methods even while reducing the time and cost of manufacturing.

The method builds on existing approaches by combining the lithography techniques traditionally used to pattern microelectronics with novel self-assembling materials called block copolymers. When added to a lithographically patterned surface, the copolymers' long molecular chains spontaneously assemble into the designated arrangements.

"There's information encoded in the molecules that results in getting certain size and spacing of features with certain desirable properties," Nealey explains. "Thermodynamic driving forces make the structures more uniform in size and higher density than you can obtain with the traditional materials."

The block copolymers pattern the resulting array down to the molecular level, offering a precision unattainable by traditional lithography-based methods alone and even correcting irregularities in the underlying chemical pattern. Such nanoscale control also allows the researchers to create higher-resolution arrays capable of holding more information than those produced today.

In addition, the self-assembling block copolymers only need one-fourth as much patterning information as traditional materials to form the desired molecular architecture, making the process more efficient, Nealey says. "If you only have to pattern every fourth spot, you can write those patterns at a fraction of the time and expense," he says.

In addition to shared intellectual contributions, the collaboration between the UW-Madison and Hitachi teams provided very clear objectives about creating a technology that is industrially viable. "This research addresses one of the most significant challenges to delivering patterned media — the mass production of patterned disks in high volume, at a reasonable cost," says Richard New, director of research at Hitachi Global Storage Technologies. "The large potential gains in density offered by patterned media make it one of the most promising new technologies on the horizon for future hard disk drives."

In its current form, this method is very well-suited for designing hard drives and other data-storage devices, which need uniformly patterned templates — exactly the types of arrangements the block copolymers form most readily. With additional advances, the approach may also be useful for designing more complex patterns such as microchips.

"These results have profound implications for advancing the performance and capabilities of lithographic materials and processes beyond current limits," Nealey says.

In addition to support from the National Science Foundation, NSEC and Hitachi Global Storage Technologies, additional funding was provided by the Semiconductor Research Corporation.

Adapted from materials provided by University of Wisconsin-Madison.

http://www.sciencedaily.com/releases/2008/08/080814154323.htm

Limbs Saved By Menstrual Blood Stem Cells

ScienceDaily (Aug. 19, 2008) — Cells obtained from menstrual blood, termed 'endometrial regenerative cells' (ERCs) are capable of restoring blood flow in an animal model of advanced peripheral artery disease. A new study demonstrates that when circulation-blocked mice were treated with ERC injections, circulation and functionality were restored.

Critical limb ischemia, an advanced form of peripheral artery disease, causes approximately 150,000 amputations per year in the US. Currently there are no medical or surgical interventions that are effective in the advanced stages of the disease. ERCs are cells taken from menstrual blood that are capable of forming into at least 9 different tissue types, including heart, liver and lung.*

Dr. Michael Murphy, a vascular surgeon from Indiana University and lead author of this study has already performed clinical trials with adult stem cells for patients with peripheral artery disease. He stated, "The advantage of ERCs is that they can be used in an 'off the shelf' manner, meaning they can be delivered to the point of care, do not require matching, and are easily injectable without the need for complex equipment."

The experiments were performed as a collaboration between University of Western Ontario, Scripps Research Institute, Indiana University, and several other academic centers. The ERC cell population is currently being developed by the US publicly traded company Medistem Inc, who supported these studies.

"We are proud of assembling such a strong, clinically experienced team to contribute to these studies" said Dr. Thomas Ichim, CEO of Medistem. "Dr. Ewa Carrier and Suman Kambhampati are hematologists who use stem cells on a regular basis, Dr. Angle is a vascular surgeon, who like Dr. Murphy sees CLI on a daily basis, and Dr. Amit Patel has performed numerous cardiac stem cell clinical trials. With such a team that understands not only the science, but also the practical implementation, we feel we are well positioned to translate this discovery into a practical therapy in the near future".

* This discovery won the 'Medicine Research Award of the Year' award for BioMed Central's Research Awards in 2007.

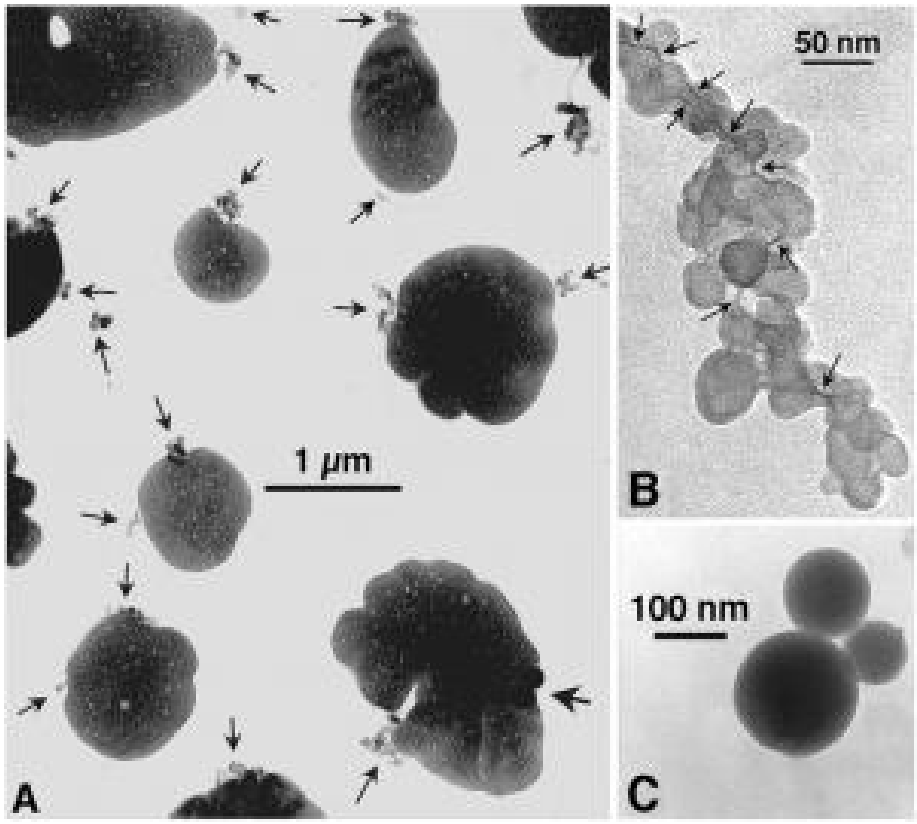
Journal reference:

1. Michael P Murphy, Hao Wang, Amit N Patel, Suman Kambhampati, Niren Angle, Kyle W Chan, Annette M Marleau, Andrew Pyszniak, Ewa Carrier, Thomas E Ichim and Neil H Riordan. **Allogenic Endometrial Regenerative Cells: An "Off the Shelf Solution" For Critical Limb Ischemia?** *Journal of Translational Medicine*, (in press)

Adapted from materials provided by BioMed Central/Journal of Translational Medicine, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2008/08/080818220609.htm

NASA Study Improves Ability To Predict Aerosols' Effect On Cloud Cover



Small soot and sulfate aerosols are seen in these microscope slides. Trapped in the atmosphere, these tiny particles can have an important effect on climate. (Credit: Mihály Pósfai, Arizona State University)

ScienceDaily (Aug. 19, 2008) — Using a novel theoretical approach, researchers from NASA and other institutions have identified the common thread that determines how aerosols from human activity, like the particles from burning of vegetation and forests, influence cloud cover and ultimately affect climate. The study improves researchers' ability to predict whether aerosols will increase or decrease cloud cover.

"We connected the dots to draw a critical conclusion, and found evidence over the Amazon that traces the direct path of the effect of human activity on climate change by way of human-caused aerosols," said study co-author Lorraine Remer, a physical scientist at NASA's Goddard Space Flight Center in Greenbelt, Md. "During the dry season in the Amazon, the only aerosols of any magnitude are from smoke emerging from human-initiated fires."

It is well documented from previous studies that aerosols play an essential role in how clouds develop. With this knowledge, a team comprised of Remer, Ilan Koren of the Weizmann Institute in Rehovot, Israel and J. Vanderlei Martins of the University of Maryland Baltimore County set out to explore one of the least understood but most significant aspects of climate change caused by human activity: the connection between a change in the amount of human-caused aerosols and change in the structure of clouds. Findings from their study will be published tomorrow in the journal Science.

"Scientists have observed instances where increases or decreases in the amount of these tiny particles have increased and decreased cloud cover in different places and times," said Remer. "We saw an example of this ourselves: increased aerosols over the Amazon produced less cloud cover. Over the

Atlantic Ocean, however, increased aerosols actually produced more cloud cover. We wanted to know what the link was between these different outcomes from varying amounts and types of aerosols. This paper gives us a clear picture of what is occurring."

The team developed an analytical model, or line of thinking that combined knowledge of cloud development, satellite observations and mathematical calculations of aerosol concentration and cloud properties in an effort to explain how the two opposing effects of aerosols on clouds can influence cloud coverage and life cycle.

"This result helps us understand aerosols' effect on a cloud's mass and lifetime -- how long it will provide cloud cover, how deep the clouds will be, and when and where it will rain," said Remer. "This improved understanding leads to prediction and prediction can help us plan and perhaps prevent some of the potential consequences of putting aerosols from human activity into the atmosphere."

To test their model, Remer's team used aerosol and cloud observations from NASA's Terra satellite of the Amazon during the 2005 dry season The season offers stable weather conditions and an abundance of human-caused aerosols from fires, set to clear new land and burn through old pastures to prepare the land for the next crop season.

Aerosols are the tiny particles that make up smoke, dust, and ocean spray. Traveling on wind currents, aerosols move from their source and into the atmosphere, where they become individually encased by water and turn into the droplets that combine to create clouds.

Cloud microphysics makes clear that the larger the number of aerosol particles suspended in air the less water in the atmosphere is available for condensation on each individual particle. Under these conditions, a cloud will have a much larger number of small droplets. The smaller the droplets, the longer it will take for a cloud to rain. Aerosol-rich clouds like this spread out by winds, produce less rainfall, and last longer, creating more cloud cover.

However, aerosols also influence clouds through their ability to absorb heat from the sun. The trapped heat causes the atmospheric layer to warm up, and changes the environment in which the cloud develops. The overall result is to make the environment less hospitable for cloud growth. Even the smallest resulting changes in cloud cover can significantly warm or cool the atmosphere and change when and where fresh water will be available in the region.

"As we'd expected in applying our model, increased smoke from the fires created clouds rife with a more pronounced radiative effect -- rich with human-caused aerosols that absorbed sunlight, warmed the local atmosphere, and blocked evaporation. This led to reduced cloud cover over the Amazon," said co-author Martins. "And it's encouraging to know the science behind our model should stand no matter the region."

Adapted from materials provided by NASA/Goddard Space Flight Center.

http://www.sciencedaily.com/releases/2008/08/080814163554.htm

Aboriginal Kids Can Count Without Numbers

A new study of the aboriginal children -- from two communities which do not have words or gestures for numbers -- found that they were able to copy and perform number-related tasks. (Credit: iStockphoto/Dan Talson)

ScienceDaily (Aug. 19, 2008) — Knowing the words for numbers is not necessary to be able to count, according to a new study of aboriginal children by UCL (University College London) and the University of Melbourne. The study of the aboriginal children – from two communities which do not have words or gestures for numbers – found that they were able to copy and perform number-related tasks.

The findings, published in the journal *Proceedings of the National Academy of Sciences*, suggest that we possess an innate mechanism for counting, which may develop differently in children with dyscalculia.

Professor Brian Butterworth, lead author from the UCL Institute of Cognitive Neuroscience, says: "Recently, an extreme form of linguistic determinism has been revived which claims that counting words are needed for children to develop concepts of numbers above three. That is, to possess the concept of 'five' you need a word for five. Evidence from children in numerate societies, but also from Amazonian adults whose language does not contain counting words, has been used to support this claim.

"However, our study of aboriginal children suggests that we have an innate system for recognizing and representing numerosities – the number of objects in a set – and that the lack of a number vocabulary should not prevent us from doing numerical tasks that do not require number words."

The study looked at Australian indigenous populations, who have very restricted vocabularies for numbers. Although gestures are used to communicate in some indigenous Australia societies, there appear to be no gestures for numbers. The study worked with children aged four to seven from two indigenous communities: one on the edge of the Tanami Desert about 400 km north west of Alice Springs where Warlpiri is spoken; the other on Groote Eylandt in the Gulf of Carpentaria, where the local language is Anindilyakwa. Both have words for one, two, few and many, though in Anindilyakwa there are ritual words for numbers to 20, but children will not know these. The team also worked with an English-speaking indigenous group in Melbourne.

Professor Brian Butterworth continues: "In our tasks we couldn't, for example, ask questions such as "How many?" or "Do these two sets have the same number of objects?" We therefore had to develop special tasks. For example, children were asked to put out counters that matched the number of sounds made by banging two sticks together. Thus, the children had to mentally link numerosities in two different modalities, sounds and actions, which meant they could not rely on visual or auditory patterns alone. They had to use an abstract representation of, for example, the fiveness of the bangs and the fiveness of the counters. We found that Warlpiri and Anindilyakwa children performed as well as or better than the English-speaking children on a range of tasks, and on numerosities up to nine, even though they lacked number words.

"Thus, basic numerical concepts do indeed appear to depend on an innate mechanism. This may help explain why children in numerate cultures with developmental dyscalculia find it so difficult to learn arithmetic. Although they have plenty of formal and informal opportunities to learn to count with words and do arithmetic, the innate mechanism on which skilled arithmetic is based may have developed atypically."

Journal reference:

1. B. Butterworth, R. Reeve, F. Reynolds and D. Lloyd. **Numerical thought with and without words: Evidence from indigenous Australian children**. *Proceedings of the National Academy of Sciences*, Published online Aug. 18, 2008

Adapted from materials provided by University College London - UCL, via AlphaGalileo.

http://www.sciencedaily.com/releases/2008/08/080818185209.htm

New Robot Scouts Best Locations For Components Of Undersea Lab

Once launched, the Woods Hole Oceanographic Institution's Sentry operates without being tethered to the ship. It is preprogrammed for the areas it is to map but can operate independently to navigate around cliffs, basins and other terrain it encounters. (Credit: Image courtesy of University of Washington)

ScienceDaily (Aug. 18, 2008) — Like a deep-sea bloodhound, Sentry – the newest in an elite group of unmanned submersibles able to operate on their own in demanding and rugged environments – has helped scientists pinpoint optimal locations for two observation sites of a pioneering seafloor laboratory being planned off Washington and Oregon.

Successful selection of the two sites is a crucial step in developing an extensive sensor network above and below the seafloor on the Juan de Fuca Plate, according to John Delaney, University of Washington oceanographer and chief scientist for a two-week mapping expedition.

The network, which will be connected to land by underwater cables from locations near Warrenton and Pacific City, Ore., will help unlock secrets about such things as the ocean's ability to absorb greenhouse gases and help scientists learn how seafloor stresses cause earthquakes and tsunamis. The network is one component of a wider project being overseen by the Consortium for Ocean Leadership as part of the National Science Foundation's Oceans Observatories Initiative.

"The ocean community is on the threshold of a new era in which an ensemble of novel technologies will provide us with an increasingly powerful capacity for exploring and interacting with the global ocean system," Delaney said. "The cruise itself is an example of the coming generation of systems, where highly capable autonomous underwater vehicles like Sentry will be integral components. Today's AUVs are helping us develop the power and high-speed communications network we'll need to explore powerful and potentially dangerous processes at underwater volcanoes, within powerful tsunamis or in the wake of large storms and hurricanes."

In plans thus far, cables from two places on land will extend to five primary nodes – each about the size of a large dinner table. Like underwater extension cords, the nodes will supply power to – and communicate with – instruments, robots and smaller secondary nodes.

Choosing the right sites involved mapping and imaging in remarkable detail using sonar instruments, a towed camera and Sentry. Sentry, for instance, produces maps precise to within 1 meter, or about 3 ½ feet, as it glides about 250 feet above the seafloor. Operators program the vehicle with directions of the area to map but the vehicle is on its own when it comes to maneuvering up and down cliffs, basins and other terrain that it encounters, all while keeping a consistent distance from the bottom.

The one-of-a-kind autonomous underwater vehicle – built by Woods Hole Oceanographic Institution with funding largely from the National Science Foundation – made six dives during the July 22 to Aug. 5 expedition. It was the first time the vehicle has been used during an actual oceanographic research cruise. Sentry surveyed 212 linear kilometers of seafloor, or about 53 square kilometers, as it traced parallel lines like a lawn mower making a pattern across a yard.

"Seeing the first maps pop up on our screen was a real thrill for us, they represent the results of hard work by all members of our team," said Dana Yoerger, the lead Woods Hole Oceanographic Institution engineer of Sentry.

The work made it possible to finalize locations for two critical sites. One is near an area 50 miles off Newport, Ore., where scientists would like to learn more about the icy methane that collects on or below the seafloor where the Juan de Fuca plate dives beneath North America.

"Most developed nations have major research efforts focused on understanding – and learning to use – these energy-rich deposits of methane," Delaney said. "Our plan is to build the infrastructure that will allow entire generations of scientists to study these deposits firsthand using robotic telepresence – no other country is there yet." The other site is about 300 miles west of Cannon Beach, Ore., and in a decidedly different environment. That one's on top of Axial Seamount, the largest active submarine volcano east of Hawaii and north of Baja California, Mexico. Earthquakes, eruptions and hydrothermal venting at Axial Seamount are representative of what happens worldwide along the 43,000 mile Mid-Ocean Ridge System.

"The key to choosing these locations is to find sites that are protected but within reach of really interesting processes that we're trying to investigate," said Deborah Kelley, UW oceanographer and co-chief scientist on the expedition. For details of the all the tools used, as well as preliminary surveying for other parts of the planned observatory, see the expedition's Web site at http://ooi.ocean.washington.edu/cruise/.

The expedition was funded by the National Science Foundation through the Consortium for Ocean Leadership, Arizona State University and the UW School of Oceanography. There were 32 scientists, engineers, marine technicians and students on board, representing the UW, ASU, WHOI, College of Charleston and the National Institute of Advanced Industrial Science and Technology, Japan.

Adapted from materials provided by University of Washington.

http://www.sciencedaily.com/releases/2008/08/080813120749.htm

Extinction Most Likely For Rare Trees In Amazon Rainforest

ScienceDaily (Aug. 18, 2008) — Common tree species in the Amazon will survive even grim scenarios of deforestation and road-building, but rare trees could suffer extinction rates of up to 50 percent, predict Smithsonian scientists and colleagues.How resilient will natural systems prove to be as they weather the next several decades of severe, human-induced global change? The debate is on between proponents of models that maximize and minimize extinction rates.

The Amazon basin contains about 40 percent of the world's remaining rainforest. One of the fundamental characteristics of tropical forests is the presence of very rare tree species. Competing models of relative species abundance, one based on Fisher's alpha statistic and the other based on Preston's lognormal curve, yield different proportions of rare trees in the forest.Thirty years ago Stephen P. Hubbell, senior scientist at the Center for Tropical Forest Science of the Smithsonian Tropical Research Institute and distinguished professor in the Department of Ecology and Evolution at the University of California, Los Angeles, and his colleague Robin Foster, now at the Field Museum in Chicago, set up a unique experiment to monitor the growth, birth and death of more than 250,000 tropical trees on Panama's Barro Colorado Island. This large "forest dynamics plot" would generate the data needed to build good models that include rare species.

Today the Center for Tropical Forest Science coordinates a Global Earth Observatory—a network of 20 such forest study sites in 17 countries, which maintains "actuarial tables" for more than 3 million trees.Hubbell works with data from the network to develop and test his neutral theory of biodiversity—an attempt to find a unified explanation of large, complex biological systems that accurately predicts the outcome of major ecological and evolutionary forces of change.

In this offering, the authors use the neutral theory to predict the number of tree species and to test predictions of the Millenium Ecosystems Assessment that forecasts major tree extinctions in the Amazon over the next several decades. First, they estimate that the Brazilian Amazon has (or had) 11,210 large tree species, and, of these, 5,308 species are classified as rare.Based on optimistic and non-optimistic scenarios for road construction in the Amazon published by the Smithsonian's William Laurance and colleagues in the journal Science in 2004, they predict that the rare species will suffer between 37 and 50 percent extinction, whereas the extinction rate for all trees could be from 20 to 33 percent overall.

Would a simpler Amazon forest lacking many of its rarer trees function? Will the extinction of species other than trees—pollinators, seed predators, carnivores—contribute significantly to the lost of rainforest resilience? This and other biological quandaries remain. The authors exhort: "Although it is an old scientific chestnut, we must once again emphasize how important it is to support continuing basic science on tropical forests."

Journal reference:

1. Hubbell et al. **Colloquium Paper: How many tree species are there in the Amazon and how many of them will go extinct?** *Proceedings of the National Academy of Sciences*, 2008; DOI: 10.1073/pnas.0801915105

Adapted from materials provided by Smithsonian Tropical Research Institute, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2008/08/080813164644.htm

Call For Better Protection Of Older People From Climate Change Impact

ScienceDaily (Aug. 18, 2008) — A new report published by the Stockholm Environment Institute, University of York, in collaboration with Help the Aged, calls on government and public authorities to take action to better protect older people from the future effects of climate change.

The report Growing Old in a Changing Climate is the first national report to examine the impact of climate change on an ageing population. It aims to stimulate wider debate on the issue, and appropriate policy responses from institutions, politicians and older people.

Dr Gary Haq, University of York and lead author of the report, said: "Older people are among the prime contributors to climate change, but also potentially some of the first casualties. There is an urgent need to exploit synergies between climate change policies and policies aimed at older people, and to avoid duplication and contradiction. Older people must be part of the solution: we need to make it easier for them to conserve energy, use public transport and maintain crucial social networks that will help them better cope with the effects of a changing climate."

Mervyn Kolher, Special Advisor, Help the Aged and co-author, said: "Two enormous - but utterly predictable - waves will be rolling across the global landscape in the coming decades: the ageing of our populations and the effects of climate change. Whatever other political and social policy changes will command our attention; these two challenges will be constant and unrelenting. Older people are likely to be physically, financially and emotionally less resilient to climate change and Government strategies will need to address this."

The report outlines five recommendations and calls on government agencies and older people's organisations to make a concerted effort to reduce the vulnerability of older people by improving their ability to cope with future effects of climate change. It calls on government to:

- Risk assess all future policies so they do not undermine government targets to reduce UK greenhouse gas emissions and put older people at risk
- Climate change proof the homes of older people – both new and existing - to increase energy efficiency and tackle fuel poverty
- Enrich local accessibility to deliver safer, stronger and healthier communities for older people
- Better transport for older people to ensure they can maintain independence and connect to friends, family and wider community.
- Leadership on older people and climate change and the setting up of an older people and climate change group to outline a national policy framework to focus and co-ordinate action.

Adapted from materials provided by University of York, via AlphaGalileo.

http://www.sciencedaily.com/releases/2008/08/080814212323.htm

Key Photosynthesis Step Replicated: Scientists Learn From Nature To Split Water Into Hydrogen And Oxygen

Scientists have developed a way to use chemicals found in plants to replicate a key process in photosynthesis. (Credit: iStockphoto/Dane Steffes)

ScienceDaily (Aug. 18, 2008) — An international team of researchers led by Monash University has used chemicals found in plants to replicate a key process in photosynthesis paving the way to a new approach that uses sunlight to split water into hydrogen and oxygen.

The breakthrough could revolutionise the renewable energy industry by making hydrogen – touted as the clean, green fuel of the future – cheaper and easier to produce on a commercial scale.

Professor Leone Spiccia, Mr Robin Brimblecombe and Dr Annette Koo from Monash University teamed with Dr Gerhard Swiegers at the CSIRO and Professor Charles Dismukes at Princeton University to develop a system comprising a coating that can be impregnated with a form of manganese, a chemical essential to sustaining photosynthesis in plant life.

"We have copied nature, taking the elements and mechanisms found in plant life that have evolved over 3 billion years and recreated one of those processes in the laboratory," Professor Spiccia said.

"A manganese cluster is central to a plant's ability to use water, carbon dioxide and sunlight to make carbohydrates and oxygen. Man-made mimics of this cluster were developed by Professor Charles Dismukes some time ago, and we've taken it a step further, harnessing the ability of these molecules to convert water into its component elements, oxygen and hydrogen," Professor Spiccia said.

"The breakthrough came when we coated a proton conductor, called Nafion, onto an anode to form a polymer membrane just a few micrometres thick, which acts as a host for the manganese clusters."

"Normally insoluble in water, when we bound the catalyst within the pores of the Nafion membrane, it was stabilised against decomposition and, importantly, water could reach the catalyst where it was oxidised on exposure to light."

This process of "oxidizing" water generates protons and electrons, which can be converted into hydrogen gas instead of carbohydrates as in plants.

"Whilst man has been able to split water into hydrogen and oxygen for years, we have been able to do the same thing for the first time using just sunlight, an electrical potential of 1.2 volts and the very chemical that nature has selected for this purpose," Professor Spiccia said.

Testing revealed the catalyst assembly was still active after three days of continuous use, producing oxygen and hydrogen gas in the presence of water, an electrical potential and visible light.

Professor Spiccia said the efficiency of the system needed to be improved, but this breakthrough had huge potential. "We need to continue to learn from nature so that we can better master this process."

"Hydrogen has long been considered the ideal clean green fuel, energy-rich and carbon-neutral. The production of hydrogen using nothing but water and sunlight offers the possibility of an abundant, renewable, green source of energy for the future for communities across the world."

The research is published in August in the scientific journal Angewandte Chemie, International Edition.

Journal reference:

1. Robin Brimblecombe, Gerhard F. Swiegers, G. Charles Dismukes, Leone Spiccia. **Sustained Water Oxidation Photocatalysis by a Bioinspired Manganese Cluster**. *Angewandte Chemie*, Published Online: Aug 1 2008 DOI: 10.1002/anie.200801132

Adapted from materials provided by Monash University.

http://www.sciencedaily.com/releases/2008/08/080817223544.htm

Why An Exciting Book Is Just As Thrilling As A Hair-raising Movie

Still frame illustrating the movies of disgusted facial expressions used in the study. (Credit: Mbemba Jabbi and Christian Keysers)

ScienceDaily (Aug. 18, 2008) — Watching Keanu Reeves walk along the ledge of a skyscraper and lose his footing in The Matrix can make us skip a heartbeat or sweat, as if we were risking our own life. This sharing of other people's emotions in movies has been shown to depend on the fact that observers the same brain regions are activated in the observers when they feel an emotion and when they see someone else experience a similar emotion.

We all know, however, that reading a book describing the same scene can be similarly gripping. This week, in a paper published in the online, open-access journal PLoS ONE, Mbemba Jabbi, Jojanneke Bastiaansen and Christian Keysers show us why.

At the NeuroImaging Center of the University Medical Center Groningen of the University of Groningen (the Netherlands), Jabbi and colleagues compared what happens in our brains when we view the facial expressions of other people with the brain activity as we read about emotional experiences.

"We placed our participants in an fMRI scanner to measure their brain activity while we first showed our subject short 3s movie clips of an actor sipping from a cup and then looking disgusted," said Christian Keysers. "Later on, we asked them to read and imagine short emotional scenarios; for instance, walking along a street, bumping into a reeking, drunken man, who then starts to retch, and realizing that some of his vomit had ended up in your own mouth. Finally, we measured their brain activity while the participants tasted unpleasant solutions in the scanner."

"Our striking result," said Keysers, "is that in all three cases, the same location of the anterior insula lit up. The anterior insula is the part of the brain that is the heart of our feeling of disgust. Patients who have

damage to the insula, because of a brain infection for instance, lose this capacity to feel disgusted. If you give them sour milk, they would drink it happily and say it tastes like soda."

Prof. Keysers continued, "What this means is that whether we see a movie or read a story, the same thing happens: we activate our bodily representations of what it feels like to be disgusted– and that is why reading a book and viewing a movie can both make us feel as if we literally feel what the protagonist is going through."

In a world that is increasingly dominated by visual media, added Keysers, this finding is good news for the written media, in particular: reading a good book or an exciting newspaper article really can feel as emotionally vivid as watching a movie.

Journal reference:

1. Jabbi et al. **A Common Anterior Insula Representation of Disgust Observation, Experience and Imagination Shows Divergent Functional Connectivity Pathways**. *PLoS One*, 2008; 3 (8): e2939 DOI: 10.1371/journal.pone.0002939

Adapted from materials provided by Public Library of Science, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2008/08/080812213812.htm