Infoteca's E-Journal

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Sistema de Infotecas Centrales, Universidad Autónoma de Coahuila

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Natural Childbirth Makes Mothers More Responsive To Own Baby-cry

Mothers who delivered vaginally compared to C-section delivery were significantly more responsive to the cry of their own baby, a new study has found. (Credit: iStockphoto/Damir Cudic)

ScienceDaily (Sep. 4, 2008) — A new study has found that mothers who delivered vaginally compared to caesarean section delivery (CSD) were significantly more responsive to the cry of their own baby, identified through MRI brain scans two to four weeks after delivery.

The results of the study, to be published today in The Journal of Child Psychology and Psychiatry, suggest that vaginal delivery (VD) mothers are more sensitive to own baby-cry in the regions of the brain that are believed to regulate emotions, motivation and habitual behaviours.

CSD is a surgical procedure, in which delivery occurs via incisions in the abdominal and uterine wall. It is considered necessary under some conditions to protect the health or survival of infant or mother, but it is controversially linked with postpartum depression. In the US the occurrence of CSD has increased steeply from 4.5% of all deliveries in 1965 to a recent high in 2006 of 29.1%.

The critical capacity of adults to develop the thoughts and behaviours needed for parents to care successfully for their newborn infants is supported by specific brain circuits and a range of hormones. The experience of childbirth by VD compared with CSD uniquely involves the pulsatile release of oxytocin from the posterior pituitary, uterine contractions and vagino-cervical stimulation. Oxytocin is a key mediator of maternal behaviour in animals.

"We wondered which brain areas would be less active in parents who delivered by caesarean section, given that this mode of delivery has been associated with decreased maternal behaviours in animal models, and a trend for increased postpartum depression in humans," said lead author Dr. James Swain, Child Study Centre, Yale University. "Our results support the theory that variations in delivery conditions

such as with caesarean section, which alters the neurohormonal experiences of childbirth, might decrease the responsiveness of the human maternal brain in the early postpartum."

The researchers also looked into the brain areas affected by delivery conditions and found relationships between brain activity and measures of mood suggesting that some of the same brain regions may help regulate postpartum mood.

"As more women opt to wait until they are older to have children, and by association be more likely to have a caesarean section delivery, these results are important because they could provide better understanding of the basic neurophysiology and psychology of parent-infant attachment," said Swain. "This work could lead to early detection of families at risk for postpartum depression and attachment problems and form a model for testing interventions."

Journal reference:

1. Swain JE, Tasgin E, Mayes LC, Feldman R, Constable RT, Leckman JF. **Maternal Brain Response to Own Baby Cry is Affected by Cesarean Section Delivery**. *The Journal of Child Psychology and Psychiatry*, 2008; 49 (10) DOI: 10.1111/j.1469-7610.2008.01963.x

Adapted from materials provided by Wiley-Blackwell, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2008/09/080903204227.htm

Do 68 Molecules Hold The Key To Understanding Disease?

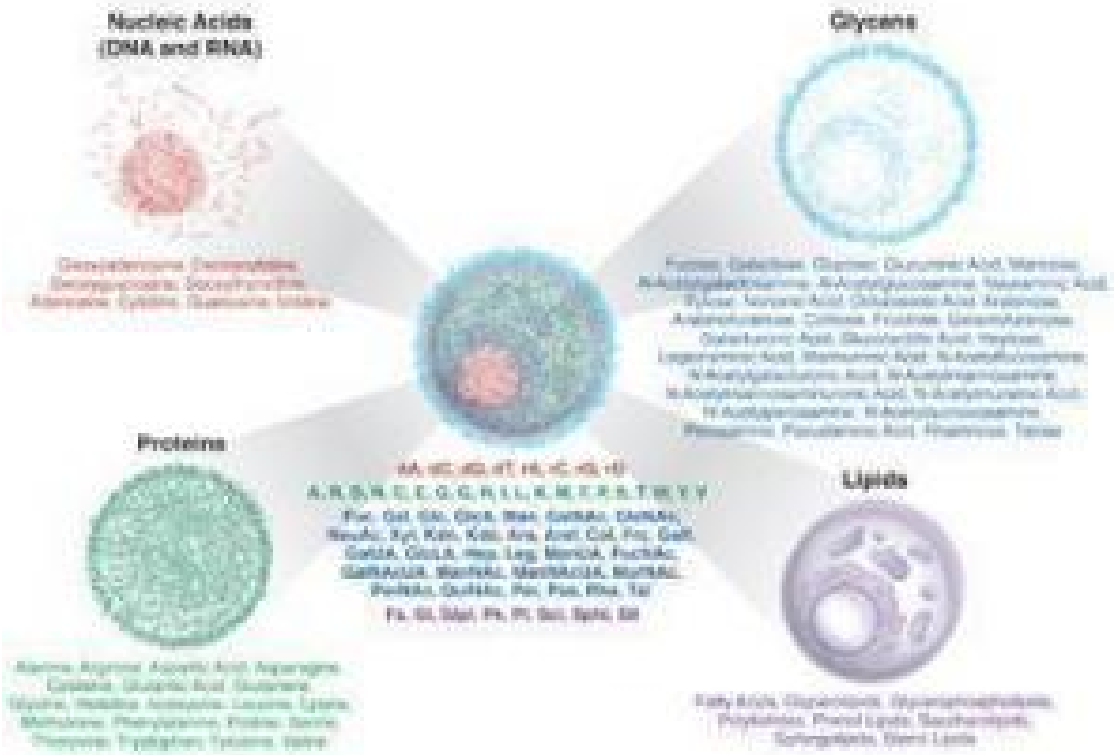


Illustration of "molecular building blocks." (Credit: Image courtesy of University of California - San Diego)

ScienceDaily (Sep. 4, 2008) — Why is it that the origins of many serious diseases remain a mystery?In considering that question, a scientist at the University of California, San Diego School of Medicine has come up with a unified molecular view of the indivisible unit of life, the cell, which may provide an answer.

Reviewing findings from multiple disciplines, Jamey Marth, Ph.D., UC San Diego Professor of Cellular and Molecular Medicine and Investigator with the Howard Hughes Medical Institute, realized that only 68 molecular building blocks are used to construct these four fundamental components of cells: the nucleic acids (DNA and RNA), proteins, glycans and lipids. His work, which illustrates the primary composition of all cells, is published in the September issue of Nature Cell Biology.

Like the periodic table of elements, first published in 1869 by Russian chemist Dmitri Mendeleev, is to chemistry, Marth's visual metaphor offers a new framework for biologists.

This new illustration defines the basic molecular building blocks of life and currently includes 32 glycans (sugar linkages found throughout the cell) and eight kinds of lipids (which compose cell membranes) along with the more well-known 20 amino acids that are used to make proteins and the eight nucleosides that compose the nucleic acids, DNA and RNA.

"These 68 building blocks provide the structural basis for the molecular choreography that constitutes the entire life of a cell," said Marth. "And two of the four cellular components are produced by these molecular building blocks in processes that cannot be encoded by the genes. These cellular components –

the glycans and lipids – may now hold the keys to uncovering the origins of many grievous diseases that continue to evade understanding."

Currently, the vast majority of medical research looks to the human genome and proteome for answers, but those answers remain elusive, and perhaps for good reason.

"We have now found instances where the pathogenesis of widespread and chronic diseases can be attributed to a change in the glycome, for example, in the absence of definable changes in the genome or proteome," Marth said, adding that, as biomedical researchers, "we need to begin to cultivate the integration of disciplines in a holistic and rigorous way in order to perceive and most effectively manipulate the biological mechanisms of health and disease."

"What is important is that no one has composed it and laid it out so clearly before," said Ajit Varki, M.D., Distinguished Professor of Medicine and Cellular and Molecular Medicine and founder and co-director of the Glycobiology Research and Training Center at UC San Diego School of Medicine, and chief editor of the major textbook in the field, The Essentials of Glycobiology. "Glycobiology, for example, is a relatively new field of study in which researchers at UC San Diego have much expertise, and Dr. Marth's work further illustrates the importance of these glycan molecules."

Marth believes that biology should become more integrative both in academic and research settings. "I'm one who believes that we don't need to sacrifice breadth of knowledge in order to acquire depth of understanding."

Adapted from materials provided by University of California - San Diego. Original article written by Debra Kain.

http://www.sciencedaily.com/releases/2008/09/080903213325.htm

Cigarettes' Power May Not Be In Nicotine Itself, New Study Suggests

ScienceDaily (Sep. 4, 2008) — There may be a very good reason why coffee and cigarettes often seem to go hand in hand.

A Kansas State University psychology professor's research suggests that nicotine's power may be in how it enhances other experiences. For a smoker who enjoys drinking coffee, the nicotine may make a cup of joe even better.

And that may explain why smoking is so hard to quit.

"People have very regimented things they do when they smoke," said Matthew Palmatier, assistant professor of psychology at K-State. "If you think about where people smoke or who they smoke with, you realize that it occurs in very specific places, often with a specific group of people. Maybe it's a reason why nicotine is so addictive — if you get used to having that extra satisfaction from things you normally enjoy, not having nicotine could reduce the enjoyment in a given activity.

"People may not be smoking to obtain a pleasurable drug state. They may be smoking in order to regulate their mood, and that effect could make nicotine more addictive than other drugs."

Palmatier said much previous research on nicotine addiction has looked at the drug itself rather than the other factors he is studying.

"The approach we're taking is out of left field," he said. "But it seems to be one of the best explanations as to why people smoke."

Palmatier has a grant from the National Institute on Drug Abuse to understand how this phenomenon can be used to better design tobacco addiction treatments, usually offered in patches and pills. He began psychological research in addiction as a graduate student and later began researching the reinforcing effects of nicotine.

"The big picture is trying to figure out why people smoke," Palmatier said. "There are a lot of health risks, and the majority of smokers already know what they are. They want to quit but can't. It's not because nicotine is a potent drug; it doesn't induce significant amounts of pleasure or euphoria. Yet, it's just as difficult if not more difficult to quit than other drugs."

At K-State, Palmatier studies rats that are allowed to self-administer nicotine by pushing a lever. The main source of light in their testing environment shuts off when the rats earn a dose of nicotine. After about a minute, the light comes back on to signal that more nicotine is available.

By manipulating this signal, Palmatier and his colleagues found that the rats weren't really that interested in nicotine by itself.

"We figured out that what the rats really liked was turning the light off," Palmatier said. "They still self-administered the nicotine, but they took more of the drug when it was associated with a reinforcing light."

Palmatier and colleagues published a paper on their research in the August issue of Neuropsychopharmacology.

Palmatier has begun looking at how rats respond to sweet tastes after having nicotine. He said preliminary results show that nicotine has comparable effects on sweet tastes. That is, rats respond more for sugar-water solutions after getting nicotine.

"The taste aspect is really important because we can actually figure out how nicotine is increasing the subjects' behavior," Palmatier said. "If it makes a reward more pleasurable, then it may increase the palatability of a sweet taste."

Palmatier said that a future phase of research would be determining whether nicotine can make unpleasant experiences more tolerable, helping explain why lighting up after a bad day at work can be tempting.

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

http://www.sciencedaily.com/releases/2008/09/080903172424.htm

Most Vaccine-allergic Children Can Still Be Safely Vaccinated, Experts Say

Writing in the September issue of Pediatrics, the multicenter research team offers pediatricians a step-by-step tool for quickly identifying children with allergic reactions to vaccines, and a much-needed guide, they say, to safely immunize those who are allergic.

Serious allergic reactions to vaccines are extremely rare - one or two per million vaccinations, according to some estimates - but when they happen, such episodes can be serious, even life-threatening, making it critical for pediatricians to instantly spot true allergic reactions and differentiate them from more benign nonallergic responses, investigators say. It is also crucial that pediatricians design a safe immunization plan for children with confirmed vaccine allergies. Children who have had one allergic reaction are believed to be at a higher risk for future reactions, typically more serious than the first.

"We cannot reiterate enough that the vaccines used today are extremely safe, but in a handful of children certain vaccine ingredients can trigger serious allergic reactions," says Robert Wood, M.D., lead author on the paper and chief of pediatric Allergy and Immunology at Hopkins Children's. "For the most part, even children with known allergies can be safely vaccinated."

Given recent outbreaks of vaccine-preventable infections like measles, mumps and whooping cough in the United States, and measles and polio overseas, it is essential to safely vaccinate as many children as possible, investigators say.

Combing through available evidence on vaccine safety and allergies, the Hopkins-led team developed a sequence of instructions - an algorithm - that prompts physicians one step at a time on how to evaluate and immunize children with known or suspected vaccine allergies.

The guidelines are intended for doctors and parents who are uncertain about vaccine safety in children who have already had or are at high risk for having allergic reactions to vaccines.

In such cases, the Hopkins-led group advises a workup by an allergist, including skin prick testing-a prick on the skin or an injection under the skin with a small dose of vaccine or the suspected allergen from the vaccine-or blood tests that would detect the presence of characteristic antibodies that patients develop to allergens, such as antibodies to gelatin or egg proteins used in several common vaccines.

In many cases, allergic children can be vaccinated using alternative forms of a vaccine that are free of the allergen. Even if allergen-free formulations are unavailable, many children can still be vaccinated and remain under physician supervision for several hours after vaccination. Another option is testing the child to check for immunity. If blood tests show the child has already developed protective antibodies, it may be OK, at least temporarily, to withhold further doses of the vaccine, researchers write.

"Vaccines save lives, and parents should know that children who have had allergic reactions after a vaccine are likely to have developed protection against infection as a result of the vaccination," says investigator Neal Halsey, M.D., an infectious disease specialist at Hopkins Children's, and professor of International Health at the Johns Hopkins University Bloomberg School of Public Health.

"Most children who have had an allergic reaction after a vaccine can still be vaccinated against other diseases safely and some can receive additional doses of vaccines they might have reacted to," Halsey adds.

Many children with known vaccine allergies who have low levels of protective antibodies and require more doses can be vaccinated safely under the guidelines. In some cases, children with known allergies can be given antiallergy medications, such as antihistamines and corticosteroids, before vaccination to help ward off or lessen the allergic reaction. For a step-by-step guide to vaccine administration in children with known or suspected vaccine allergy, see the full text of the article at http://pediatrics.aappublications.org/future/122.3.shtml.

Immunizations of children with known vaccine allergies should always be administered under medical supervision in a clinic equipped to treat life-threatening allergic reactions or in a hospital intensive-care unit. Patients can usually go home after an hour or two if they have no adverse reactions.

True allergies typically cause immediate reactions, involving the immune system as a whole that occur within a few minutes to a few hours of vaccination. By contrast, delayed reactions, which occur within days, even weeks after vaccination, are generally benign and are rarely, if ever, dangerous.

Symptoms of immediate allergic reactions include hives, swelling, wheezing, coughing, low blood pressure, vomiting, diarrhea, and can lead to full-blown anaphylaxis, a life-threatening allergic reaction.

The research was funded by the Centers for Disease Control and Prevention.

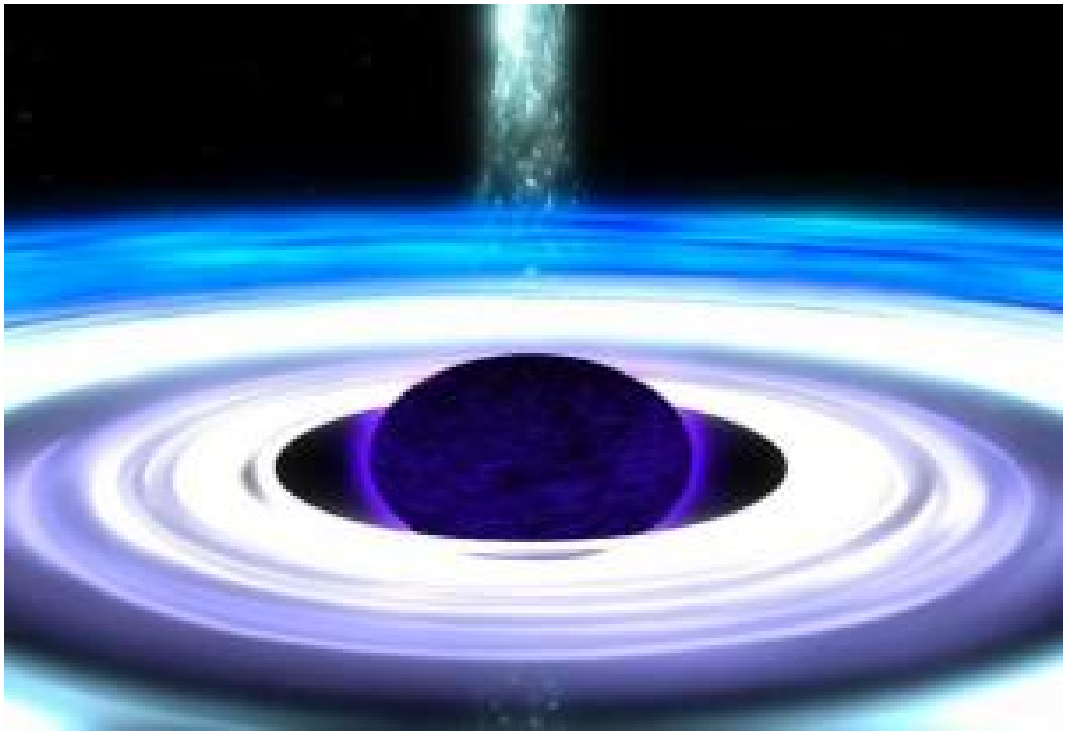
Co-investigators on the research: Melvin Berger, M.D. Ph.D., University Hospitals of Cleveland; Stephen Dreskin, M.D. Ph.D., University of Colorado; Rosanna Setse, M.D. M.P.H., Johns Hopkins University Bloomberg School of Public Health; Renata Engler, M.D., Walter Reed Army Medical Institute; Cornelia Dekker, M.D., Stanford University School of Medicine. The Clinical Immunization Safety Assessment Network, consisting of six medical research centers with expertise in immunization safety, was part of the study.

Conflict of interest disclosure for Hopkins investigators: Halsey has received research support from vaccine manufacturer Wyeth and is a consultant for vaccine manufacturers GlaxoSmithKline and Merck.

Adapted from materials provided by Johns Hopkins Medical Institutions, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2008/09/080902074557.htm

Closest Look Ever At Edge Of A Black Hole



This image is from a computer animation illustrating a spinning black hole. The close-up view here represents the immediate vicinity of the black hole, with the event horizon depicted as a black sphere. The surrounding disk of gas, represented by white and blue rings, whirls around the black hole. The white column over the pole of the black hole represents a jet of gas being ejected from the vicinity of the black hole at nearly the speed of light. (Credit: NASA)

ScienceDaily (Sep. 4, 2008) — Astronomers have taken the closest look ever at the giant black hole in the center of the Milky Way. By combining telescopes in Hawaii, Arizona, and California, they detected structure at a tiny angular scale of 37 micro-arcseconds - the equivalent of a baseball seen on the surface of the moon, 240,000 miles distant. These observations are among the highest resolution ever done in astronomy.

"This technique gives us an unmatched view of the region near the Milky Way's central black hole," said Sheperd Doeleman of MIT, first author of the study that will be published in the Sept. 4 issue of the journal Nature.

"No one has seen such a fine-grained view of the galactic center before," agreed co-author Jonathan Weintroub of the Harvard-Smithsonian Center for Astrophysics (CfA). "We've observed nearly to the scale of the black hole event horizon - the region inside of which nothing, including light, can ever escape."

Using a technique called Very Long Baseline Interferometry (VLBI), a team of astronomers led by Doeleman employed an array of telescopes to study radio waves coming from the object known as Sagittarius A* (A-star). In VLBI, signals from multiple telescopes are combined to create the equivalent of a single giant telescope, as large as the separation between the facilities. As a result, VLBI yields exquisitely sharp resolution.

The Sgr A* radio emission, at a wavelength of 1.3 mm, escapes the galactic center more easily than emissions at longer wavelengths, which tend to suffer from interstellar scattering. Such scattering acts like fog around a streetlamp, both dimming the light and blurring details. VLBI is ordinarily limited to wavelengths of 3.5 mm and longer; however, using innovative instrumentation and analysis techniques, the team was able to tease out this remarkable result from 1.3-mm VLBI data.

The team clearly discerned structure with a 37 micro-arcsecond angular scale, which corresponds to a size of about 30 million miles (or about one-third the earth-sun distance) at the galactic center. With three telescopes, the astronomers could only vaguely determine the shape of the emitting region. Future investigations will help answer the question of what, precisely, they are seeing: a glowing corona around the black hole, an orbiting "hot spot," or a jet of material. Nevertheless, their result represents the first time that observations have gotten down to the scale of the black hole itself, which has a "Schwarzschild radius" of 10 million miles.

"This pioneering paper demonstrates that such observations are feasible," commented theorist Avi Loeb of Harvard University, who is not a member of the discovery team. "It also opens up a new window for probing the structure of space and time near a black hole and testing Einstein's theory of gravity."

In 2006, Loeb and his colleague, Avery Broderick, examined how ultra-high-resolution imaging of the galactic center could be used to look for the shadow or silhouette of the supermassive black hole lurking there, as well as any "hot spots" within material flowing into the black hole. Astronomers now are poised to test those theoretical predictions.

"This result, which is remarkable in and of itself, also confirms that the 1.3-mm VLBI technique has enormous potential, both for probing the galactic center and for studying other phenomena at similar small scales," said Weintroub.The team plans to expand their work by developing novel instrumentation to make more sensitive 1.3-mm observations possible. They also hope to develop additional observing stations, which would provide additional baselines (pairings of two telescope facilities at different locations) to enhance the detail in the picture. Future plans also include observations at shorter, 0.85-mm wavelengths; however, such work will be even more challenging for many reasons, including stretching the capabilities of the instrumentation, and the requirement for a coincidence of excellent weather conditions at all sites.

"The technical capabilities that have been developed for the Smithsonian's Submillimeter Array on Mauna Kea are a crucial contribution to this program," said Jim Moran, one of the CfA participants in this work.Other CfA or former CfA researchers who participated on the project include Ken Young and Dan Marrone.

Headquartered in Cambridge, Mass., the Harvard-Smithsonian Center for Astrophysics (CfA) is a joint collaboration between the Smithsonian Astrophysical Observatory and the Harvard College Observatory. CfA scientists, organized into six research divisions, study the origin, evolution and ultimate fate of the universe.

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Adapted from materials provided by Harvard-Smithsonian Center for Astrophysics.

http://www.sciencedaily.com/releases/2008/09/080903172415.htm

Cinnamon-based Packaging To Prevent Mold In Bread And Other Baked Goods

Chemists have created a new type of cinnamon-based paper packaging that could keep baked goods fresher for an extra 10 days. (Credit: Wikimedia Commons)

ScienceDaily (Sep. 4, 2008) — Bread that goes moldy is the bane of consumers and bakers alike, ruining appetites and wasting food and money. Now, researchers in Spain report development of a new type of paper packaging made with cinnamon oil that appears to prolong the freshness of bread and other baked goods by up to 10 days.

The packaging appears safe and environmentally friendly.

In the new study, Cristina Nerín, A. Rodriguez, and D. Ramón Battle point out that scientists have tried many different approaches for fighting mold growth in bread, including ultraviolet light, sterile packaging, and the use of chemical preservatives. So-called active packaging, which attacks bread mold with antimicrobials, may provide a better alternative, the researchers say.

The scientists prepared active packaging composed of paraffin wax paper with different concentrations of cinnamon essential oil, which has high antimicrobial activity. They then inoculated fresh white bread with a common mold species and stored the bread in either plain wax paper or cinnamon-based wax paper for several days. After just three days, the packaging containing just 6 percent cinnamon oil inhibited 96 percent of mold growth, whereas the plain wax paper did not prevent mold growth, the researchers say. The cinnamon-based wrapper continued to inhibit mold for up to 10 days.

Journal reference:

1. Rodri%u0301guez et al. **New Cinnamon-Based Active Paper Packaging against Rhizopusstolonifer Food Spoilage**. *Journal of Agricultural and Food Chemistry*, 2008; 56 (15): 6364 DOI: 10.1021/jf800699q

Adapted from materials provided by American Chemical Society.

http://www.sciencedaily.com/releases/2008/09/080901215335.htm

Loss Of Sleep, Even For A Single Night, Increases Inflammation In The Body

ScienceDaily (Sep. 4, 2008) — Loss of sleep, even for a few short hours during the night, can prompt one's immune system to turn against healthy tissue and organs.

A new article in the September 15th issue of Biological Psychiatry, by the UCLA Cousins Center research team, reports that losing sleep for even part of one night can trigger the key cellular pathway that produces tissue-damaging inflammation. The findings suggest a good night's sleep can ease the risk of both heart disease and autoimmune disorders such as rheumatoid arthritis.

Specifically, the researchers measured the levels of nuclear factor (NF)-κB, a transcription factor that serves a vital role in the body's inflammatory signaling, in healthy adults. These measurements were repeatedly assessed, including in the morning after baseline (or normal) sleep, after partial sleep deprivation (where the volunteers were awake from 11 pm to 3:00 am), and after recovery sleep. In the morning after sleep loss, they discovered that activation of (NF)-κB signaling was significantly greater than after baseline or recovery sleep. It's important to note that they found this increase in inflammatory response in only the female subjects.

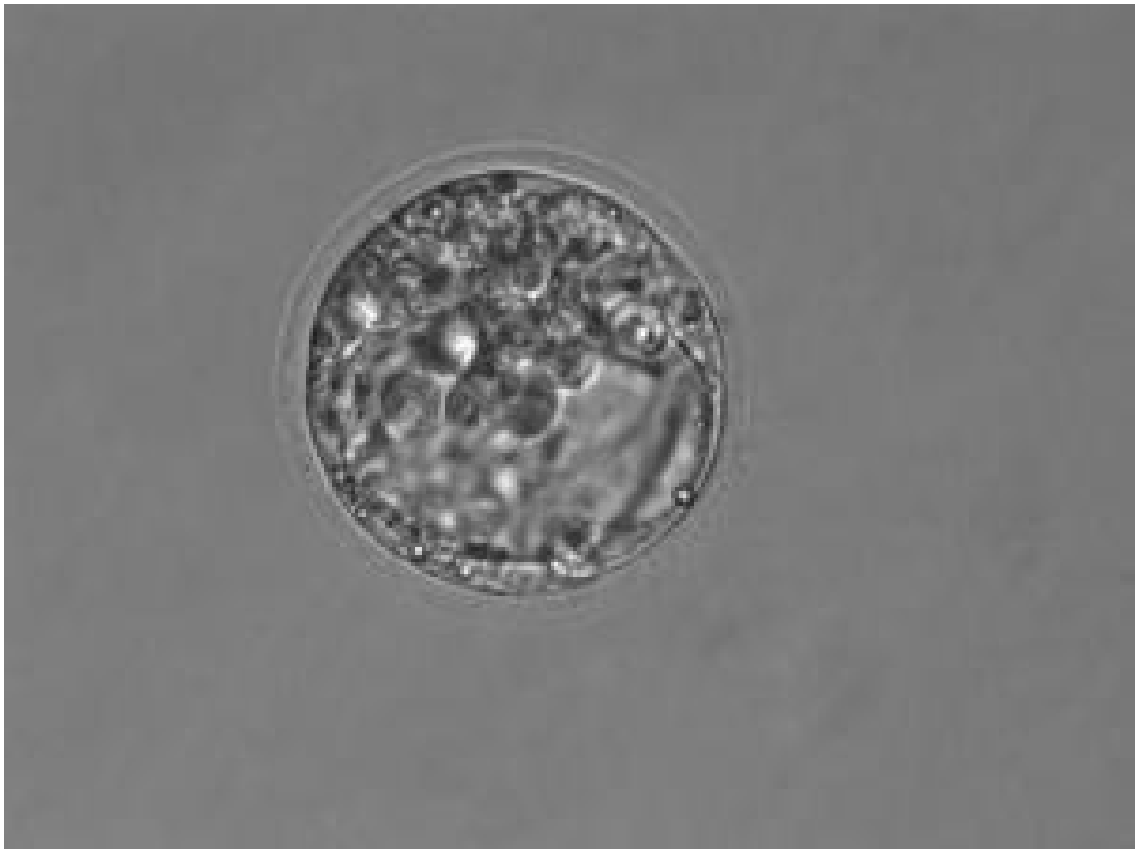
These data close an important gap in understanding the cellular mechanisms by which sleep loss enhances inflammatory biology in humans, with implications for understanding the association between sleep disturbance and risk of a wide spectrum of medical conditions including cardiovascular disease, arthritis, diabetes, certain cancers, and obesity. John H. Krystal, M.D., Editor of Biological Psychiatry and affiliated with both Yale University School of Medicine and the VA Connecticut Healthcare System, comments: "The closer that we look at sleep, the more that we learn about the benefits of sleeping. In this case, Irwin and colleagues provide evidence that sleep deprivation is associated with enhancement of pro-inflammatory processes in the body."

"Physical and psychological stress brought on in part by grinding work, school and social schedules is keeping millions of Americans up at night," said Dr. Irwin, lead author and director of the Cousins Center for Psychoneuroimmunology at the Semel Institute. "America's sleep habits are simply not healthy. Our findings suggest even modest sleep loss may play a role in common disorders that affect sweeping segments of the population." In other words, sleep is vitally important to maintaining a healthy body. And as Dr. Krystal notes, "these findings provide a potential mechanistic avenue through which addressing sleep disturbance might improve health."

Adapted from materials provided by Elsevier, via AlphaGalileo.

http://www.sciencedaily.com/releases/2008/09/080902075211.htm

'Lab On A Chip' Improves Success Of In Vitro Fertilization



Scientists could improve the success rate of in vitro fertilization using a "lab on a chip" to study embryos. Above is a mouse embryo at the fifth day of development cultured in a 1 microliter droplet. (Credit: Mark Johnson and Amanda Pennington)

ScienceDaily (Sep. 4, 2008) — In a finding that could boost the success rate of in vitro fertilization (IVF), researchers report development of a tiny "lab on a chip" to evaluate the fitness of embryos harvested for transfer.

Researchers describe the method as faster, easier, and more reliable than conventional embryo selection methods.

In the new study, Todd Thorsen and colleagues note that the current method for evaluating an embryo's fitness for IVF involves microscopic examination of the embryo's physical characteristics, such as cell shape, which is time-consuming and unreliable.

Almost 130,000 women undergo IVF procedures each year in the U.S. alone, but the procedure has only a 30 percent success rate. To boost IVF success, doctors often transfer more than one embryo to the uterus, which can lead to multiple births and increases the pregnancy risks to mother and child. A better, more targeted method of embryo selection is needed, the researchers say.

The scientists describe development of a so-called microfluidic chip, about the size of a quarter. It is intended to automatically analyze the health of embryos intended for transplant by measuring how the embryo alters key nutrients in the tissue culture medium used to nurture embryos.

In laboratory studies, the researchers collected fluids surrounding 10 mouse embryos and added the fluids to the computer-controlled chip for analysis. They showed that the device could quickly (in minutes instead of hours) and accurately measure the nutrient content of the sample fluids.

Besides improving the quality of embryos chosen for IVF, the system could ultimately cut costs associated with the procedure, the scientists say.

Journal reference:

1. Urbanski et al. **Noninvasive Metabolic Profiling Using Microfluidics for Analysis of Single Preimplantation Embryos**. *Analytical Chemistry*, 2008; 80 (17): 6500 DOI: 10.1021/ac8010473

Adapted from materials provided by American Chemical Society.

http://www.sciencedaily.com/releases/2008/09/080901215003.htm

Verifying Wireless Hackers For Homeland Security

ScienceDaily (Sep. 4, 2008) — Wireless Sensor Networks (WSNs) used to detect and report events including hurricanes, earthquakes, and forest fires and for military surveillance and antiterrorist activities are prone to subterfuge. In the International Journal of Security and Networks, computer scientists at Florida Atlantic University describe a new antihacking system to protect WSNs.

Feng Li, Avinash Srinivasan, and Jie Wu explain that there are two types of cyber-sabotage that might occur on a WSN. The first is the fabricated report with false votes attack in which phony data is sent to the base station with forged validation. This presents the authorities monitoring a WSN for impending disaster with a quandary: if the data arriving from the network is validated but false, how can they know for sure?

The second kind of attack adds false validation votes to genuine incoming data. The problem facing those monitoring the WSN now is if genuine data is being labeled as false, how to trust any data arriving from the WSN.

Li and colleagues point out that most existing WSN systems have built-in software on the network that can ward off the first kind of attack so that false data usually cannot be given valid credentials and those monitoring the system will be able to spot subterfuge easily. However, WSNs are not usually protected against the second kind of attack, so that a genuine impending disaster cannot be verified remotely, which defeats the purpose of a WSN.

The team has now devised a Probabilistic Voting-based Filtering Scheme (PVFS) to deal with both of these attacks simultaneously. They used a general en-route filtering scheme that can achieve strong protection against hackers while maintaining normal filtering to make the WSN viable.

The scheme breaks WSNs into clusters, and locks each cluster to a particular data encryption key. As data reaches headquarters from the WSN clusters, the main cluster-heads along the path checks the report together with the votes, acting as the verification nodes in PVFS. The verification node is set up so that it will not drop a report immediately it finds a false vote, instead it will simply record the result. Only when the number of verified false votes reaches a designed threshold will a report be dropped.

This way, should a saboteur compromise one or more sensors on any given WSN to launch an attack, the PVFS will apply probability rules to determine the likelihood that this has happened. It will do so based on data arriving from other sensors in different clusters before reporting incoming data as false.

Detecting compromised sensors in a WSN in this way is of vital important to homeland security as well as successfully tracking natural events with the potential to devastate cities. By countering sabotage, false alarms that waste response efforts could be minimized in times of impending crisis.

Adapted from materials provided by Inderscience Publishers, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2008/09/080903172417.htm

Drug hope for cystic fibrosis

An experimental drug is proving effective for treating the genetic disease cystic fibrosis (CF).

CF produces thick, sticky mucus that clogs the lungs and the pancreas, leading to life-threatening chest infections and problems with digestion.

Existing treatments only ease symptoms, but the new drug, VX-770 restores function to defective proteins which cause the disease.

The early trial results were presented at the BA Festival of Science.

> **Drug therapies which target defects at the root of the disease have the potential to improve greatly the quality of life of CF patients**
> Lead researcher Dr David Sheppard from the University of Bristol

One in 25 people in the UK is a carrier for a defective CF gene which disables or destroys a protein known as CFTR. Although carriers do not develop CF, they run the risk of passing the gene on to their children. Around 8,000 people in the UK have CF.

Defects in the CFTR protein affect the transport of chloride and other ions across cells. VX-770 is designed to increase the probability that the CFTR channel is open, thereby increasing chloride transport across the cell surface.

So far it has been tested in CF patients with a genetic defect known as G551D. Further clinical trials are necessary to learn more about the total number of patients who might benefit from the drug.

Trial results

One of the most recognisable symptoms of CF is salty sweat, caused by the failure of the sweat ducts to reabsorb sweat. Patients who received 150mg twice a day saw the concentration of salt in their sweat decrease by almost 50% and lung function improve by 10%. Lead researcher Dr David Sheppard from the University of Bristol said: "The early results with VX-770 suggest that drug therapies which target defects at the root of the disease have the potential to improve greatly the quality of life of CF patients."

Researchers are testing other compounds that work in a similar way.

Rosie Barnes, chief executive of the Cystic Fibrosis Trust said: "The development of VX-770 is very encouraging for people with CF with a specific mutation of the CF gene - about 6% of those with CF in the UK. "The CF Trust warmly welcomes any advances in the understanding and treatment of this terrible disease."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/7605800.stm

Published: 2008/09/09 14:31:39 GMT

http://news.bbc.co.uk/2/hi/health/7605800.stm

Pollution 'hinders heart pacing'

Air pollution from traffic hinders the heart's ability to conduct electrical signals, a study has suggested.

Exposure to small particulates - tiny chemicals caused by burning fossil fuels - caused worrying changes on the heart traces of 48 heart patients.

Particulate pollution is already known to increase heart attack risk.

The Circulation study appears to back this up and the heart trace changes seen were characteristic of poor oxygen supply to the heart.

The electrocardiograms of the 48 patients studied, who had recently been hospitalised for heart attack, unstable angina or worsening symptoms of coronary heart disease, showed unusual changes called ST-segment depression.

The pollution levels in this study were not even that high yet they are still seeing changes
Professor David Newby, Edinburgh University

Patients recovering from heart attacks had the greatest changes in pollution-related ST-segment depression over the course of the 10-month study, the Harvard University researchers found.

The American Heart Association already recommend that some heart patients, particularly those who have had a heart attack, delay driving for two to three weeks after leaving the hospital and avoid driving in heavy traffic because of the stress it creates.

Lead researcher Dr Diane Gold said: "Our study provides additional rationale to avoid or reduce heavy traffic exposure after discharge, even for those without a heart attack, since traffic exposure involves pollution exposure as well as stress."

She said more work was needed to evaluate the mechanisms behind the pollution-related ST-segment depression, but said the most likely explanation was inadequate blood supply to the heart or inflamed heart muscle.

Judy O'Sullivan of the British Heart Foundation said: "It has been established for some time that exposure to high levels of air pollution can exacerbate symptoms in people with heart and circulatory disease.

"Our advice to heart patients is to avoid prolonged exposure to high levels of air pollution."

Professor David Newby, professor of cardiology at Edinburgh University, said: "There is a whole wealth of data showing if you live in a polluted area you are more likely to get cardiovascular disease.

"The pollution levels in this study were not even that high yet they are still seeing changes, which is important.

"We should all strive to reduce pollution."

According to the World Health Organization, air pollution accounts for three million deaths worldwide every year.

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/7604689.stm

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As Barriers Disappear, Some Gender Gaps Widen

By JOHN TIERNEY

When men and women take personality tests, some of the old Mars-Venus stereotypes keep reappearing. On average, women are more cooperative, nurturing, cautious and emotionally responsive. Men tend to be more competitive, assertive, reckless and emotionally flat. Clear differences appear in early childhood and never disappear. What's not clear is the origin of these differences. Evolutionary psychologists contend that these are innate traits inherited from ancient hunters and gatherers. Another school of psychologists asserts that both sexes' personalities have been shaped by traditional social roles, and that personality differences will shrink as women spend less time nurturing children and more time in jobs outside the home. To test these hypotheses, a series of research teams have repeatedly analyzed personality tests taken by men and women in more than 60 countries around the world. For evolutionary psychologists, the bad news is that the size of the gender gap in personality varies among cultures. For social-role psychologists, the bad news is that the variation is going in the wrong direction. It looks as if personality differences between men and women are smaller in traditional cultures like India's or Zimbabwe's than in the Netherlands or the United States. A husband and a stay-at-home wife in a patriarchal Botswanan clan seem to be more alike than a working couple in Denmark or France. The more Venus and Mars have equal rights and similar jobs, the more their personalities seem to diverge.

These findings are so counterintuitive that some researchers have argued they must be because of cross-cultural problems with the personality tests. But after crunching new data from 40,000 men and women on six continents, David P. Schmitt and his colleagues conclude that the trends are real. Dr. Schmitt, a psychologist at Bradley University in Illinois and the director of the International Sexuality Description Project, suggests that as wealthy modern societies level external barriers between women and men, some ancient internal differences are being revived.

The biggest changes recorded by the researchers involve the personalities of men, not women. Men in traditional agricultural societies and poorer countries seem more cautious and anxious, less assertive and less competitive than men in the most progressive and rich countries of Europe and North America.

To explain these differences, Dr. Schmitt and his collaborators from Austria and Estonia point to the hardships of life in poorer countries. They note that in some other species, environmental stress tends to disproportionately affect the larger sex and mute costly secondary sexual characteristics (like male birds' displays of plumage). And, they say, there are examples of stress muting biological sex differences in humans. For instance, the average disparity in height between men and women isn't as pronounced in poor countries as it is in rich countries, because boys' growth is disproportionately stunted by stresses like malnutrition and disease. Personality is more complicated than height, of course, and Dr. Schmitt suggests it's affected by not just the physical but also the social stresses in traditional agricultural societies. These villagers have had to adapt their personalities to rules, hierarchies and gender roles more constraining than those in modern Western countries — or in clans of hunter-gatherers. "Humanity's jaunt into monotheism, agriculturally based economies and the monopolization of power and resources by a few men was 'unnatural' in many ways," Dr. Schmitt says, alluding to evidence that hunter-gatherers were relatively egalitarian. "In some ways modern progressive cultures are returning us psychologically to our hunter-gatherer roots," he argues. "That means high sociopolitical gender equality over all, but with men and women expressing predisposed interests in different domains. Removing the stresses of traditional agricultural societies could allow men's, and to a lesser extent women's, more 'natural' personality traits to emerge."

Some critics of this hypothesis question whether the international variations in personality have more to do with the way people in different cultures interpret questions on personality tests. (For more on this debate, go to www.nytimes.com/tierneylab.) The critics would like to see more direct measures of personality traits, and so would Dr. Schmitt. But he notes that there's already an intriguing trend reported for one trait — competitiveness — based on direct measures of male and female runners. Competitive running makes a good case study because, to mix athletic metaphors, it has offered a level playing field to women the past two decades in the United States. Similar numbers of males and females run on high school and college teams and in road races. Female runners have been competing for equal shares of prize money and receiving nearly 50 percent more scholarship aid from Division I colleges than their male counterparts, according to the N.C.A.A.

But these social changes have not shrunk a gender gap among runners analyzed by Robert Deaner, a psychologist at Grand Valley State University in Michigan, who classifies runners as relatively fast if they keep close to the pace of the world's best runners of their own sex. When Dr. Deaner looks at, say, the top 40 finishers of each sex in a race, he typically finds two to four times as many relatively fast male runners as relatively fast female runners. This large gender gap has persisted for two decades in all kinds of races — high school and college meets, elite and nonelite road races — and it jibes with other studies reporting that male runners train harder and are more motivated by competition, Dr. Deaner says. This enduring "sex difference in competitiveness," he concludes, "must be considered a genuine failure for the sociocultural conditions hypothesis" that the personality gap will shrink as new roles open for women.

If he and Dr. Schmitt are right, then men and women shouldn't expect to understand each other much better anytime soon. Things could get confusing if the personality gap widens further as the sexes become equal. But then, maybe it was that allure of the mysterious other that kept Mars and Venus together so long on the savanna.

This article has been revised to reflect the following correction:

Correction: September 10, 2008
The Findings column on Tuesday, about gender gaps, misidentified the educational affiliation of Robert Deaner, a psychologist who analyzed competitive runners. He is at Grand Valley State University, in Michigan — not Colgate University, where he received his bachelor's degree.

http://www.nytimes.com/2008/09/09/science/09tier.html?_r=1&em&oref=slogin

Call to Arms for an American-Led Green Revolution

By DAVID VICTOR

HOT, FLAT, AND CROWDED

Why We Need a Green Revolution — and How It Can Renew America

By Thomas L. Friedman

Illustrated. 438 pages. Farrar, Straus & Giroux. $27.95.

When the Soviet Union chucked Sputnik into space in 1957, it galvanized America to come from behind and win the space race. The federal government opened its checkbook to finance an array of projects. Students shifted to new subjects like astronautical engineering and Russian studies to help the United States understand and eclipse the Soviet Union. The moon shot inspired a patriotic nation and produced useful commercial technologies along the way. The space race was expensive, but it worked.

Thomas L. Friedman's latest book is a plea for a new Sputnik moment. His breezy tour of America's energy policy documents a nation that has become dangerously dependent on fossil fuels. The bulging bank accounts of oil exporters like Russia, Iran and Venezuela give them the swagger and ability to cause lots of mischief.

Even more worrisome is all the carbon dioxide that comes from burning fossil fuels, not just oil but also coal and, to a lesser degree, natural gas. Since carbon dioxide pollution accumulates in the atmosphere, humans are recklessly changing the climate. The United States' record is particularly poor because we are, per capita, among the biggest gulpers of oil and belchers of carbon dioxide. The need for American leadership has never been greater.

And if all that's not bad enough, Mr. Friedman, a columnist for The New York Times and three-time Pulitzer Prize winner, shows that the economic opportunities created by a technology-driven world where the economic playing field has been leveled are making these trends a lot worse. The stunning growth of Asia's tiger economies, especially China's, has been a miracle for the world's industrial output but a horror for the environment.

Asia's growth hinges on coal, which is bad news because today's coal technologies are particularly intense emitters of carbon dioxide. The best data show that in the last six years alone, China's coal-fired growth has been so rapid that the country has expanded its coal production by an amount equal to the entire output of the United States coal industry. Couple that with the worldwide population shift into cities, and the result is Mr. Friedman's title: "Hot, Flat, and Crowded."

The litany of dangers has been told many times before, but Mr. Friedman's voice is compelling and will be widely heard. Dependence on fossil fuels is no longer just a topic for woodsy seminars or the grist for conspiracy theories from the threat industry. Mr. Friedman shows that both energy and environmental

fears are going mainstream — "green is the new red, white, and blue" — and that is a great opportunity for bipartisanship. Unfortunately, the nation's cockpit in Washington is stuffed full of special-interest lobbyists and partisan bickerers. China and other nations, Mr. Friedman warns, will seize the opportunities to invest in new green industries and leave us in the dust.

The alarm bells ring with pithy Friedmanisms. My favorite is his broadside against cheap talk about the coming "green revolution." A revolution is needed, to be sure, because a whole suite of new technologies — from smarter biofuels that cut our dependence on oil to better power plants and a new digital-era electric grid — are badly needed to supplant today's dirty fuels system. But buzz is not the same as revolution, because real revolutions force new directions, not just new talk. People get hurt.

Today, Mr. Friedman says, "the adjective that most often modifies 'green revolution' is 'easy.' That's not a revolution. That's a party." This costume party is more about conspicuous environmentalism than facing the hard truths essential to effective energy policy, like what it will really cost to make a change and why that investment is worth it.

Mr. Friedman's strength is his diagnosis of our energy and environmental nightmares. But blind spots appear when he turns to remedies. One is renewable power. Like most observers, Mr. Friedman assumes that the road out of today's mess is studded with wind turbines and solar plants. Maybe that's true, but maybe not. Such renewable resources account for only a tiny fraction of current power supply, and when the titans of today's energy industry think about cutting carbon dioxide, they are more likely to imagine building carbon-free nuclear power plants or advanced coal plants that safely bury their pollution underground.

These two camps — the emerging renewable-resources industry and the titans who actually have their hands on the controls in today's energy system — are pulling in different directions. Economists will rightly have heartburn that these 412 pages never dwell much on the cost of different policy options, nor does Mr. Friedman ever question his claim that building a renewable-energy system is automatically a good idea because many new jobs will flow (at unknown expense) into these new industries.

The other blind spot is politics. The most intriguing chapter in Mr. Friedman's book is his last, which poses the toughest challenge. Can America be like China, where a visionary government can impose a new direction on the country in the face of national emergency? Or will America devolve into a country that is so mired in red tape and local opposition that it builds absolutely nothing anywhere, near anything? Societies like that get stuck because they can't embrace new technologies, like the cherished wind turbines and the power lines needed to carry their current.

Mr. Friedman's lament is that the United States is becoming such a place because parochial interests have created gridlock. But most striking is that this seasoned observer of the American political scene offers not much of a blueprint for fixing the political problem except the bromide that we need new leaders who are willing to embrace better policies.

Heads will be nodding across airport lounges, as readers absorb Mr. Friedman's common sense about how America and the world are dangerously addicted to cheap fossil fuels while we recklessly use the atmosphere as a dumping ground for carbon dioxide. The Sputnik is heading into orbit, thanks to high energy prices, growing fear of the changing climate and pleas like Mr. Friedman's. But whether we as a nation — and with us, the world — are really prepared to do anything to solve the problem is still in doubt.

David G. Victor, director of the energy and sustainable development program at Stanford University and an adjunct senior fellow at the Council on Foreign Relations, is writing a book on global warming.

http://www.nytimes.com/2008/09/10/books/10victor.html?ref=science

Superstitions evolved to help us survive

00:01 10 September 2008
NewScientist.com news service
Ewen Callaway

Darwin never warned against crossing black cats, walking under ladders or stepping on cracks in the pavement, but his theory of natural selection explains why people believe in such nonsense.

The tendency to falsely link cause to effect – a superstition – is occasionally beneficial, says Kevin Foster, an evolutionary biologist at Harvard University.

For instance, a prehistoric human might associate rustling grass with the approach of a predator and hide. Most of the time, the wind will have caused the sound, but "if a group of lions is coming there's a huge benefit to not being around," Foster says.

Foster and colleague Hanna Kokko, of the University of Helsinki, Finland, sought to determine exactly when such potentially false connections pay off.

Simplified behaviour

Rather than author just-so stories for every possible superstition – from lucky rabbit's feet to Mayan numerology – Foster and Kokko worked with mathematical language and a simple definition for superstition that includes animals and even bacteria.

The pair modelled the situations in which superstition is adaptive. As long as the cost of believing a superstition is less than the cost of missing a real association, superstitious beliefs will be favoured.

In general, an animal must balance the cost of being right with the cost of being wrong, Foster says. Throw in the chances that a real lion, and not wind, makes the rustling sound, and you can predict superstitious beliefs, he says.

Real and false associations become even cloudier when multiple potential "causes" portend an event. Rustling leaves and say, a full moon, might precede a lion's arrival, tilting the balance toward superstition more than a single "cause" would, Foster explains.

In modern times, superstitions turn up as a belief in alternative and homeopathic remedies. "The chances are that most of them don't do anything, but some of them do," he says.

Michael Shermer, publisher of *Skeptic* magazine, has proposed a similar explanation for such beliefs, albeit in less mathematical language.

"Our brains are pattern-recognition machines, connecting the dots and creating meaning out of the patterns that we think we see in nature. Sometimes A really is connected to B, and sometimes it is not," he says. "When it isn't, we err in thinking that it is, but for the most part this process isn't likely to remove us from the gene pool, and thus magical thinking will always be a part of the human condition."

Scientific superstition

Yet not all superstitions persist because of their evolutionary kick. "Once you get to things like avoiding ladders and cats crossing the road, it's clear that culture and modern life have had an influence on many of these things," says Foster.

"My guess would be that in modern life, the general tendency to believe in things where we don't have scientific evidence is less beneficial than it used to be," he adds.

However, Wolfgang Forstmeier, an evolutionary biologist at the Max Planck Institute of Ornithology in Starnberg, Germany, argues that by linking cause and effect – often falsely – science is a simply dogmatic form of superstition.

"You have to find the trade off between being superstitious and being ignorant," he says. By ignoring building evidence that contradicts their long-held ideas, "quite a lot of scientists tend to be ignorant quite often," he says.

Journal reference: *Proceeding of the Royal Society B* (DOI: 10.1098/rspb.2008.0981)

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Why don't architects ever retire?

By Witold Rybczynski
Posted Tuesday, Sept. 9, 2008, at 11:16 AM ET

Asked why so many architects lived long lives, Philip Johnson quipped, "Of course they live long—they have a chance to act out all their aggressions." Johnson must have had a lot of acting out left to do, for his well-publicized "retirement" at 85 turned out to be only the first of many, and he continued to design and build until his death 13 years later. I.M. Pei, more judicious in all things, was 72 when he announced his retirement from the firm he had founded 28 years before. Golf, fishing, mah-jongg? Hardly. "I want to spend whatever time I have left working," he said, and he has been doing just that—in France, Germany, Qatar, China. His most recent building, done in collaboration with his two sons' firm, Pei Partnership Architects, is the Embassy of the People's Republic of China in Washington, D.C. At 91, Pei is the same age Frank Lloyd Wright was when he died. Wright didn't pretend to retire; he just kept drawing until the end. And what drawings! His last decade saw three great masterpieces: the Price Company Tower, the Beth Sholom Synagogue, and the Solomon R. Guggenheim Museum.

What is it with architects that they don't—or can't—retire? In part, it is the nature of their profession. Architecture is a delicate balancing act between practicality and artistry, and it takes a long time to master all the necessary technical skills as well as to learn how to successfully manipulate the thousands of details that compose even a small building. Requisite skills for the successful practitioner include dealing with clients: individuals, committees, communities, boards. The architect, proposing an as-yet-unbuilt vision of the future, must be able to persuade, and it's easier to be persuasive if you have a proven track record.

For all these reasons, architectural wunderkinds are few and far between; architects have traditionally hit their stride in late middle age. Ludwig Mies van der Rohe was 62 when he started designing the Lake Shore Drive apartments, which became the model for all subsequent steel-and-glass towers; Le Corbusier was 63 when he built the marvelous chapel at Ronchamp, setting the architectural world on its ear; Louis Kahn was 64 when the Salk Institute was built; and Frank Gehry was 68 when he produced the Bilbao Guggenheim. So once you finally get really good at it, why stop?

It's not so hard for an architect to keep going. Since building is a team endeavor, the old master is surrounded by scores of assistants. For any slowing down that occurs in later years, there are plenty of younger hands and minds to pick up the pace. The younger minds propose, but the master disposes, and the big decisions still benefit from years of practice and experience. From the client's point of view, since buildings represent large investments, it is safer, by far, to know that a seasoned practitioner is overseeing the process.

In old age, painters have the choice of retreating to their studios and picking the subject that interests them. Architects don't have that luxury; they depend on clients for their work. All architects have experienced periods when the clients stopped coming, for one reason or another—when there was no work in the office and staff had to be let go, oblivion beckoning. So when clients continue to knock at the door with large, interesting commissions, it's very hard to say no. After all, who knows for how long the knocking will continue? I met Gehry when he was 73. He said that he was turning down a lot of work and speculated that he probably would not do more than a handful of projects before retiring. That was six years—and many, many buildings—ago.

*Witold Rybczynski is **Slate**'s architecture critic.*

Article URL: http://www.slate.com/id/2198786/

New E-Newspaper Reader Echoes Look of the Paper

By ERIC A. TAUB

CAMBRIDGE, Mass. — The electronic newspaper, a large portable screen that is constantly updated with the latest news, has been a prop in science fiction for ages. It also figures in the dreams of newspaper publishers struggling with rising production and delivery costs, lower circulation and decreased ad revenue from their paper product.

While the dream device remains on the drawing board, Plastic Logic will introduce publicly on Monday its version of an electronic newspaper reader: a lightweight plastic screen that mimics the look — but not the feel — of a printed newspaper.The device, which is unnamed, uses the same technology as the Sony eReader and Amazon.com's Kindle, a highly legible black-and-white display developed by the E Ink Corporation. While both of those devices are intended primarily as book readers, Plastic Logic's device, which will be shown at an emerging technology trade show in San Diego, has a screen more than twice as large. The size of a piece of copier paper, it can be continually updated via a wireless link, and can store and display hundreds of pages of newspapers, books and documents.

Richard Archuleta, the chief executive of Plastic Logic, said the display was big enough to provide a newspaperlike layout. "Even though we have positioned this for business documents, newspapers is what everyone asks for," Mr. Archuleta said.

The reader will go on sale in the first half of next year. Plastic Logic will not announce which news organization will display its articles on it until the International Consumer Electronics Show in Las Vegas in January, when it will also reveal the price.

Kenneth A. Bronfin, president of Hearst Interactive Media, said, "We are hopeful that we will be able to distribute our newspaper content on a new generation of larger devices sometime next year." While he would not say what device the company's papers would use, he said, "we have a very strong interest in e-newspapers. We're very anxious to get involved."

The Hearst Corporation, the parent of Hearst Interactive Media, owns 16 daily newspapers, including The Houston Chronicle, The San Antonio Express and The San Francisco Chronicle, and was an early investor in E Ink. The company already distributes electronic versions of some papers on the Amazon Kindle.

Newspaper companies have watched the technology closely for years. The ideal format, a flexible display that could be rolled or folded like a newspaper, is still years off, says E Ink. But it foresees color displays

with moving images and interactive clickable advertising coming in only a few more years, according to Sriram K. Peruvemba, vice president for marketing for E Ink.

E Ink expects that within the next few years it will be able to create technology that allows users to write on the screen and view videos. At a recent demonstration at E Ink's headquarters here, the company showed prototypes of flexible displays that can create rudimentary colors and animated images. "By 2010, we will have a production version of a display that offers newspaperlike color," Mr. Peruvemba said.

If e-newspapers take off, the savings could be hefty. At the The San Francisco Chronicle, for example, print and delivery amount to 65 percent of the paper's fixed expenses, Mr. Bronfin said.

With electronic readers, publishers would also learn more about its readers. With paper copy subscriptions, newspapers know what address has received a copy and not much else. About those customers picking up a copy on the newsstand, they know nothing.As an electronic device, newspapers can determine who is reading their paper, and even which articles are being read. Advertisers would be able to understand their audience and direct advertising to its likeliest customers.While this raises privacy concerns, "these are future possibilities which we will explore," said Hans Brons, chief executive of iRex Technologies in Eindhoven, the Netherlands.

IRex markets the iLiad, an 8.5 by 6.1-inch electronic reader that can be used to receive electronic versions of the newspaper Les Echos in France and NRC Handelsblad in the Netherlands. The iRex, Kindle and eReader prove the technology works. The big question for newspaper companies is how much people will pay for a device and the newspaper subscription for it.

Papers face a tough competitor: their own Web sites, where the information is free. And they have trained a generation of new readers to expect free news. In Holland, the iLiad comes with a one-year subscription for 599 euros ($855). The cost of each additional year of the paper is 189 euros ($270). NRC offers just one electronic edition of the paper a day, while Les Echos updates its iRex version 10 times a day.

A number of newspapers, including The New York Times, offer electronic versions through the Kindle device; The Times on the Kindle costs $14 a month, similar to the cost of other papers. "The New York Times Web site started as a replica of print, but it has now evolved," said Michael Zimbalist, vice president for research and development operations at The New York Times Company. "We expect to experiment on all of these platforms. When devices start approximating the look and feel of a newspaper, we'll be there as well," Mr. Zimbalist said.

Most electronic reading devices use E Ink's technology to create an image. Unlike liquid-crystal display of computer monitors and televisions, electronic paper technology does not need a backlight, remains displayed even when the power source runs down, and looks brighter, not dimmer, in strong light. It also draws little power from the device's battery.

Plastic Logic's first display, while offering a screen size that is 2.5 times larger than the Kindle, weighs just two ounces more and is about one-third the Kindle's thickness.

It uses a flexible, lightweight plastic, rather than glass, a technology first developed at Cambridge University in England. Plastic Logic, based in Mountain View, Calif., was spun off from that project.

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http://www.nytimes.com/2008/09/08/technology/08ink.html?th&emc=th

A Caricaturist, but No Funny Stuff Here

By MICHAEL KIMMELMAN

BERLIN — It means coming to terms with the past: Vergangenheitsbewältigung, a German mouthful. Every German knows the word. Generations have been raised on it. An Italian woman who used to run multicultural affairs for the city of Rome, a Jew, was complaining over a coffee the other day, apropos of rising anti-immigrant sentiment there, that Italy still sells Mussolini bobble-head dolls and other Fascist knickknacks as souvenirs. Like the French and Poles, she said, Italians have never properly reckoned with their own history.

"Germans, on the other hand," she added — and at this point she rolled her eyes the way people do when a second helping of meat dumplings is placed before them — "with them, it's maybe enough already."

Not that everyone would agree with this view of course. But it is a widely held sentiment across Europe, to the credit of the Germans. As part of this endless endeavor to leave no byway of guilt and self-flagellation unexplored, we now get the exhibition of Arthur Szyk's work that just opened at the Deutsches Historisches Museum.

Szyk (it's pronounced shik) was a Jewish caricaturist who spent roughly the last decade of his life in the United States. He's unknown here, hardly familiar in America. Born in 1894 in what is now Poland, he fought with the Russian Army on the German front in World War I, then moved during the 1920s to Paris, like many young artists. There he studied at the Académie Julian, declining Modernist abstraction for an old masterly, illuminated-manuscript, miniaturist style of eye-straining detail. Perhaps he was influenced, or fortified, by the "return to order," as neo-Classicism in that era was called.

In any case, from Paris he went to London and onward to New York, having established a reputation with several exhibitions. During the 1940s he became famous as a popular illustrator of books and magazine covers for Time, Collier's, Esquire and others, and as a political cartoonist for newspapers like The New York Post and PM. Several generations of Americans grew up on his versions of "Mother Goose" and "Andersen's Fairy Tales." His life's work, though, was crusading against the Nazis and, later, for Israel and civil rights.

Notwithstanding his influence on comic artists like Art Spiegelman, and the occasional Szyk show, he has pretty much dropped down the memory hole today. Naturally, the show here, introducing him to a German audience, focuses on his antiwar agitprop. There are works about the Holocaust, about Israel and America. Most of the drawings, reproduced magazine covers and other illustrations mock Hitler and Mussolini.

They turn Goebbels into a skunk, Göring into a fat Cossack, the aged Marshal Pétain into Pierrot, the sad clown, and the Japanese into bats and gorillas. To picture his style, think of Mad magazine in the heyday of Will Elder and Harvey Kurtzman but without any sense of humor. Szyk, it seems, had absolutely none.

This inclined him toward cloying kitsch when he extolled Israel, and it produced corn when the subjects were cowboys or George Washington on horseback. Szyk thrived in angry mode, tackling enemies with a sledgehammer, saving subtlety for his penmanship.

In his dexterity he recalls a bygone age of monastic scribes slaving over parchment pages. Illustrations like “Fortress Europe,” “Wagner” and “Ride of the Valkyries” are more intricate than Swiss watch works and sublimely obsessive. Reproductions hardly do the original drawings justice. The wow factor lent weight to his message, never mind if the one actually had nothing to do with the other.

At the same time, however, Szyk exploited the grosser virtues of caricature to knock viewers over the head with his point so that no one could get lost in the exquisite details of a drawing, or rather so that people might lose themselves in the details only after having absorbed the main idea. One of his most potent drawings is “The Babykiller (German Airman),” a straightforward portrait of a skinny, slouching, vacant-eyed Wehrmacht soldier in an oversize uniform, hands demurely guarding his crotch. It’s the banality of evil personified. In such a case Szyk rose to the level of a Daumier or a Rowlandson.

Of course he also drew those gorillas and bats. His loathed Germans never failed to be at least human. In 1941, in a cartoon for The American Mercury, he depicted a trio of half-naked black African tribesmen, toting shields and spears and fleeing a Luftwaffe squadron. The caption said: “Run for your lives! — The savages are coming!” Which is to say that while he was ahead of his day in championing civil rights, he was also a man of his times.

And times change, along with fortunes. Szyk’s did. In 1949 he drew two men watching a third walk away: “He is under investigation,” the caption says. “His blood is red, and his heart is left of the center. ... To think of it, we are all in trouble....” Two years later, after the House Un-American Activities Committee began a wrongheaded investigation into his possible Communist ties, he died at 57 — having just produced the most beautifully illuminated version of the Declaration of Independence, a testament to his patriotism.

Condemning Germans to eternal hell (he inscribed one of his illustrations, about the Polish Ghetto uprising, “to the German people, sons of Cain, be ye damned forever and ever”), he now re-emerges in a Berlin museum of German history. There’s an object lesson in this about the vagaries of life and art. On both sides of the Atlantic, in other words, Vergangenheitsbewältigung still has its benefits.

This article has been revised to reflect the following correction:

Correction: September 9, 2008
The Abroad column on Monday, about an exhibition of the work of the caricaturist Arthur Szyk at a museum in Berlin, rendered part of the museum’s name incorrectly. It is the Deutsches Historisches Museum, not the Deutsche Historisches Museum. The error also appeared in an accompanying picture caption.

http://www.nytimes.com/2008/09/08/arts/design/08szyk.html?th&emc=th

Anthropologists Develop New Approach To Explain Religious Behavior

Totem Poles, Stanley Park, Vancouver, British Columbia. (Credit: iStockphoto)

ScienceDaily (Sep. 10, 2008) — Without a way to measure religious beliefs, anthropologists have had difficulty studying religion. Now, two anthropologists from the University of Missouri and Arizona State University have developed a new approach to study religion by focusing on verbal communication, an identifiable behavior, instead of speculating about alleged beliefs in the supernatural that cannot actually be identified.

"Instead of studying religion by trying to measure unidentifiable beliefs in the supernatural, we looked at identifiable and observable behavior - the behavior of people communicating acceptance of supernatural claims," said Craig T. Palmer, associate professor of anthropology in the MU College of Arts and Science. "We noticed that communicating acceptance of a supernatural claim tends to promote cooperative social relationships. This communication demonstrates a willingness to accept, without skepticism, the influence of the speaker in a way similar to a child's acceptance of the influence of a parent."

Palmer and Lyle B. Steadman, emeritus professor of human evolution and social change at Arizona State University, explored the supernatural claims in different forms of religion, including ancestor worship; totemism, the claim of kinship between people and a species or other object that serves as the emblem of a common ancestor; and shamanism, the claim that traditional religious leaders in kinship-based societies could communicate with their dead ancestors. They found that the clearest identifiable effect of religious behavior is the promotion of cooperative family-like social relationships, which include parent/child-like relationships between the individuals making and accepting the supernatural claims and sibling-like relationships among co-acceptors of those claims.

"Almost every religion in the world, including all tribal religions, use family kinship terms such as father, mother, brother, sister and child for fellow members," Steadman said. "They do this to encourage the kind of behavior found normally in families - where the most intense social relationships occur. Once people realize that observing the behavior of people communicating acceptance of supernatural claims is how we actually identify religious behavior and religion, we can then propose explanations and hypotheses to account for why people have engaged in religious behavior in all known cultures."

Palmer and Steadman published their research in *The Supernatural and Natural Selection: The Evolution of Religion*. The book was published by Paradigm Publishers.

Adapted from materials provided by University of Missouri-Columbia.
http://www.sciencedaily.com/releases/2008/09/080909122749.htm

Protein 'Switch' Suppresses Skin Cancer Development

ScienceDaily (Sep. 10, 2008) — The protein IKKalpha (IKKα) regulates the cell cycle of keratinocytes and plays a key role in keeping these specialized skin cells from becoming malignant, researchers at The University of Texas M. D. Anderson Cancer Center report in the Sept. 9 issue of Cancer Cell.

"We have shown that IKKα acts as a sentry, monitoring and, when necessary, halting proliferation of these important cells. In the first mouse model of its kind, we also found that deleting IKKα spontaneously induced squamous cell carcinomas by activating the epidermal growth factor receptor pathway," said senior author Yinling Hu, Ph.D., assistant professor in M. D. Anderson's Department of Carcinogenesis at the Science Park - Research Division in Smithville, Texas. "These results provide new therapeutic targets for prevention of skin cancer."

Keratinocytes originate in the basal layer of the epidermis to replace skin cells at the surface that have been shed. As keratinocytes gradually move up through the skin layers, they differentiate and eventually form the top layer of the skin, which is composed of squamous cells. The cycle ends through terminal differentiation, in which cells lose their ability to reproduce by dividing in two. They eventually die.

Hu and colleagues reported in research last year that a reduction in IKKα expression promotes the development of chemically induced papillomas and carcinomas, which are benign and malignant tumors of the epithelium respectively. Epithelial cells make up the outer layers of skin and the inner linings of many organs, including the lungs and the gastrointestinal, reproductive and urinary tracts. Most cancers originate in organ epithelial cells. The researchers also demonstrated that an intact IKKα gene is required to suppress skin cancer development.

Downregulation of IKKα has been noted in a variety of human squamous cell carcinomas, including those of the skin, esophagus, lungs, and head and neck.

IKKα's role in maintaining skin homeostasis, or stability, had remained unclear because an appropriate mouse model was not available. To solve this problem, Bigang Liu, the first author, and colleagues generated mice with IKKα deletions in their keratinocytes.

In a series of experiments, Hu's group found evidence that IKKα functions as a sentry that monitors keratinocyte proliferation and then induces terminal differentiation. In one experiment, within a few days of birth, mutant mice had developed thickened and wrinkled skin and gradually showed retarded development. The researchers also found that even a low level of IKKα in the epidermis was sufficient to allow normal embryonic skin development.

The researchers examined the signaling pathways involved in overproliferation and reduced differentiation in IKKα -deficient cells. In one, they found that IKKα turns down a cellular signaling loop that activates EGFR and other growth factors previously found to regulate keratinocyte proliferation and differentiation.

Another experiment demonstrated that IKKα deletions in keratinocytes cause skin carcinomas and that inactivating EGFR reverses this process in the mutant mice. Furthermore, either inactivation of EGFR or reintroduction of IKKα inhibited excessive cell division, induced terminal differentiation, and prevented skin cancer by repressing the EGFR-driven signaling loop.

Hu's group concluded that IKKα is a switch for proliferation and differentiation and is essential to maintaining skin homeostasis, or stability, and preventing skin cancer.

"This study has revealed the importance of IKKα in maintaining skin homeostasis and in preventing skin cancer, as well as the mechanism of how IKKα acts in these processes," Hu said. "We will further investigate how IKKα deletion targets a single cancer initiation cell, which will provide new avenues to treat cancer."

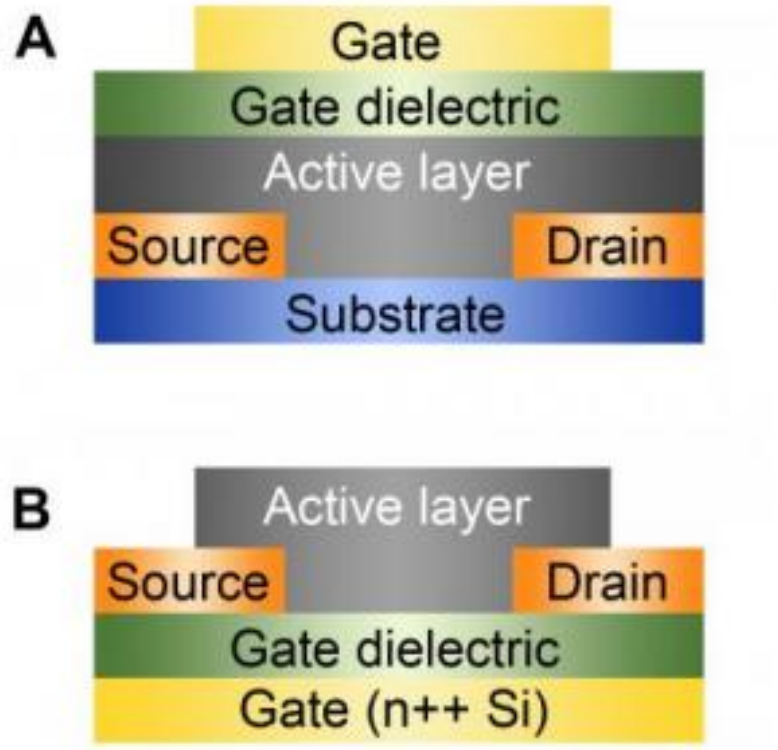
Co-authors with Hu and Liu are Xiaojun Xia, Ph.D., Feng Zhu, Ph.D., Eunmi Park, Ph.D., Steve Carbajal, Kaoru Kiguchi, M.D., Ph.D., John DiGiovanni, Ph.D., and Susan Fischer, Ph.D., all of M. D. Anderson's Science Park - Research Division.

Research was funded by grants from the National Cancer Institute. Hu moved this month to the Cancer and Inflammation Program, Center for Cancer Research at the National Cancer Institute.

Adapted from materials provided by University of Texas M. D. Anderson Cancer Center, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2008/09/080908140100.htm

Bottoms Up: Better Organic Semiconductors For Printable Electronics



Restacking organic semiconductors: An improved formulation for a polymer blend semiconductor causes key semiconducting molecules to migrate to the bottom of the active layer, allowing chip designers to replace top-gated structures (a) with more easily manufactured bottom-gate, bottom-contact devices (b). (Credit: Yoon, SNU/Talbott, NIST)

ScienceDaily (Sep. 10, 2008) — Researchers from the National Institute of Standards and Technology (NIST) and Seoul National University (SNU) have learned how to tweak a new class of polymer-based semiconductors to better control the location and alignment of the components of the blend.

Their recent results—how to move the top to the bottom—could enable the design of practical, large-scale manufacturing techniques for a wide range of printable, flexible electronic displays and other devices.

Organic semiconductors—novel carbon-based molecules that have similar electrical properties to more conventional semiconducting materials like silicon and germanium—are a hot research topic because practical, high-performance organic semiconductors would open up whole new categories of futuristic electronic devices. Think of tabloid-sized "digital paper" that you could fold up into your pocket or huge sheets of photovoltaic cells that are dirt cheap because they're manufactured by—basically—ink-jet printing.

The problem is performance. Small organic molecules have been developed with key electrical parameters close to the benchmark set by amorphous silicon semiconductors, but they are very difficult to deposit in a stable, uniform film—a key manufacturing requirement. Larger molecule polymer

semiconductors, on the other hand, make excellent thin films but have at best limited semiconductor properties.

A patent from British researchers in 2005 offered a promising compromise: blend the small semiconductor molecules in with the polymer. This works surprisingly well, but with an asterisk. Tests showed that actual devices, field effect transistors, made with the blend only worked well in a so-called "top-gated" structure. The critical active part of the film was on the top, and the switching part of the device (the "gate") had to be layered on top of that, a process difficult or impossible to do on a large scale without destroying the fragile film.

Working at NIST's Center for Neutron Research, the SNU/NIST research team used a neutron imaging technique that allowed them to observe, with nanometer resolution, how the distribution of small organic semiconductor molecules embedded in polymer films changed with depth—the films are less than 100 nanometers thick. In the thin films originally described by the patent, the bulk of the semiconductor molecules end up at the top of the film, as suspected.

However, when the SNU/NIST research team substituted a polymer with significantly higher molecular mass, something interesting happened. The organic semiconductor small molecules distributed themselves evenly at the top and bottom of the film. Having an active region of the film on the bottom is key for large-scale manufacturing because it means the rest of the device—gate, source, drain—can be laid down first and the delicate film layer added last.

In addition, they report, the optimized blend of polymer and organic semiconductor actually has better performance characteristics than the organic semiconductor on its own.

Journal reference:

1. Kang et al. **Structure and Properties of Small Molecule−Polymer Blend Semiconductors for Organic Thin Film Transistors**. *Journal of the American Chemical Society*, 2008; 0 (0): 0 DOI: 10.1021/ja804013n

Adapted from materials provided by National Institute of Standards and Technology.

http://www.sciencedaily.com/releases/2008/09/080904115128.htm

Parenting Children With Disabilities Becomes Less Taxing With Time

ScienceDaily (Sep. 10, 2008) — Having a child with a disability takes a toll on parents' mental and physical health, yet new research suggests that, over time, parents learn to adapt to the challenges of caring for a disabled child. As these parents age, the study shows, their health more closely mirrors the health of parents with children who don't have disabilities.

The study, conducted by a team of sociologists and social work researchers from the University of Chicago and University of Wisconsin-Madison, is the first to use a representative sample to systematically examine the effect of having children with developmental or mental health problems on parental well-being, comparing the sample to parents of children without disabilities.

Researchers analyzed data from the Study of Midlife in the United States to examine the effect of having disabled children on parental health; the extent to which the toll varies by parental age and gender; and the effect of disability-related factors on the well-being of parents of children with disabilities.

Journal reference:

1. Jung-Hwa Ha, Jinkuk Hong, Marsha Mailick Seltzer, and Jan S. Greenberg. **Age and Gender Differences in the Well-Being of Midlife and Aging Parents with Children with Mental Health or Developmental Problems: Report of a National Study**. *Journal of Health and Social Behavior*, September 2008 [link]

Adapted from materials provided by American Sociological Association, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2008/09/080908125230.htm

Rail, Road Or Waterway?

ScienceDaily (Sep. 10, 2008) — Is road transport the best way to send oranges from Spain to northern Germany? Or would it be better to ship them by rail or waterway for part of the route? A new software package determines the cheapest, fastest or most environmentally compatible mode of transportation.

Prime Argentine steak accompanied by a good French wine, with strawberries from Spain as dessert. And mood music playing on a stereo system made in Japan. Most national and international freight is transported by road, because it is the least expensive option. But this is likely to change soon, due to road tolls and the rising cost of fuel. Even when it's a question of making sure that the merchandise is delivered precisely on time, trucks are not always the most reliable solution. It can often take a long time to clear goods through the container terminals, and tailbacks on the motorways can cause additional delays.

So what is the optimum strategy for transporting goods over a particular route? Where could costs be saved by using inland waterways, and at what point would it be best to transship to a road or rail vehicle? What is the cheapest, fastest, or most environmentally compatible overall solution? Answers can be provided by a new software package developed by researchers at the Fraunhofer Institute for Material Flow and Logistics IML in Dortmund.

"The user enters the locations between which the goods are to be transported, as you would when using a route planner," says IML team leader Joachim Kochsiek. "The system calculates different variants to find the optimum solution that fits the specified criterion: costs, time or, in a future version, least environmental burden. It even factors in the time and costs for transshipment."

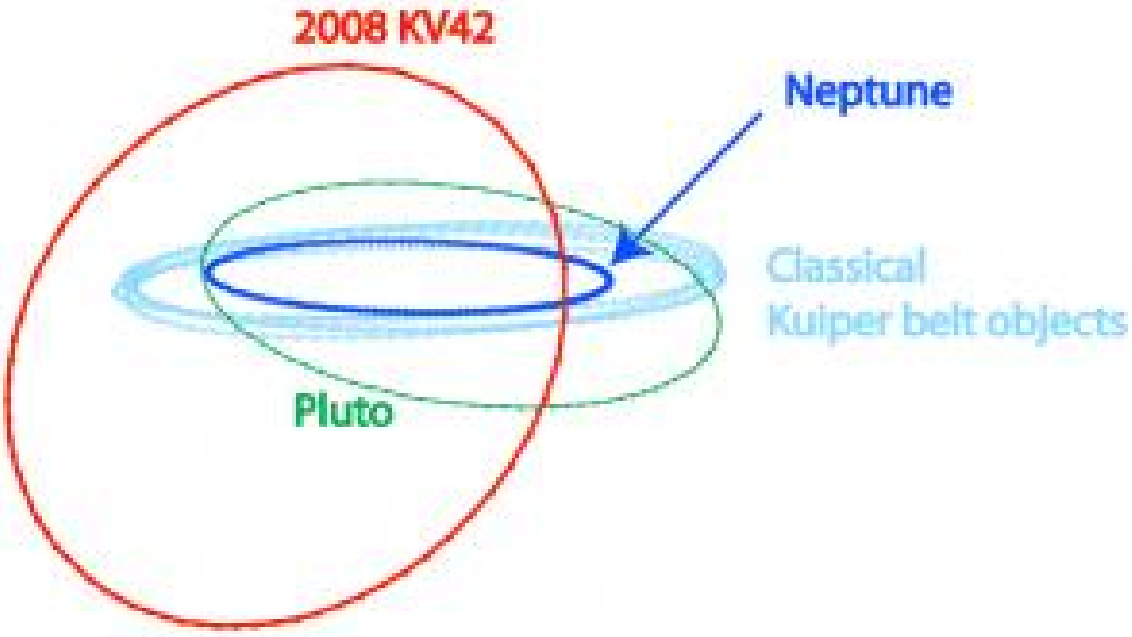
Digital maps of road, rail and inland waterway networks can be purchased off the shelf, but the information they provide is not sufficiently detailed for the new software.

"There are different categories of train, and different pricing systems for different rail connections – we can't apply a standard price per kilometer. We need to know what rules apply to the speed, width and height of trains, how many wagons are permitted on a particular section of railroad, and the maximum speed limit. Whereas this kind of information is included in road maps, it has to be compiled manually for the rail networks," Kochsiek explains.

For each mode of transportation, the system adapts its calculation of costs and fuel consumption to the degree of capacity utilization. For example, the lower the number of wagons pulled by a locomotive, the higher the costs. A prototype version of the software for optimizing time and costs is already available. The researchers are now working on the algorithms for calculating the environmental burden. A later version with online access will enable modified shipping timetables, for instance, to be instantly included in the calculations.

Adapted from materials provided by Fraunhofer-Gesellschaft.
http://www.sciencedaily.com/releases/2008/09/080908135908.htm

Astronomers Discover Missing Link For Origin Of Comets



A near edge-on view of the solar ecliptic plane viewed from about 100 AU distance. This figure shows the orbits of Netpune (diameter 30AU), Pluto, 2008 KV42 and 4 other 'classical' KBOs. Demonstrates the inclined nature of 2008 KV42's orbit, when compared to other objects in the outer solar system. (Credit: Canada-France Ecliptic Plane Survey)

ScienceDaily (Sep. 9, 2008) — An international team of scientists that includes University of British Columbia astronomer Brett Gladman has found an unusual object whose backward and tilted orbit around the Sun may clarify the origins of certain comets.

In the first discovery of its kind, researchers from Canada, France and the United States have discovered an object that orbits around the Sun backwards, and tilted at an angle of 104 degrees – almost perpendicular to the orbits of the planets.

"Certain types of comets are not naturally produced after planet formation, especially those with highly tilted orbits," says Prof. Gladman. "This discovery may finally show how they transition from the Oort Cloud to become objects like Halley's Comet."

Composed of icy rock, 2008 KV42 is called a "trans-Neptunian" object since its orbital path is larger than that of Neptune. The object is roughly 50 kilometres across and at present 35 times further from than the Sun than Earth.

The orbits of such objects in the region beyond Neptune's orbit provide fresh insights into the early history of our solar system, says Gladman, who teaches in the Dept. of Physics and Astronomy and holds the Canada Research Chair in Planetary Astronomy.

The international team has been carrying out a targeted search for objects with highly tilted orbits. Their discovery was made using the Canada-France-Hawaii Telescope in Hawaii, with follow-up observations provided by the MMT telescope in Arizona, the Cerro Tololo Inter-American Observatory (CTIO) four-metre telescope in Chile, and the Gemini South telescope, also in Chile, in which Canada is a partner.

"Having quick access to the MMT and Gemini South telescopes, via the generous support of the observers and directors, was critical here. Given the highly unusual orbit, the object would have been lost without the rapid tracking from these large telescopes," says Gladman.

The discovery team is currently performing follow-up observations of 2008 KV42 to pin down its orbit with greater precision. They will then begin unravelling the archaeological information trapped in the orbit of this highly exceptional member of the trans-Neptunian population.

Adapted from materials provided by University of British Columbia.

http://www.sciencedaily.com/releases/2008/09/080904151635.htm

'Smart Water' May Help Boost Production From Oil Wells By 60 Percent

"Smart water," a type of seawater, could help meet energy demands by boosting oil extraction by as much as 60 percent, scientists say. (Credit: Trevor MacInnis)

ScienceDaily (Sep. 9, 2008) — Researchers in Norway report that injecting a special type of seawater called "smart water" into certain low-yield oil wells may help boost oil extraction by as much as 60 percent. The study could help meet rising energy demands and provide consumers with some financial relief at the gas pump in the future, the scientists suggest.

In the new study, Tor Austad and colleagues note that more than 50 percent of the world's oil reserves — billions of gallons of oil — are trapped in oil reservoirs composed of calcium carbonate, rocks that include chalk and limestone.

Scientists now inject seawater into chalk-based oil wells to boost oil extraction, but researchers do not know if the method will work for oil wells composed of limestone, a tough material known for its low oil-recovery rates — usually less than 30 percent, but in some cases less than 5 percent.

To find out, the scientists collected core samples from Middle East oil reservoirs composed of limestone and soaked them in crude oil for several weeks. They then prepared batches of so-called "smart water," seawater formulated with sulfate and other substances to improve seawater's ability to penetrate limestone. In laboratory studies, they showed that irrigating the limestone samples with "smart water" led to the same fundamental chemical reactions that occur in chalk. Upcoming experiments will verify if the efficiency in oil recovery is comparable to the observations in chalk, the scientists note.

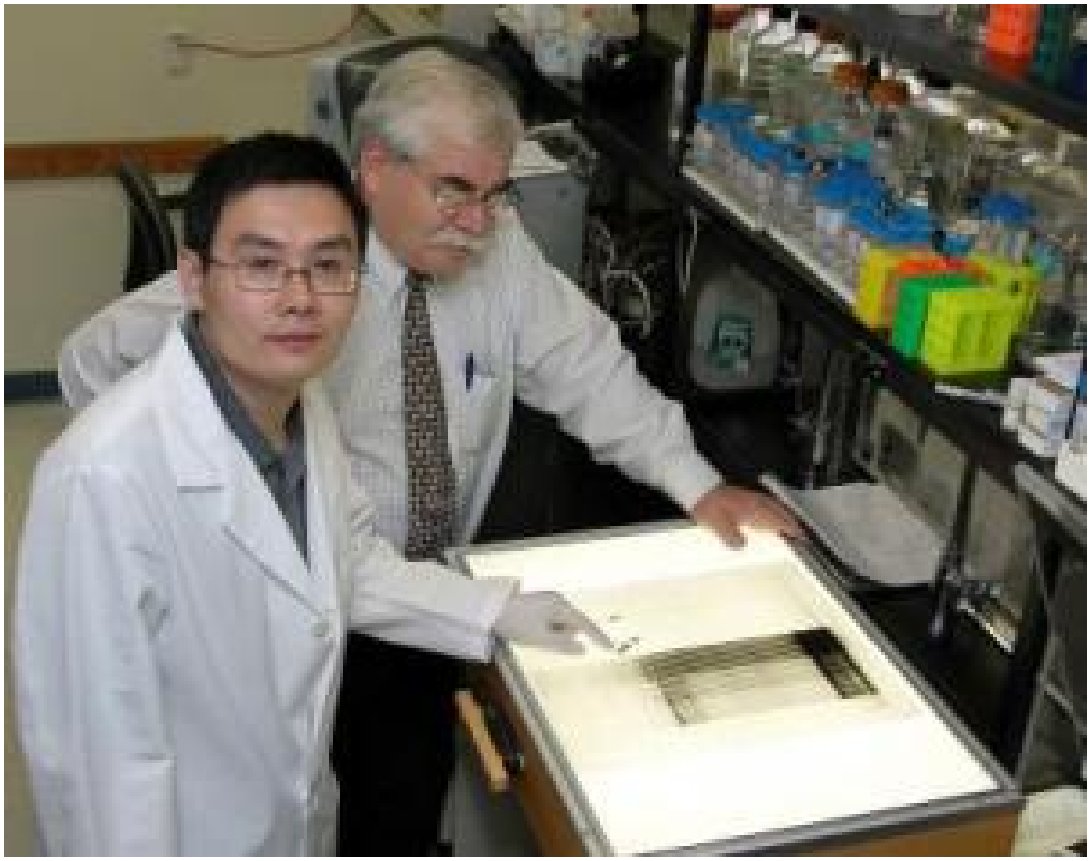
Journal reference:

1. Strand et al. **"Smart Water" for Oil Recovery from Fractured Limestone**. *Energy & Fuels*, 2008; 0 (0): 0 DOI: 10.1021/ef800062n

Adapted from materials provided by American Chemical Society.

http://www.sciencedaily.com/releases/2008/09/080908102811.htm

Discovery Challenges Fundamental Tenet Of Cancer Biology



Hui Li and Jeffrey Sklar identify unexpected chimeras in normal uterine tissue. (Credit: Henderson/Yale)

ScienceDaily (Sep. 9, 2008) — Yale researchers have identified an unusual molecular process in normal tissues that causes RNA molecules produced from separate genes to be clipped and stitched together.

The discovery that these rearranged products exist in normal as well as cancerous cells potentially complicates the diagnosis of some cancers and raises the possibility that anti-cancer drugs like Gleevec could have predictable side effects.

"Our findings are surprising because we identified in normal cells certain types of gene products— so called chimeric RNAs and proteins—thought to be found only in cancerous cells or in cells on their way to becoming cancerous," said Jeffrey Sklar, professor of pathology and laboratory medicine at Yale School of Medicine, and senior researcher on the study.

Chimeric proteins are considered to be key factors that drive many forms of cancer. They arise from chromosome abnormalities in which segments of the chromosomes are rearranged. At the sites where chromosome segments reattach, genes fuse giving rise to chimeric RNA, which in turn is used to construct the chimeric protein. Gleevec, a highly successful new anti-cancer drug, was developed to target the chimeric protein product of one such gene fusion.

Sklar's group earlier discovered that a particular gene fusion, with its associated chimeric RNA and protein, is the probable cause of certain endometrial cancers. Unexpectedly, they also found the same

chimeric RNA and protein in healthy uterine tissue — where the chromosomes and genes showed no abnormalities.

"Extensive experiments on the normal tissues and cultured cells from those tissues indicated to us that a previously little-known process, the direct splicing together of two RNAs from separate genes—or trans-splicing—is responsible for producing the chimeras," said Sklar.

They also found that level of the chimeric molecules in normal cells was decreased by elevated estrogen and increased by reduced oxygen — conditions that control the synchronized cyclic behavior of normal cells that line the inside of the uterus.

These observations suggest that trans-splicing between the RNAs might be common in other normal tissues, because gene fusions have been identified in cancers that arise in many tissues.

"These findings may bring new insights into how cancers operate. It seems that rather than scrambling chromosomes to invent new genes, cancers mimic normal cellular processes, but in an exaggerated and unregulated fashion. You might say that cancers are clever but not very original," said Yale Research scientist Hui Li, lead author of the paper.

According to the researchers, these results indicate that caution should be exercised in using chimeric gene products as markers for cancer, as is widely done now in cancer diagnosis. Additionally, cancer drugs that target products of chromosomal abnormalities may have varying degrees of toxicity because those same targets may be present in normal cells due to the trans-splicing of RNA.

Other authors on the paper are Jinlang Wang and Gil Mor, also from the Yale School of Medicine. Sklar, who is Director of the Molecular Diagnostics Program at Yale, and Mor are members of the Yale Cancer Center. Funds for the research were from the National Cancer Institute and a generous gift from the Burnstein-Turnbull family.

Citation: Science (September 5, 2008)

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

http://www.sciencedaily.com/releases/2008/09/080904145200.htm

Do No Harm To Humans: Real-life Robots Obey Asimov's Laws

ScienceDaily (Sep. 9, 2008) — European researchers have developed technology enabling robots to obey Asimov's golden rules of robotics: to do no harm to humans and to obey them.

Issac Asimov, widely regarded as the spiritual father of science fiction, outlined three rules that all robots in his future worlds must obey. The most important two were: a robot may not injure a human being or, through inaction, allow a human being to come to harm; and a robot must obey orders given to it by human beings, except where such orders would conflict with the First Law.

However, robotics in the real world has trouble striking a workable balance between these two requirements. Robots can perform tasks efficiently in controlled environments away from humans, or they can interact with humans if properly equipped with sensors to avoid any harm. But that degree of 'sensing' also creates complexity and a lack of robustness to hardware and software failures which, in turn, affects safety. Of course, robots could be safe if they move slowly enough, or work far away enough from humans – but then, their dexterity and effectiveness are dramatically reduced.

"Despite the scenarios science fiction has been depicting for decades of concrete human-robot interactions, we are still a long way from that reality," says Antonio Bicchi of the University of Pisa's Faculty of Engineering. "Most robots today can only work safely if segregated from humans, or if they move very slowly. The trade-off between safety and performance is the name of the game in physical human-machine interactions."

Building solid 'Phriendships'

Bicchi coordinates the EU-funded Phriends project to create a new generation of robots which is both intrinsically safe and versatile enough to interact with humans. "The most revolutionary and challenging feature of Phriends is designing and building robots capable of guaranteeing safety in physical human-robot interactions (pHRI)," the robotics specialist explains.

For Phriends, safety means ensuring no accidents occur, even in the event of programming bugs, sensor glitches, or hardware and software failure. But creating a robot that is both completely safe and can perform useful functions requires what Bicchi calls a "paradigm shift" in approach.

This involved going back to the drawing board and rethinking how robots are designed and function. "The classical robotics approach is to design and build robots with a specific task in mind," Bicchi notes. "The robots developed by Phriends will be intrinsically safe, since the safety is guaranteed by their very physical structure, and not by external sensors or algorithms that can fail."

The project has worked on developing new actuators – the devices which move and control the robot – concepts and prototypes; new dependable algorithms for supervision and planning; as well as new control algorithms for handling safe human-robot physical interactions. These components are then integrated into functionally meaningful subsystems, and evaluated and tested empirically. The project is also contributing to ongoing international efforts to establish new standards for collaborative human-robot operation.

Building self-awareness into robotic limbs.

Flexing design muscle

Before we get carried away at the idea of having android friends and colleagues working beside us at the office or even at home, it should be pointed out that Phriends is taking what could be described as a one limb at a time approach.

The project's main focus is on robot arms and the partners have turned to nature for inspiration in developing a prototype Variable Stiffness Actuator (VSA). Just as human and animal muscles move in opposite directions to move limbs, the VSA achieves simultaneous control of the robot arm by using two motors antagonistically to manipulate a non-linear spring which acts as an elastic transmission between each of the motors and the moving part.One of the Phriends partners, the E Piaggio Centre for Robotics and Bioengineering at the University of Pisa (IT) has developed a second version of the VSA which uses a more sophisticated antagonistic concept to move robot joints directly.

"This approach makes the robot arm lighter because its structure is 'soft' when the robot moves fast and can collide with humans, and it becomes 'hard', or tensed, when performing tasks requiring precision," describes Bicchi.

Crash courses in safety

Phriends, which received more than €2 million in funding from the EU's Sixth Framework Programme for research, has followed both a proactive and reactive approach to accidents. It has designed its robots to anticipate potential collisions with humans and avoid them. But in the unpredictable world we live in accidents will happen, and collisions may occur anywhere along the arm.Two of the project's partners – DLR in Germany and the University of Rome in Italy – have developed an ingenious solution which, like humans, relies on 'proprioception' to determine the relative position of neighbouring components using special sensors. Such 'self-awareness' enables the robot to react promptly to collisions or crashes and resume safe operations.

But even a rapid correction may be no good if the robot is heavy and solid, as industrial arms traditionally are. Phriends has explored a number of ways to make impacts gentler, including lightweight robot design, soft visco-elastic covering on the links, and mechanically decoupling the heavy motor inertia from the link inertia.

Shockingly complex simplicity

In the greater scheme of things, Phriends is one small step for robotics, but one massive leap for pHRI. "The real challenge for the future of robotics is not to do something shockingly complex, but to do even simple things in a way that is safe, dependable, and acceptable to ordinary people, thus making human-robot coexistence possible," remarks Bicchi. "The economic impact of safe and dependable robots in manufacturing is huge in terms of simplifying plant layouts, increasing the productivity of workers and machines, and for overall competitiveness."The project has already elicited industry interest. Germany's Kuka Robotics is a partner in Phriends. Kuka will release a new robot arm in 2008 which incorporates some features developed by Phriends.

Outside the EU, companies in Japan and South Korea, which are also working on similar technologies, have contacted Phriends requesting their assistance in developing new technologies and products.

The technology the project has developed also has potential applications in other fields, including in sports training and physical rehabilitation.

Adapted from materials provided by ICT Results.

http://www.sciencedaily.com/releases/2008/09/080908201841.htm

Urbanization Reconfigures Surface Hydrology

Tempe Arizona skyline at night. One of the most profound impacts of urbanization is the "reconfiguration of surface hydrology." (Credit: iStockphoto/Chris Curtis)

ScienceDaily (Sep. 9, 2008) — Amidst the semi-arid stretches of Phoenix, a visitor might blink twice at the sight of a sailboat cutting across the horizon.Tempe Town Lake, on the northern edge of Arizona State University (ASU), is just one of a multitude of lakes, small ponds, canals and dams combining flood control, water delivery, recreational opportunities and aesthetics, and altering perception of water availability and economics in the area.What are the consequences of such human-made tinkering with land cover and hydrology on surrounding native ecosystems and biodiversity? This question forms the backdrop for a case study proffered by an ASU research team and published in the journal BioScience, which found that one of the most profound impacts of urbanization is the "reconfiguration of surface hydrology."Lead author John Roach, now with Simbiotic Software in Missoula, Mont., ASU professors Nancy Grimm and J. Ramon Arrowsmith and other former graduate students mapped water resources and connectivity and tracked land-use change in the Indian Bend Watershed (IBW). The researchers, associated with the Central Arizona-Phoenix Long Term Ecological Research project (CAP-LTER) and the Integrative Graduate Education and Research Training (IGERT) in Urban Ecology funded by the National Science Foundation, found that construction of artificial lakes and canal systems along with extensive groundwater pumping have had "unintended impacts on nutrient cycling."

"As Phoenix grew from a small settlement to the large urban center it is today, it built an extensive canal network to bring water from the Salt, Verde, and Colorado rivers to agricultural fields and city taps," says Roach. "While these canals enabled farmers to grow crops in the desert, they also cut across stream channels, disrupting the flow of water and sediments from tributary networks to the main channel. In pristine streams, sandbars and other patches created where these sediments collect are often ideal places for nutrient cycling. By starving streams of their historic supply of this material, canals accidentally alter the way nutrients are cycled in stream ecosystems."Humans have altered water systems in the Phoenix area as far back as 300 B.C. The Hohokam people constructed an extensive series of canals for irrigation

in the region (until 1450 AD). A new group of settlers arrived in the 1860s and immediately began building "ditches" or simple irrigation canals. Construction continued through the 1900's as dams were built to harness the Salt and Verde rivers and the canal system was expanded to bring more land under cultivation. As the area became more urban, flood control became more important, necessitating construction of the Indian Bend Wash greenbelt, one of the first non-structural flood management structures in the United States. These activities altered surface water availability, dramatically increasing the timing and spatial distribution of stream flow.

"Prior to these alterations, channel systems like those of Indian Bend Wash were ephemeral, storm precipitation-driven systems with only a limited connection to the groundwater (via loss from the channel bed)," notes Ramon Arrowsmith, professor with School of Earth and Space Exploration in ASU's College of Liberal Arts and Sciences. "Now, the surface and subsurface hydrologic network is short circuited with water entering the channel from well and canal sources, and water leaving by important evaporation, seepage, and canal redirection."The authors emphasize how modern urban water systems shatter any limitations imposed by the topographic contours of a region. The Central Arizona Project cuts a blue swatch across the Sonoran Desert and subdivides watersheds, to deliver a reported 1.7 × 109 m3 per year (or 1.5 million acre-feet) of surface water to the area. In addition, the pumping of ground water has dropped the water table 90 meters and connected surface and subsurface flows, "not only increasing the spatial and temporal availability of water, but having the unintended effect of increasing the flux of NO3 through urban waterways by returning nitrogen leached from historic fertilizer applications to surface flows."

One concern is the potential impact on riparian species, the "integrity of native ecosystems and the continued delivery of goods and services from these ecosystems."Streams in deserts are often overlooked in their importance because of their ephemeral nature; however, streams in general have been shown to be critical to the removal of excess nitrogen from agricultural fields and waste water run-off from urban areas. Denitrification, a bacterially-mediated process, converts nitrate to nitrogen gas, which then is released harmlessly to the atmosphere. High nitrogen loads from urban areas can overwhelm streams' capacity to remove nitrates and the resulting pollution of downstream rivers has been linked to the proliferation of coastal dead zones."We were surprised by how frequently the concentration of nitrate in surface waters was determined by the turning of a tap," Roach notes. "Because the groundwater below the greater Phoenix ecosystem contains a lot of nitrate, when groundwater wells are tuned on, the concentration of nitrate in the canals and streams receiving this water goes up. This nitrogen, in turn, can act as fertilizer, stimulating unwanted growth and producing changes in what the stream looks like that are independent of the decision to deliver more water to city lawns."

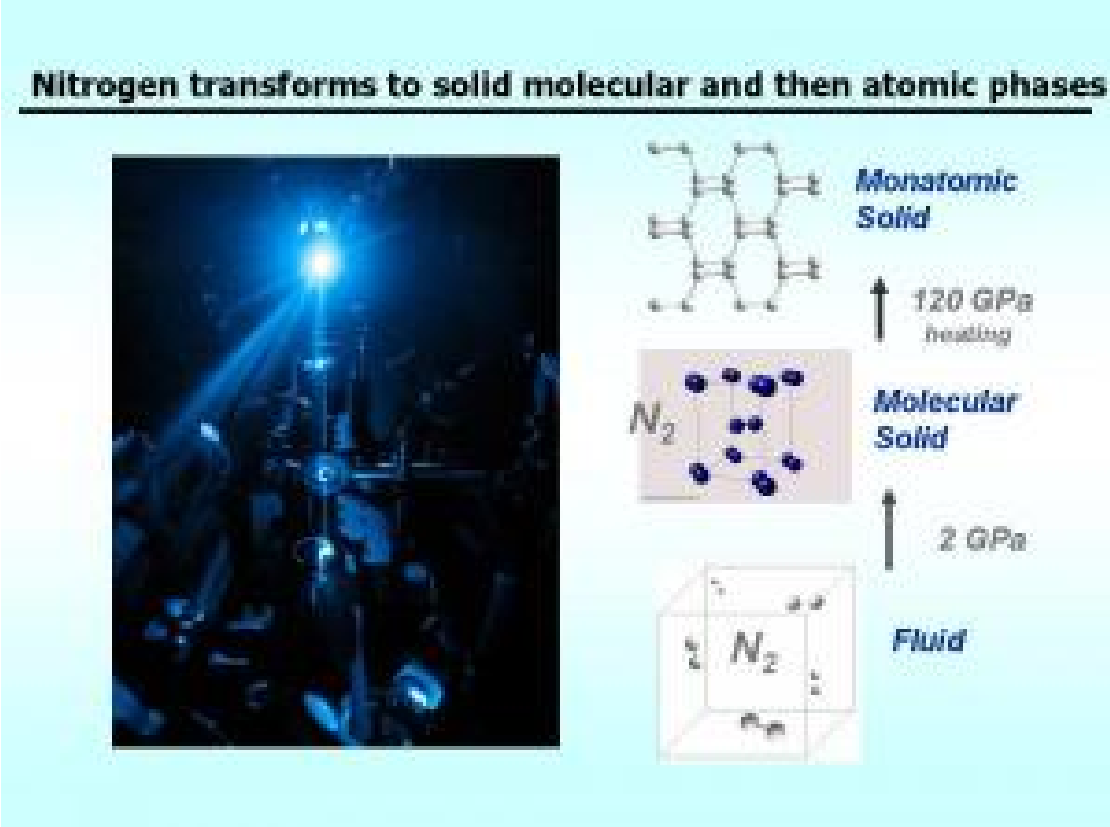
The present study underscores the importance of understanding the structure and function of natural streams and arid ecosystems and how they are impacted by human-altered systems, water distribution and design. The authors point out that the unintended consequences "must be carefully evaluated – especially in arid and semiarid cities – if managers are to have any hope of mitigating them."

Grimm, a professor in the School of Life Sciences and member of the Global Institute of Sustainability at ASU, sums their study up: "Our findings contribute to answering the more general question of how fundamental ecosystem services – those processes of ecosystems that provide a natural resource or regulate properties of the resource, for example – change when people make large alterations to streams during the course of urban development. Perhaps our case study will help define how to best design such ecosystems to meet the need to provide multiple services – in this case, protection from flooding, recreation, and regulation of nutrient concentrations reaching downstream systems."

Adapted from materials provided by Arizona State University.

http://www.sciencedaily.com/releases/2008/09/080903134327.htm

Putting The Squeeze On Nitrogen For High Energy Materials



Left: Raman-laser heating setup for experiment; blue laser was used to interrogate the nitrogen sample at high pressures and temperatures in a diamond anvil cell (photo courtesy of Seth King). Right: schematic of nitrogen transformations under pressure. (Credit: Carnegie Institution)

ScienceDaily (Sep. 9, 2008) — Nitrogen atoms like to travel in pairs, hooked together by one of the strongest chemical bonds in nature. By subjecting nitrogen molecules to extreme temperatures and pressures scientists are getting a new understanding of not only nitrogen but other similar molecules, including hydrogen.

In the current online edition of Physical Review Letters, researchers from the Carnegie Institution's Geophysical Laboratory report changes in the melting temperature of solid nitrogen at pressures up to 120 gigapascals (more than a million atmospheres) and temperatures reaching 2,500° Kelvin (more than 4000° Fahrenheit). These results, plus observed changes in the structure of solid nitrogen at high pressures, could lead to new high energy nitrogen- or hydrogen-based fuels in the future. Hypothesized nitrogen polymers could form materials with higher energy content than any known non-nuclear material.

Alexander Goncharov, Viktor Struzhkin, and Russell Hemley from Carnegie, with Jonathan Crowhurst from Lawrence Livermore National Laboratory, compressed liquid nitrogen in a device known as a diamond anvil cell, which generates ultrahigh pressures by squeezing a sample between two gem-quality diamonds. Because the diamonds are transparent to most wavelengths of light, the sample can be heated by a laser during the experiment. A technique called Raman spectroscopy uses light emitted by the heated sample to analyze changes in the sample's molecular structure as they occur.

"Until now, no one had made these kinds of in situ observations of nitrogen at such extreme temperatures and pressures," says Goncharov. "Our measurements of the melting line and the vibration properties of the fluid indicated by the Raman spectroscopy give us a very clear picture of how nitrogen and its molecular bonds respond under these conditions."

A chart of the temperatures and pressures at which a substance changes from one phase to another (from liquid to gas, from one crystal structure to another, and so on) is called a phase diagram. For nitrogen, as well as most other materials, the high temperature and pressure regions of the phase diagram are relatively unexplored territories. Researchers hope that these unexplored regions may harbor new materials with useful properties.

At room temperature and atmospheric pressure, nitrogen is a gas, but it can be cooled and compressed to form a liquid or a solid, depending on the temperature and pressure. Even as it changes phases, however, the nitrogen remains a two atom (diatomic) molecule, held together by a strong—and energy rich—triple bond.

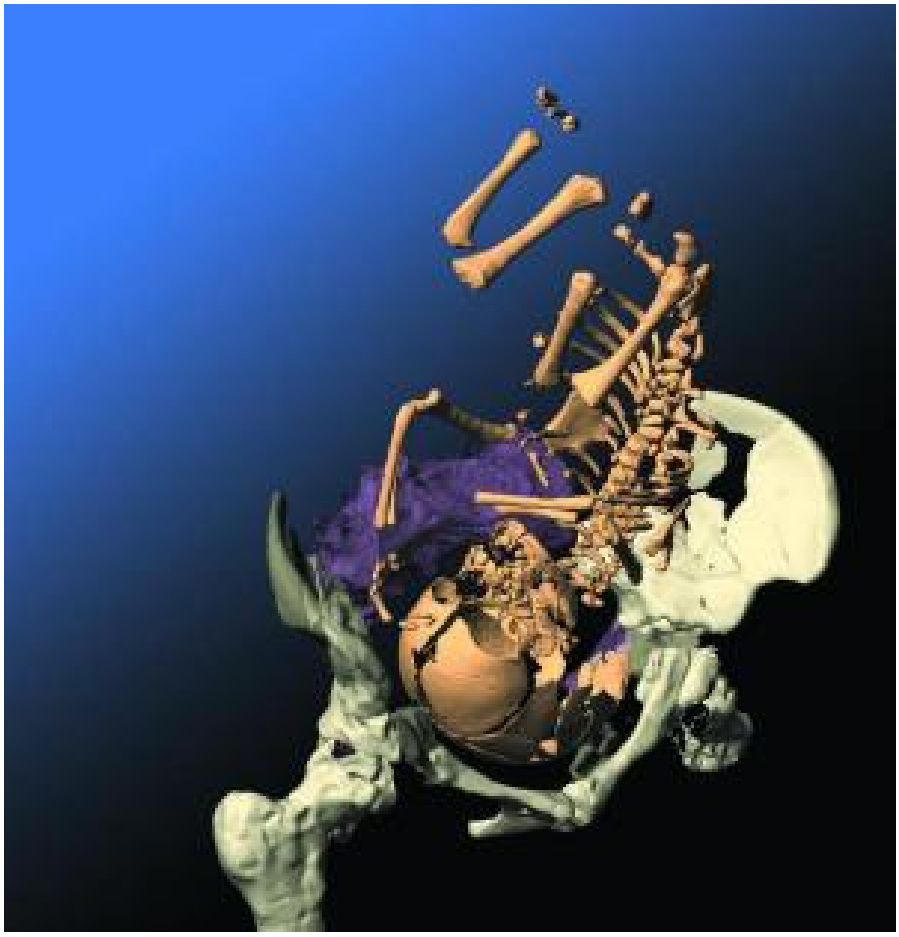
"Nitrogen compounds tend to be high energy density materials," says Goncharov. "Pure nitrogen can be a powerful fuel or explosive if one can figure out how to associate nitrogen atoms in a material other than as a triple-bonded diatomic molecule. Recent experiments have shown that nitrogen transforms to nonmolecular single-bonded phases at very high pressure. These could serve as high energy density materials if preserved on a return to ambient pressure. Our results will help show the way to synthesize these materials at less extreme conditions."

Filling the gaps in nitrogen's phase diagram has implications for the study of other critical materials, say Goncharov. "Nitrogen is an archetypal diatomic molecule. Knowledge of its phase diagram and other properties gives a hint about the behavior of other diatomics, among which is hydrogen. Many key transformations and other phenomena occur in nitrogen at much lower pressures than in hydrogen," he says. "Hydrogen is a fuel for the future. It is theorized to have fascinating properties under high pressure, including transformation to metallic, superconducting and superfluid states. Whether the materials with such properties can be recovered and stabilized at ambient pressure remains an open question. But with nitrogen, we are moving ahead quickly. "

Adapted from materials provided by Carnegie Institution.

http://www.sciencedaily.com/releases/2008/09/080903134318.htm

Childbirth Was Already Difficult For Neanderthals



Neanderthals had a brain at birth of a similar size to that of modern-day babies. (Credit: Ch. Zollikofer, courtesy of University of Zurich)

ScienceDaily (Sep. 9, 2008) — Neanderthals had a brain at birth of a similar size to that of modern-day babies. However, after birth, their brain grew more quickly than it does for Homo sapiens and became larger too. Nevertheless, the individual lifespan ran just as slowly as it does for modern human beings.

These new insights into the history of human evolution are being presented in the journal Proceedings of the National Academy of Sciences, by researchers from the University of Zurich.

Dr. Marcia Ponce de León and Prof. Christoph Zollikofer from the Anthropological Institute of the University of Zurich examined the birth and the brain development of a newborn Neanderthal baby from the Mezmaiskaya Cave in the Crimea. That Neanderthal child, which died shortly after it was born, was evidently buried with such care that it was able to be recovered in good condition from the cave sediments of the Ice Age after resting for approximately 40,000 years.

The only well-preserved find of a fossil newborn known to date provides new information on how, in the course of evolution, the very special kind of individual human development has crystallised. Dr. Marcia Ponce de León and Prof. Zollikofer reconstructed the skeleton on the computer from 141 individual parts. They discovered that the brain at the time of birth was of exactly the same size as a typical human

newborn. It had a volume of about 400 cubic centimetres. However, the skeleton was considerably more robustly formed than that of a modern human newborn.

In order to clarify whether the head of a Neanderthal newborn baby, like today's human, still fits through the birth canal of the mother's pelvis, they reconstructed a female Neanderthal pelvis which had already been found in the 1930s. This enabled the process of birth to be simulated. The computer reconstruction shows that the birth canal of this woman was wider than that of a Homo sapiens mother, but the head of the Neanderthal newborn was somewhat longer than that of a human newborn because of its relatively robust face.

This meant that for the Neanderthals, the birth was probably about as difficult as it is for our own race. "The brain size of a newborn of 400 cubic centimetres is probably an evolutionary birth limit which had already been reached with the last common ancestors of human beings and Neanderthals" concludes Zollikofer. "That would mean that for the last 500,000 years, we have been paying a high evolutionary price in the form of birth problems for our large brain."

To study the development after birth, the researchers examined not only the Mezmaiskaya newborn but also other Neanderthal children up to an age of approximately 4. It is astonishing that the Neanderthal brain grew even more quickly during childhood than that of Homo sapiens. Until now, one has assumed that the consequence of rapid growth was a shorter lifespan and high mortality under the motto of "live fast – die young." However, the new studies show that the Neanderthal brain indeed grew more quickly than our own, but on average, a larger volume had to be reached in adult age. The duration of brain growth is therefore the same for both kinds of human being.

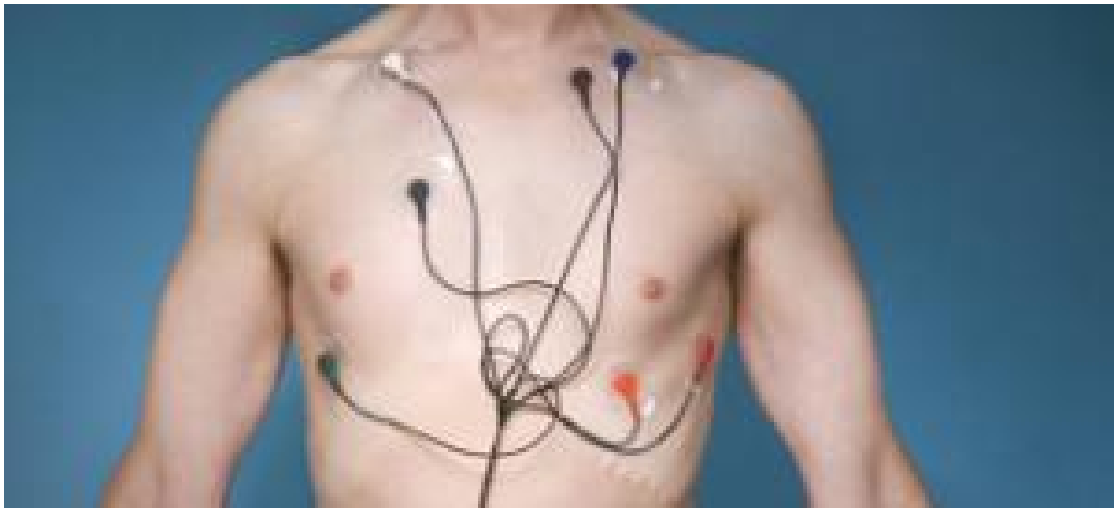
The large brain brought consequences for the life history (pregnancy, puberty, life expectancy) of the Neanderthals. For children to develop a large brain in a short space of time, they need additional energy and nutrition from the mothers. The only mothers capable of providing this were those who had developed the necessary constitution themselves. They therefore had their first child a little later. If one now compares the entire life history of an average Neanderthal with that of a modern human being, a picture emerges which deviates significantly from existing doctrine: the development of the Neanderthals was just as slow as that of modern people, if not even a little slower.

Despite major physical differences between modern man and the Neanderthal since birth, both types actually obey the same restrictions which are forced upon us by the laws of physiology, development and evolution. "As far as birth, development of the brain and life history are concerned, we are astonishingly similar to each other", says Dr. Ponce de León.

Adapted from materials provided by University of Zurich.

http://www.sciencedaily.com/releases/2008/09/080908203013.htm

Early Warning System For Cardiac Patients For Home Use



The HEART GUARD allows people with coronary heart disease or who are at risk of it to monitor their heart activity as they go about daily life and alerts them if there are any abnormalities. (Credit: Image courtesy of Eureka)

ScienceDaily (Sep. 9, 2008) — Heart disease is the number one cause of death in Europe and early diagnosis is essential to save lives. Monitoring the heart's rhythm and electrical activity in real time using an electrocardiogram (ECG) provides vital information about abnormalities and gives clues to the nature of a problem.

Some cardiac conditions need long-term monitoring — inconvenient for patients as it requires them to be away from their everyday environment for indeterminate periods of time.

Six years ago, Latvian company Integris Ltd, a specialist in the development of mobile wireless telemedicine ECG recording devices, came up with the concept of an inexpensive, real-time heart activity monitor for personal use. Initially, the wireless technologies available were not a practical option for the device Integris had in mind, but when hybrid chips came onto the market EUREKA project E! 3489 HEART GUARD was born.

The HEART GUARD system comprises a lightweight, simple to use, matchbox-size device with five electrodes that are strategically placed on the wearer's chest. The wireless device transmits data in real time directly to the patient's pocket computer or desktop PC for instant interpretation by the system's unique software. The low-cost device is discreet enough to be worn 24 hours a day, recording, analysing and reporting not only the rhythm and electrical activity of a patient's heart but also his physical activity and body positions, as they go about their daily life.

'Effectively, it is an early warning system,' explains Juris Lauznis, Director of Integris, the project's lead partner. 'If HEART GUARD detects a problem, patients are alerted by means of vibration or a buzzer, prompting them to check their PC for further information and advice. At the very least, the device will help to monitor and manage a patient's condition – and it could even save a life.'

Currently HEART GUARD is being developed for home use only, with patients monitoring their own condition and only contacting a doctor or hospital if the system identifies a cause for concern. HEART GUARD also has applications in a number of other areas, including telemedicine, sports medicine, patient

rehabilitation following cardiac surgery or a heart attack and as a low-cost ECG monitoring system in hospitals and clinics with limited budgets.

With the 30-month project completed and clinical trials of the prototype successfully concluded by Kaunas Medical University's Institute of Cardiology, the Lithuania Academy of Physical Education and the Research Institute of Cardiology at the University of Latvia, the next steps are to satisfy the EU's strict compliance requirements for medical devices and then source a company to manufacture and distribute the system. If successful, the first commercial HEART GUARD devices could be on the market and saving lives by the end of 2008 or early 2009.

Adapted from materials provided by Eureka.

http://www.sciencedaily.com/releases/2008/09/080903101418.htm

On the Far Shores of Invention

By NICOLAI OUROUSSOFF

SOME of us are overfond of complaining about the big money that drives new architecture today. The theoretical designs that once served as a critical commentary on the professional mainstream have all but dried up. Architects who once flaunted their radical credentials now work almost exclusively for giant corporations and nouveau-riche clients. But take heart. There is evidence that serious architecture is still being made, some of it even in New York. Here are a few highlights of the coming season; the best of them reflect the spirit of inventiveness that has distinguished great architecture since the first primitive shed.

The decision by the Museum of Arts and Design to renovate Edward Durell Stone's building at 2 Columbus Circle in Manhattan set off a furious preservation battle. Described as a "die-cut Venetian palazzo on lollipops" by the architecture critic Ada Louise Huxtable when it opened in 1964, the original building was derided as the height of tackiness but later celebrated as a bridge to postmodernism. A redesign by Allied Works Architecture of Seattle that opens to the public on Sept. 27 is intended to create a new home with adequate exhibition space for the museum's collections and to lend the building a more contemporary flair. Now, after the long angry debate, the public will be able to judge.

Renzo Piano seems to be building everywhere these days, and some argue that the steep rise in the number of commissions he accepts has coincided with a decline in the quality of his work. But his California Academy of Sciences in San Francisco, which opens Sept. 27, is likely to remind us why this cultivated architect remains a darling of the art world. Enveloped within the lushness of Golden Gate Park, the building's razor-thin roof, supported on delicate steel columns, is carpeted with a lush garden. It promises to be an enchanting counterpoint to Herzog & de Meuron's M. H. de Young Museum, which opened nearby in 2005.

''Tulou: Affordable Housing for China,'' a show opening on Oct. 3 at the Cooper-Hewitt National Design Museum in Manhattan, focuses on a low-income housing prototype designed by Urbanus of Shenzhen, one of China's most talented young architecture firms. Inspired by the traditional fortified compounds found in the mountains of southwestern China, the cylindrical housing complexes would be inserted into odd leftover lots that are a byproduct of the country's frantic urban growth. The aim, the architects say, is to instill a sense of community among the poor migrant workers who are the most neglected segment of Chinese society.

For many Modernists glass was not only an expression of the coming machine age but also a mystical substance that would cleanse society of physical, psychological and moral impurities. ‘‘Toplight: Roof Transparencies From 1760 to 1960,” opening on Oct. 23 at the Canadian Center for Architecture in Montreal, revisits some of the most triumphant expressions of that dream, including the 19th-century shopping arcades in Paris, Joseph Paxton’s Crystal Palace in London and James Stirling’s Faculty of History building at Cambridge University.

Steven Holl’s Linked Hybrid residential towers in Beijing, connected by an irregular pattern of enclosed bridges, are conceived as an antidote to the soulless gated communities that are choking the life out of many Asian cities. Enclosing bars, cafes, viewing decks and a swimming pool, the glass bridges will function as an elevated urban street. The towers, which are to be completed later this year, frame enormous portals at ground level, allowing the surrounding city to flow through the site. The result is a richly embroidered three-dimensional city that reflects Beijing’s diversity and reconfirms China’s place at the forefront of architectural experimentation.

Frank Gehry’s Art Gallery of Ontario, to open on Nov. 14, is his first building in Toronto, the city of his birth. Mr. Gehry remodeled the museum’s interior, polishing up the old galleries and adding new galleries for contemporary art in the back. But he saved the fireworks for the facade: a blocklong curvaceous glass screen supported on steel trusses.

At 91 I. M. Pei rarely takes on major commissions anymore, preferring to pass them on to his firm’s younger partners. But the Museum of Islamic Art in Doha, Qatar, which opens on Nov. 22, seems to have been too great a temptation to resist: a cultural monument on its own island in the Arabian Gulf. Mr. Pei has created a composition of imposing geometric forms that enclose a light-filled interior. With its soaring interior dome, the museum is also a thoughtful balance of Eastern and Western traditions, and as such reaches back to a time when the two were intimately intertwined.

http://www.nytimes.com/2008/09/07/arts/design/07ouro.html?ref=arts

Shun meat, says UN climate chief

By Richard Black
Environment correspondent, BBC News website

People should consider eating less meat as a way of combating global warming, says the UN's top climate scientist.

Rajendra Pachauri, who chairs the Intergovernmental Panel on Climate Change (IPCC), will make the call at a speech in London on Monday evening.

UN figures suggest that meat production puts more greenhouse gases into the atmosphere than transport.

But a spokeswoman for the UK's National Farmers' Union (NFU) said methane emissions from farms were declining.

> **People may not realise that changing what's on their plate could have an even bigger effect**
> Joyce D'Silva
> Compassion in World Farming

Dr Pachauri has just been re-appointed for a second six-year term as chairman of the Nobel Prize-winning IPCC, the body that collates and evaluates climate data for the world's governments.

"The UN Food and Agriculture Organization (FAO) has estimated that direct emissions from meat production account for about 18% of the world's total greenhouse gas emissions," he told BBC News.

"So I want to highlight the fact that among options for mitigating climate change, changing diets is something one should consider."

Climate of persuasion

The FAO figure of 18% includes greenhouse gases released in every part of the meat production cycle - clearing forested land, making and transporting fertiliser, burning fossil fuels in farm vehicles, and the front and rear end emissions of cattle and sheep.

The contributions of the three main greenhouse gases - carbon dioxide, methane and nitrous oxide - are roughly equivalent, the FAO calculates.

Transport, by contrast, accounts for just 13% of humankind's greenhouse gas footprint, according to the IPCC.

Dr Pachauri will be speaking at a meeting organised by Compassion in World Farming (CIWF), whose main reason for suggesting people lower their consumption of meat is to reduce the number of animals in factory farms.

CIWF's ambassador Joyce D'Silva said that thinking about climate change could spur people to change their habits. "The climate change angle could be quite persuasive," she said.

"Surveys show people are anxious about their personal carbon footprints and cutting back on car journeys and so on; but they may not realise that changing what's on their plate could have an even bigger effect."

Side benefits

There are various possibilities for reducing the greenhouse gas emissions associated with farming animals. They range from scientific approaches, such as genetically engineering strains of cattle that produce less methane flatus, to reducing the amount of transport involved through eating locally reared animals.

"The NFU is committed to ensuring farming is part of the solution to climate change, rather than being part of the problem," an NFU spokeswoman told BBC News.

"We strongly support research aimed at reducing methane emissions from livestock farming by, for example, changing diets and using anaerobic digestion."

Methane emissions from UK farms have fallen by 13% since 1990. But the biggest source globally of carbon dioxide from meat production is land clearance, particularly of tropical forest, which is set to continue as long as demand for meat rises.

Ms D'Silva believes that governments negotiating a successor to the Kyoto Protocol ought to take these factors into account. "I would like governments to set targets for reduction in meat production and consumption," she said. "That's something that should probably happen at a global level as part of a negotiated climate change treaty, and it would be done fairly, so that people with little meat at the moment such as in sub-Saharan Africa would be able to eat more, and we in the west would eat less."

Dr Pachauri, however, sees it more as an issue of personal choice.

"I'm not in favour of mandating things like this, but if there were a (global) price on carbon perhaps the price of meat would go up and people would eat less," he said.

"But if we're honest, less meat is also good for the health, and would also at the same time reduce emissions of greenhouse gases."

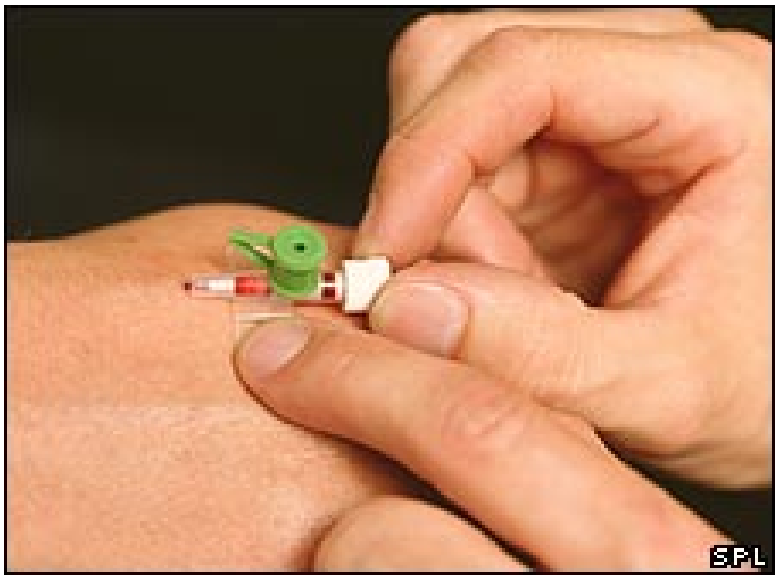
Richard.Black-INTERNET@bbc.co.uk

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/science/nature/7600005.stm

Published: 2008/09/07 02:10:24 GMT

Vein tubes 'fitted needlessly'

A third of patients have unnecessary tubes inserted into veins when they are in hospital, pharmacists have warned.



Researchers from Aberdeen's Robert Gordon University said this needlessly exposed them to serious complications, such as infections and blood clots.

Just under 350 patients were studied over six weeks, the majority of whom had the tubes, called cannulas, fitted.

An A&E expert recognised cannulas should be used less frequently and for shorter periods.

It's entirely reasonable to look at their use
Dr Martin Shalley, emergency medicine consultant

The study was presented to the British Pharmaceutical Conference in Manchester.

Cannulas - hollow plastic tubes with a needle at the tip which cost around £1.70 each - are used to give medication and fluids to people who cannot swallow because they are unconscious or being given nil by mouth, and it has been estimated that around 80% of hospital patients have them fitted.

Drugs may also be more easily absorbed if given this way.

But potential complications include problems with veins (phlebitis), drugs leaking into tissues around the site of the tube, serious infection and blood clots.

'Common practice'

Of the patients studied - who were all treated in the acute medical assessment unit of Aberdeen Royal Infirmary, 91% of patients had a cannula inserted. But 28% of the tubes were never used.

The researchers also found that in 71% of patient records there was no documentation of a cannula being inserted, while in 57% there was no documentation of it being removed.

Four patients had developed blood poisoning, which infection control specialists said was likely to be linked to the cannula.

The researchers, led by Dr Yash Kumarasamy, said that in many UK hospitals, it has become common practice to insert an intravenous cannula when the patient is admitted, irrespective of need.

He said: "We would like to see the introduction of a formal procedure under which hospital pharmacists review patients and their medications and make recommendations to the treatment team about whether or not a cannula is needed."

Dr Martin Shalley, a former president of the British Association of Emergency Medicine, agreed there had been an over-reliance on cannula use.

He said many trusts had policies saying cannulas had to be removed after 72 hours

"It used to be a knee-jerk response to insert a cannula - but we now recognise there's a need to think if fitting one is a benefit for that patient.

"It's entirely reasonable to look at their use. That's the case in A&E medicine and across acute medicine too."

And Dr Shalley said he thought the level of use of cannulas had increased the level of hospital-acquired infections such as MRSA.

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/7600002.stm

Published: 2008/09/07 00:07:41 GMT

Young 'ignorant on mental health'

Experts are concerned about lack of awareness

Almost half of all schoolchildren cannot name a single mental health condition, a study of 500 young people has found.

And fewer than half of those surveyed felt that schools provided enough information about mental health, a third preferred to trust the internet.

Great Ormond Street Hospital conducted the poll. It is launching its own child mental health information website.

A spokesman said the results were "worrying and surprising".

> **This ignorance is probably one of the reasons why for too long now there has been a stigma attached to living with a mental health condition**
> Dr John Goldin
> Great Ormond Street Hospital

Mental health problems are far from rare in the young - between one in 12 and one in 15 children and teenagers deliberately self-harm, with more than 25,000 admitted to hospital each year due to the severity of their injuries.

More than 1% of 11 to 16-year-olds are said to be "seriously depressed."

However, the survey of 500 young people revealed wide gaps in knowledge, with boys between the ages of 12 and 14 the least likely to be able to name a single mental health condition.

Those who did manage to do so were most likely to point to substance abuse, depression and self-harm as the most common.

Celebrity confessions

While the internet was the most popular source of advice, 17 and 18-year-old girls said that they likely to gather their mental health knowledge from celebrities talking about their mental health problems.

Dr John Goldin, a consultant child and adolescent psychiatrist at Great Ormond Street, said: "Our findings which show that nearly half of 12-18 year olds in the UK cannot name a single mental health condition are both worrying and surprising.

"This ignorance is probably one of the reasons why for too long now there has been a stigma attached to living with a mental health condition.

"It is important that young people feel they can come forward and speak out if they or someone they know is experiencing mental health difficulties."

An analysis of 2,000 confidential enquiries to Great Ormond Street's "Children First" website found that "psychosocial" problems were the most common topic.

The hospital has responded by setting up a new section on the site, complete with information and audio diaries recorded by teenagers with mental health problems.

Child mental health charity Young Minds said the website would be a "vital resource".

Its chief executive Sarah Brennan said: "Websites such as Great Ormond Street Hospital's help young people to understand more about mental health problems and ensure they have access to information when they need it.

"They provide information which young people don't feel comfortable getting elsewhere, often helping to identify what might be wrong and how to get help."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/7599696.stm

Published: 2008/09/07 00:26:01 GMT

Infections linked to cot deaths

Some cases of cot death may be due to a bacterial infection, researchers say.

The Archives of Disease in Childhood study found samples from babies who had died for no apparent reason often carried potentially-harmful bacteria.

Some experts believe toxins produced by these bacteria could trigger a chemical storm, which overwhelms the baby, resulting in sudden death.

There are around 250 sudden infant deaths a year in the UK. The majority are never fully explained.

REDUCE COT DEATH RISK
Place your baby on their back to sleep
Do not let anyone smoke in the same room as your baby
Do not let your baby get too hot or too cold
Keep baby's head uncovered - place your baby with their feet to the foot of the cot
Do not share a bed with your baby if you have been drinking alcohol, take drugs or if you are a smoker
If your baby is unwell, seek medical advice promptly
The safest place for your baby to sleep is in a cot in a room with you for the first six months
Source: FSID

Scientists know that there are certain things that parents can do to cut the risk of cot death - such as not smoking during or after pregnancy, and putting babies to sleep on their backs, but the precise reasons why this helps are not completely understood.

Associate professor Paul Goldwater, from The Women's and Children's Hospital and the University of Adelaide in Australia, who carried out the latest research, believes bacterial infections may contribute to some sudden infant deaths.

He analysed the post mortem reports for 130 babies who had died of sudden infant death syndrome (SIDS), 32 who had died suddenly as a result of infection, and 33 who had died of non-infectious cause, such as a road traffic accident.

Sterile sites

He then analysed the bacterial isolates from "sterile" sites which are normally free of infections, such as heart blood, spleen, or cerebrospinal fluid, in the SIDS babies, and compared these with those of the other 65 babies.

Infection at a sterile site was rare in those infants who had died of non-infectious causes, but this was relatively common in both the SIDS babies and the babies who had died suddenly as a result of infection.

Unsurprisingly, almost one in five of the babies who had died suddenly as a result of infection had a sterile site infection. But so too did one in 10 of the SIDS babies.

In many cases, the infection was caused by Staphylococcus aureus, a particularly virulent bacteria, known to produce potentially lethal toxins.

Dr Goldwater told Archives of Disease in Childhood: "The finding of S. aureus in a normally sterile site in a large proportion of cases of SIDS would indicate that a proportion of these babies died of staphylococcal disease."

He said, given his findings and similar findings by other researchers in the past, any cases of SIDS where S. aureus is isolated from sterile sites should be considered for reclassification.

Professor George Haycock, scientific advisor to the Foundation for the Study of Infant Deaths, said: "The suggestion that infectious organisms such as S. aureus and E. coli play a part in a proportion of sudden infant deaths provides us with another important piece of the SIDS puzzle.

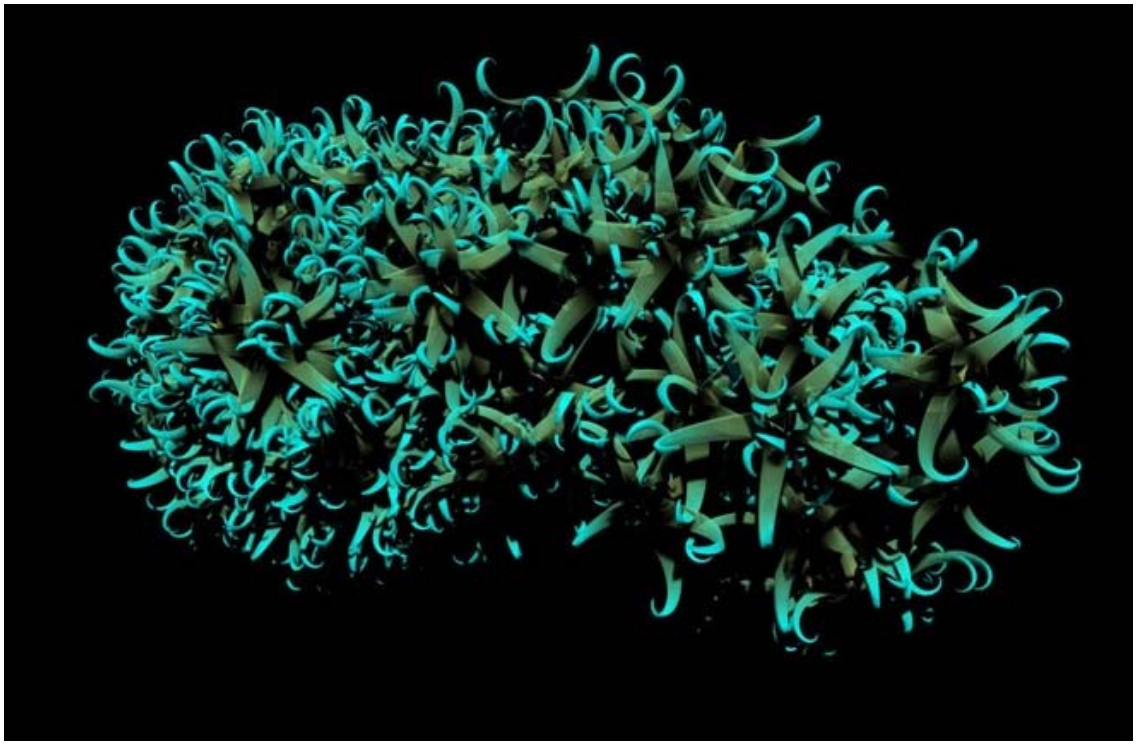
"It is important to recognise that both S. aureus and E coli are ubiquitous organisms carried by most, if not all, of the healthy adult population and that colonisation of infants does not imply lack of hygiene or normal care, but is bound to happen in a proportion of individuals.

"How deaths involving these organisms, by either of the mechanisms outlined above, can be prevented is not known at present since colonisation of some infants is inevitable."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/science/nature/7606900.stm

Published: 2008/09/10 23:50:37 GMT

Could Life Evolve on the Internet?
By Brandon Keim ✉September 09, 2008 | 7:50:23 PMCategories: Complexity, Evolution, Systems Biology



If principles of life are universal, could life emerge on the internet?

I posed the question to evolutionary dynamicist Martin Nowak of Harvard University, developer of a mathematical model of evolution's origins, the period during which unique chemical structures experienced mutation and selection that guided them toward replication -- and thus to life.
Though Nowak's focus is biological life, the principles seem broadly applicable, perhaps even to configurations of electrons coursing through the Internet's silicon and fiber-optic substrate.
"Computer viruses are some form of evolution," said Nowak.
"Viruses fulfill replication, mutation and selection -- but people don't consider them to be alive, because they think life has to be made of chemicals," said Irene Chen, a Harvard systems biologist who specializes in early biomolecules.
"We can definitely make things in a computer that fulfill the criteria for life that NASA uses, except it's not chemical," she added, and cited the AVIDA program at Michigan State.
Indeed, computer viruses and e-mail spam have arguably displayed evolutionary characteristics. But Nowak was more interested in the forms of social life produced by the internet. "It's already an interesting phenomenon that allows people to function in a different way," he said. "It leads to very different properties than what were out there before."
His words echoed those of microbiologist and complexity researcher Carl Woese. "Man is the one who's undergoing this incredible evolution now," he said earlier this year in my article on complexity and evolution. "We see some in the insects, but the social processes by which man is evolving are creating a whole new level of organization."

Image: The Storm Worm malware as visualized by MIT's Alex Dragulescu; from WikiMedia Commons, diagram of an RNA polymerase protein.

http://blog.wired.com:80/wiredscience/2008/09/could-life-evol.html

EU in crop biofuel goal rethink

European Union lawmakers have voted to set a limit on targets to increase the use of road transport biofuels.

Campaigners say that biofuels from grains and food crops contribute to food price inflation.

The original EU target that 10% of all road transport fuel should come from renewable sources by 2020 did not set limits for crop biofuels.

A committee of the European Parliament has now voted to limit such fuels to 6% of the 10% target.

At least 4% of the total will have to be achieved using electricity or hydrogen from renewable sources, or from second-generation biofuels from waste or non-food crops.

Green MEP Claude Turmes, of Luxembourg, welcomed the decision.

"While the maintenance of a binding target for biofuels is a bitter pill to swallow, the committee has at least strengthened the safeguards against the damaging impact of agri-fuels in this directive," he said.

The panel also approved a mid-term goal of 5% of road transport fuel from renewable sources by 2015, of which one fifth should not be food crop-based biofuels. Analysts say that a couple of years ago, biofuels looked like a perfect solution for the 27-member bloc, which was keen to lower carbon emissions, protect the environment and find alternative energy solutions.

But the longer-term impact on food prices and deforestation, especially in the developing world, has prompted a rethink of the original targets.

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/europe/7610396.stm

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Online Learning, Upscale (and Scaled Up)

John Katzman

John Katzman has never aimed low. The first company he founded, the Princeton Review, went head on at the standardized testing industry and its assertion that the SAT and other exams couldn't be "coached." Hundreds of thousands of students (and hundreds of millions of dollars) later, Katzman and Princeton Review have proved otherwise.

Katzman is set to unveil a new endeavor, and its not-so-modest ambitions are simply these: to merge the best of what for-profit and high-end nonprofit higher education have to offer; to show academically exclusive colleges that they can succeed, and dramatically increase their "scale," online; and, oh yes, to change the face of teacher education.

In the coming years, Katzman and his new company, 2Tor, aim to become the online platform for some of the most successful graduate, professional and other programs at leading universities in the United States. Under this model, 2Tor will provide both the technological platform and the student services so that programs that are now highly selective (and often serve comparatively few students) can be delivered much more widely. Katzman, who foresees an investment of $15 million, from his own pocket and private investors, to finance the company, envisions creating such partnerships with one university's M.B.A. program and, say, another's psychology program. A high-prestige bachelor's degree is in his sights, too.)

2Tor is starting in a field with which Katzman is familiar, and where the need is great: teacher education. On Monday, 2Tor will announce that it is teaming up with the University of Southern California's Rossier School of Education to create an online version of its master of arts in teaching, called MAT@USC. Within a decade, in Katzman's grand vision, the online version of USC's program — which now produces about 150 students a year — could produce 5,000 or more, helping not just California but many states meet the desperate demand for teachers in high-need (urban, rural, low-income) schools.

But it is not just about volume, say Katzman and Karen Symms Gallagher, the Rossier school's dean. There is no shortage of teacher education schools, nor even of teacher prep programs offered online. But at a time when higher education institutions are facing significant pressure to increase the number of students they educate, and to be more innovative in how they do so, most of that growth and much of that innovation has been relegated, Katzman notes, to large for-profit providers (notably the mammoth University of Phoenix Online), niche for-profit institutions (Capella and Walden Universities) and ambitious but less prestigious nonprofit institutions, like Nova Southeastern University and the University of Maryland University College.

"Right now you have these very discrete worlds: the selective nonprofits where you've got good smart students, strong faculty and curriculum, and good research, but are very bounded; and the for-profits, where neither the students nor the faculty are extraordinary, the curriculum is workaday, and the

research is nonexistent, but they're large and growing fast, particularly online," says Katzman. "We want to bridge that gap: to be scalable and large, but also selective with a real emphasis on quality. It's about partnering with great nonprofit research universities to use their smarts and brand and reputation and faculty, and combine it with the methods and techniques of the for-profits that are online."

Questions abound. It is certainly true that highly selective colleges and universities, in general, are not very well represented or aggressively engaged in online education. But there are certainly no shortage of institutions operating online, and as many as 50 offer online programs that produce certified teachers, says Richard Garrett of Eduventures, a research company that closely monitors both the distance learning and teacher education markets. (Many, undoubtedly, are priced at far less than the $40,000 that USC will charge for its 13-month degree.)

There may be relatively small numbers of institutions that have enough cachet to break through that clutter, Garrett and others say, and 2Tor's success may well depend on such as-yet undetermined things as the quality of its technology and its perceived value.

"I'm personally a little skeptical of the notion of simply taking a brand-name institution and scaling it up because there's a certain amount of money behind it," says Garrett. "Their sense is obviously that this is something special, but there really needs to be some substance there. The platform needs to be above and beyond Blackboard and its peers, and they have to make it affordable. They'll have to be pretty special to break through in these high-demand fields."

The Vision

Katzman and his team at 2Tor (which includes several former colleagues from the Princeton Review as well as former executives at Hooked on Phonics and other education companies) clearly believe they are building something special. For Katzman, who built a reputation as a maverick by building the Princeton Review from scratch upon graduation from Princeton University in 1981 and departed as the company's CEO in 2006 (he remained chairman of its board through last week), the big-picture goal was to build a "great online university," one characterized not just by size but by high quality as well.

Apart from a few early (and mostly failed) experiments in which highly selective universities sought to expand onto the Internet — see AllLearn, Fathom, and UNext — relatively few have gone into true online education in a meaningful way. (There are obvious exceptions — Penn State University's World Campus, eCornell, and Stanford Online — but many online programs have mostly noncredit offerings.) That's partly because most exclusive institutions see little need to go online for one of the major reasons that colleges turn to distance education — out of the hope it will be financially lucrative. But it's also partly because, in some ways, broadening access to their educations can be seen as working against what makes them "elite" in the first place: limited access to the education they provide.

"Part of the value of a 'brand' is exclusivity," says Kevin Carey, education and policy director at Education Sector and a columnist for *Inside Higher Ed*, who notes that he does not support this view, but sees it reflected in the perceptions of some college officials. "Not just anyone can get that degree, so the very thing that is seen as making it valuable makes it hard to take advantage of what the Internet offers. If you reach too many customers, it arguably lowers the value."

At a time when (Charles Murray aside) most policy makers agree that the United States needs to significantly increase the number of college-educated Americans, Katzman sees the question of what makes an institution "elite" a little differently. "To us, the notion of 'elite' should just mean great students and great faculty," and a great environment in which those groups interact, he says. "This notion of scarcity — 'what makes a school great is that we reject so many students' — doesn't make much sense. Apple sells a lot of iPods, but it is still the elite music device, even though a lot of people have them. Apple could say, we're only going to make a handful of them, and bid up the price, but why?"

By more or less forgoing online education, the most selective (and often wealthiest) institutions have left the distance education playing field overwhelmingly to for-profit colleges and less-selective public and

private institutions. The vision that Katzman and his colleagues had, he says, was to try to bridge the gap between the "little jewels" and the behemoths.

"Could you build a Whole Foods?" Katzman says, referring to the high-end supermarket. "A Starbucks? Something scalable, but high-quality?"

It readily became clear to Katzman that creating such an institution out of whole cloth would be next to impossible. It's not that the technology isn't available — "the tools that have evolved to teach online are so much more powerful than they were even three years ago," he says — or that a terrific curriculum couldn't be shaped. But "building a university from scratch, finding great faculty, attracting great students, is a very long road," he says. "The great brands in higher education are 100 years old, mostly 200 years old."

That led him to the more practical notion of teaming up with existing "brand name" colleges for individual programs. "The key is finding high quality places," he says. But which ones?

USC Enters the Picture

Not too long ago, officials at the University of Southern California's education school approached Katzman about endowing a chair in educational entrepreneurship. Katzman laughed out loud, he admits, about the idea of a chair in "entrepreneurship" housed at an education school, given the reputation of teacher training academies as innovation backwaters.

But Gallagher, who has sought to remake the Rossier school since becoming dean at USC in 2000, ultimately sold Katzman on her vision of an innovative education school, noting among other things that she had eliminated both its Ph.D. and Ed.D. programs, refashioned the Ed.D. and re-established a tiny Ph.D. program, and wiped out the college's undergraduate teacher education program in favor of its master's program. "We're not afraid as a faculty to make decisions that are innovative, that we think can solve specific problems, even if no one else is doing them," Gallagher says. One of those "problems," she notes, is the "sense of urgency about coming up with innovative solutions to the shortage of teachers in high-need schools."

Karen Symms Gallagher, dean of USC's Rossier School of Education

The chair that Katzman and his wife, Alicia Ernst, funded at USC naturally led Katzman and Gallagher to discuss his ideas for partners for 2Tor. Teacher education was logical terrain for Katzman, given his background and interest in schools he developed at Princeton Review, the widespread criticism of many existing teacher education programs, and the dearth of talented teachers in high-need areas.

"It's a funny situation: In our society, lots of good doctors are coming out of good med schools, and lots of talented lawyers are coming out of quality law schools," Katzman says. "But a huge majority of teachers come out of mediocre schools of education. One of my questions for elite education schools is, why are you so small? If you really want to change the profession, you need to really get into the game and produce a lot of teachers."

The discussion resonated for Gallagher and Rossier, too. Urban education has historically been the education college's focus, given its Los Angeles locale. And Rossier and other colleges at USC, at the urging of Provost Chrysostomos L. Max Nikias, have been looking for ways to move their programs online, says Gallagher.

Under the arrangement to take USC's existing 13-month master of arts in teaching program online (financial terms for which were not disclosed, but involve a revenue split between USC and 2Tor), the

university will be "completely responsible for what the curriculum is, who delivers it, who gets into the program and who gets out," says Gallagher. (All of the faculty, including teaching assistants, will be the university's; it will eventually have to hire significantly more.) 2Tor will provide the Moodle-based (but heavily customized) technological platform and support; all student services; and, all-important in teacher education, establishing the relationships with the school districts where the teacher candidates will train under the aegis of master-teacher mentors, wherever that may be.

With the help of 2Tor's Ronni Ephraim, a former deputy superintendent of the Los Angeles Unified School District, USC and 2Tor are adapting the current MAT curriculum to function online, and there are ways, Gallagher says, that the online framework created by 2Tor will make possible certain beneficial things that cannot be done in an on-ground program.

Right now, she says, if USC needs to send 150 students out to classrooms to learn from schoolteachers in action, it sends one or two each to 100 different classrooms, where they take notes and return to the USC campus to share what each of them they saw. In the online program, USC can have a live video feed (or a recorded excerpt) from a classroom in one of its partner schools, "and all of us can watch the same classroom at the same time, with the faculty member deconstructing and diagnosing what's happening," the dean says. "We can be texting or blogging about what's going on while it's unfolding."

Similarly, 2Tor will arm all of the students in the fledgling program with "the Flip," a cell-phone sized video recorder that will allow students to capture their fieldwork experiences and their own lessons for future discussion (and critiques) by classmates and professors.

More fundamentally, says Katzman, the technology platform that 2Tor is building (with the help of Jeremy Johnson, who dropped out of Princeton in 2006 after the social networking site he created became part of the foundation of Zinch.com, the college admissions site) aims to recreate to the fullest extent possible the educational experience found on-ground at the sorts of selective institutions he wants to work with.

"If you ask a student at one of those schools what percentage they learned from other kids, some say half, some say a quarter," Katzman says. In building the learning software USC's students will use, which incorporates video, whiteboard, chat and other ideas from multiple sources into an underlying Moodle platform, "we've tried to build a Web 2.0 experience that puts all the discussions going on — between teacher and student, between groups of students — front and center. Those all-important conversations are an organizing principle in a way." (See a sample page here.)

Gallagher says that, contrary to the stereotype of faculty members deadset against change, professors at the Rossier school have not fought the idea of taking the master's program online. "The biggest thing we had to undo was the notion of bad online learning, of some of the master's educations that are out there," she says. "A lot of them are full of talking heads and are heavily text-based, and some of them don't even get you out in the classroom."

Apart from building the technology up front, ensuring meaningful classroom experiences may be the hardest part of 2Tor's side of the arrangement with USC. It is charged with building arrangements with school districts and finding qualified mentors — full-time teachers in those schools — for students wherever they enroll, be it a suburb of Los Angeles or Cleveland, Ohio. (An initial group of students is scheduled to enroll in the program in January, with a full class to enter in May, if all goes according to plan.)

"The challenge is taking all the theory stuff you're learning online and integrating it into the classroom where you're working a couple days a week," says Katzman. "We've got to choose the schools carefully, and the teachers the students work with carefully. And then we need to support not just the students but the mentors, too," who will receive financial subsidies from 2Tor.

Questions Galore

When told about 2Tor's and USC's plans, experts on teacher education and online learning were generally intrigued but, in some cases, skeptical. They had many questions: Would graduates of the program would have trouble getting certified to teach in states other than California? (They shouldn't, says Gallagher, because many states accept teachers with a California credential, though some may impose some additional requirements.) Why wouldn't USC take its teacher ed program online itself, without help from 2Tor? ("We'd considered it, but the biggest obstacle is that we're not experts in technology," says Gallagher. "Nor do we within our school have access to anything as sophisticated as John's technology platform.")

Garrett, the Eduventures analyst, sees several potential impediments to 2Tor's plans, based on the limited information he had about them. He and Carey of Education Sector both questioned whether USC's brand had enough national clout that students would be willing to pay the $40,000 price tag that the university plans to charge — $1,249 per credit for the 32-credit program, same as its the classroom-based master's program.

(By stitching together various federal, state and other loan forgiveness programs and foundation support it is soliciting for "last dollar in" tuition reimbursement, 2Tor expects to be able to promise students that they will recoup their tuition if they work in a high-need teaching job for three years. "We're going to keep it simple to students who should not have to worry about where the money comes from: 'If I go teach at a school that really needs me, then it's covered,' " Katzman says.)

The more basic doubt expressed by some observers is how successful 2Tor will be at finding institutions to buy what it is pitching. "Most elite schools don't really need what Katzman is offering them," says Garrett. Some are leery of experimenting with online education because quite a few of them were involved earlier this decade with UNext, AllLearn and the other failed experiments of the dot-com bust — some of which had significant attributes in common with what 2Tor is proposing. "There are still some burnt fingers," says Garrett.

Jeff Seaman, chief information officer at Sloan-C, a consortium of institutions with online programs, says that most highly selective colleges continue not to see online learning as a central strategic priority. For institutions that are intrigued by delving deeper into online programs, "but have not moved because there was a barrier, does 2Tor coming out [and potentially helping them make that move] remove that barrier?

"Based on what I've seen, it's got to be done extremely well," Seaman says. "If I'm a big prestigious institution, and I have a gem of a program I could bring online to teach hundreds of students, there are issues I have that 2Tor's not going to resolve. I still need to staff that. I need to deal with copyright issues, and make sure that online programs match into our tenure and promotion standards."

Then again, he notes, under 2Tor's model — where it might choose one high-quality business program, one social work program, and one bachelor's degree in history — perhaps only a few institutions would need to make the leap: "It might not take many to make it work."

— Doug Lederman

The original story and user comments can be viewed online at
http://insidehighered.com/news/2008/09/12/2tor.

On Disc: Best of All Possible Bernstein

By THE NEW YORK TIMES

SO how will the music world celebrate Leonard Bernstein's centenary? Fortunately it has 10 years to ponder, because the celebrations planned this season for his 90th birthday may be as hard an act to follow as, for London, the Beijing Olympic Games.

You can stick in a thumb almost anywhere and pull out a plum. Carnegie Hall is spearheading Bernstein: The Best of All Possible Worlds, a two-month citywide festival, which begins with a Carnegie concert by the San Francisco Symphony on Sept. 24. The New York Philharmonic is a major player throughout, as well it should be, at both Avery Fisher Hall and Carnegie. Great Performers at Lincoln Center joins in with a film festival at the Walter Reade Theater opening on Oct. 15. And on and on.

Collins has just published "Leonard Bernstein: American Original," a book of essays lavish with photos, assembled by Burton Bernstein, the maestro's younger brother, and Barbara B. Haws, the longtime archivist and historian of the Philharmonic. Medici Arts has released "Leonard Bernstein," a set of five DVDs of performances running from 1973 to 1990. Sony Classical, in its Original Jacket series, has released a package of 10 CDs, including one of my favorites, Bernstein's early-'60s recordings of the Symphonic Dances from "West Side Story" and the Symphonic Suite from "On the Waterfront" with the Philharmonic, filled out with other works. And on some more.

By way of background to all of this, the classical music critics of The New York Times have singled out some of their favorite recordings of Bernstein as composer, performer or speaker. You'll see their choices — and more of Lenny — in this section. But while I still have the floor, let me encourage you not to be without a Bernstein recording — any Bernstein recording — of Mahler's Symphony No. 2 ("Resurrection"). He adored the work and trotted it out for special occasions, most memorably for me in his 1,000th concert with the Philharmonic, in 1971. There are other ways than his to approach this score, but if you don't know everything he found in it, you hardly know it at all. JAMES R. OESTREICH

The classical music critics of The New York Times have chosen their favorite recordings featuring Leonard Bernstein as performer or composer.

Anthony Tommasini

BERNSTEIN: SYMPHONY NO. 2; 'SERENADE' Lukas Foss, pianist; Isaac Stern, violinist; Symphony of the Air, New York Philharmonic, conducted by Leonard Bernstein (Sony Classical SMK 60558; CD).

BERNSTEIN: 'MASS' Soloists; Berlin Radio Chorus, Deutsches Symphonie Orchester Berlin, conducted by Kent Nagano (Harmonia Mundi France HMC 901840.41; two CDs).

BERNSTEIN: 'CANDIDE' Original Broadway cast, starring Max Adrian, Robert Rounseville, Barbara Cook (Sony Broadway SK 48017; CD).

'MODERN MASTERS' Works by Lopatnikoff, Dallapiccola, Shapero. Columbia Symphony Orchestra, conducted by Bernstein (Sony Classical SMK 60725; CD).

BIZET: 'CARMEN' Marilyn Horne, James McCracken, Tom Krause; choruses; Metropolitan Opera Orchestra, conducted by Bernstein (Deutsche Grammophon 471 750-2; three CDs).

ON a muggy afternoon in July 1987, during a break from a rehearsal with a student orchestra at the Tanglewood Music Center, Leonard Bernstein spoke of the prejudice he felt he encountered for being a multitasking musician in a field that prizes specialization. "The composers don't consider me a real composer," he said, "the conductors don't consider me a real conductor, and the pianists don't consider me a real pianist."

That Bernstein was insecure about his conducting seemed hard to believe. But he did endure frequent belittling of his own music, especially his large symphonic scores.

Whenever I listen to a work like Bernstein's Second Symphony, "The Age of Anxiety" (after an Auden poem), I cannot recall why we are supposed to consider Bernstein's major compositions so inconsequential. True, he saddles this 1949 score with a hokey metaphorical narrative: four lonely friends, a woman and three men, convene at a Third Avenue bar and begin an all-night rap session about the state of man.

But this vibrant, wildly varied work's taut and inventive musical structure stands on its own, especially in Bernstein's 1950 recording with the New York Philharmonic. A quizzical prologue introduces two sets of intricate variations, which segue into a dirge, a masque and an affirming, blazingly defiant epilogue. It's essentially a symphonic piano concerto with a daunting solo part, played here brilliantly by the composer Lukas Foss. In one aggressively jazzy episode, piano riffs find common ground between Art Tatum and atonality.

When Bernstein's "Mass" was introduced in 1971 at the inauguration of the Kennedy Center in Washington, it elicited hostile criticism for its peacenik pontifications and unabashedly hybrid score, drawing from rock ballads, Broadway sizzle and Mahlerian angst.

But there are disarmingly beautiful passages in this earnest and boldly eclectic theater piece, like the chorale "Almighty Father," with its austerely spacious harmonies, and the bebopping "Alleluia." That the work has been championed by contemporary-music dynamos, like the conductor Kent Nagano on his 2003 recording, is a testimony to its strengths.

Bernstein achieved Broadway immortality with "West Side Story." But for all its problems, "Candide," with lyrics primarily by the poet Richard Wilbur, is his most rewarding theater piece. After its dismal

1956 Broadway premiere, the show was extensively reworked for subsequent revivals, notably a 1974 Broadway production, generally considered the strongest. Still, I love the original cast recording, with the sweet-voiced Robert Rounseville as Candide and the irresistible young Barbara Cook as Cunegonde.

Bernstein as a forceful young advocate of living composers can be heard on a 1953 recording, conducting the Columbia Symphony Orchestra in works by Luigi Dallapiccola, Nikolai Lopatnikoff and the overlooked American master Harold Shapero. Bernstein leads an engrossing account of Mr. Shapero's complex, sprawling Symphony for Classical Orchestra (1947).

Finally, a strong vote for Bernstein's much-debated 1973 recording of Bizet's "Carmen," with the Metropolitan Opera Orchestra and the great Marilyn Horne in the title role. Bernstein's daringly slow tempos, though criticized by some, are revelatory. Ms. Horne's "Habanera" is all the more seductive for its reined-in pacing and sultry phrasing.

Allan Kozinn

BERNSTEIN: 'CHICHESTER PSALMS,' SYMPHONIES NOS. 1, 2 Christa Ludwig, mezzo-soprano; Lukas Foss, pianist; Wiener Jeunesse-Chor, Israel Philharmonic Orchestra, conducted by Bernstein (Deutsche Grammophon 457 757-2; CD).

BERNSTEIN: 'PRELUDE, FUGUE AND RIFFS,' 'ON THE TOWN: THREE DANCE EPISODES,' 'SERENADE,' 'FANCY FREE' Benny Goodman, clarinetist; Zino Francescatti, violinist; Columbia Jazz Combo, Columbia Symphony Orchestra, New York Philharmonic, conducted by Bernstein (Sony Classical SMK 60559; CD).

BERNSTEIN: 'ARIAS AND BARCAROLLES,' OTHER WORKS Judy Kaye, soprano; William Sharp, baritone; Michael Barrett and Stephen Blier, pianists (Koch International Classics 7000; CD).

BEETHOVEN: SYMPHONY NO. 3 New York Philharmonic, conducted by Bernstein (Sony Classical SMK 60692; CD).

YOUNG PEOPLE'S CONCERTS New York Philharmonic, conducted by Bernstein (Kultur D1503; nine DVDs).

AS a composer Bernstein embodied what at the time seemed puzzling contradictions. He cultivated a hip image, drawing on Hispanic rhythms and jazz in his works of the 1940s and '50s and banging out rock songs on the piano during his televised lectures in the 1960s. And he championed contemporary music of all kinds. Yet his symphonic works were startlingly conservative, their sometimes jazzy or lightly dissonant edges giving only hints of modernity to otherwise unabashed neo-Romanticism.

But Bernstein knew a thing or two, and if neo-Romanticism was criticized as a negation of modernism in his day, today young composers have embraced it, as have audiences. His First Symphony ("Jeremiah," 1942), an ominous, wartime work, captures the spirit of its time in two intensely anxious movements that lead to a wrenching setting of excerpts from Lamentations, sung plangently by Christa Ludwig in Bernstein's 1977 recording.

The Second Symphony ("The Age of Anxiety") has dark edges too, but the zesty piano writing (played here by Lukas Foss) creates an appealing, restless energy. The disc's real draw, though, is a lithe performance of the "Chichester Psalms," a sweetly harmonized, texturally transparent setting that prefigures Steve Reich's "Tehillim" in drawing its rhythmic vitality from the meter of the Hebrew text.

Rhythm of a jazzy sort is at the heart of "Prelude, Fugue and Riffs," the virtuosic score Bernstein composed for Benny Goodman, and it drives the companion works on the disc: most notably the "On the

Town" dances and sections of "Fancy Free." But even when rhythm holds the spotlight, melody exerts a strong tug in Bernstein's music, nowhere more than in his songs. "Arias and Barcarolles" brings together eight composed at various times and in several styles (a couple flirt with 12-tone technique); eight songs from theater pieces and "Songfest" fill out the collection. "Dream With Me," from "Peter Pan" (1950), is worth the price of the disc on its own: Bernstein's languid, bittersweet melody is one of his most haunting and memorable.

For those of us of a certain age part of Bernstein's appeal was his ability to teach, painlessly. A short sample of his easygoing, persuasive analytical style is included as a bonus with his fine 1964 account of Beethoven's Third Symphony ("Eroica").

But the mother lode is the trove of Young People's Concerts, broadcast by CBS between 1958 and 1973. Eloquent and passionate, with an infectious love of music and what makes it tick, Bernstein taught a generation about classical structures and techniques (sonata form, orchestration, syncopation, musical humor) and styles (Impressionism, jazz, folk influences, American music), with loving explorations of the sections of the orchestra and particular composers (Mahler, Stravinsky, Shostakovich). These shows — the Kultur set includes 25 — have worn well: Bernstein was not condescending when he spoke to children, and even a listener who knows how music works can get a lot from his talks. Not least, they recall a time when a major network offered this kind of thing in prime time, and when the classical music world had someone with the personality to carry it off.

Steve Smith

CHERUBINI: 'MEDEA' Maria Callas, Fedora Barbieri, Gino Penno; La Scala Chorus and Orchestra, conducted by Bernstein (EMI Classics 5 67909 2; two CDs).

SIBELIUS: SYMPHONY NO. 2, 'POHJOLA'S DAUGHTER,' 'LUONNOTAR' Phyllis Curtin, soprano; New York Philharmonic, conducted by Bernstein (Sony Classical SMK 61848; CD).

MAHLER: SYMPHONY NO. 5 Vienna Philharmonic, conducted by Bernstein (Deutsche Grammophon 477 633-4; CD).

IVES: SYMPHONY NO. 2, 'CENTRAL PARK IN THE DARK,' 'THE UNANSWERED QUESTION' New York Philharmonic, conducted by Bernstein (Deutsche Grammophon 429-220-2; CD).

'ESSENTIAL LEONARD BERNSTEIN' (Deutsche Grammophon 471-518-2; two CDs).

IN his star-making debut with the New York Philharmonic at Carnegie Hall on Nov. 14, 1943, Bernstein proved he was able to make magic in a pinch. Something similar happened just over a decade later at La Scala in Milan, when an indisposed Victor de Sabata canceled a 1953 engagement. Cherubini's "Medea," a recent success for Maria Callas in Florence, was hastily scheduled; the soprano, having heard a Bernstein-led performance on the radio, recommended hiring the still young and inexperienced conductor.

Bernstein, who had only five days to learn the score, predictably drew out its heated passions, yet he accompanied the imposing Callas with supreme sympathy and flexibility. This monaural recording, long available through pirate channels, was painstakingly restored by EMI in 1999. Climaxes still distort, and the prompter is overemphatic; even so, this a vital document of a meeting for the ages.

Sibelius was not a composer with whom Bernstein was closely associated. More's the pity, to judge by a disc of the Symphony No. 2 made with the New York Philharmonic in 1966. Textures are lean and clear; the music flows easy and cool. The finale, deadly in the wrong hands, sounds properly regal. Of added

value are "Luonnotar," a moody rarity featuring the wonderful Phyllis Curtin, and a "Pohjola's Daughter" that has never been bettered.

As Bernstein recorded staples of his repertory for a second or third time late in his career, he could sometimes be guilty of distension or distortion. Not so in his spectacular Vienna Philharmonic recording of Mahler's Symphony No. 5, issued in 1988. As always, Bernstein's Mahler is internalized and idiosyncratic, but how astonishing are the peaks he finds in this account, how terrifying the abysses. You could wallow in his luminous Adagietto for days.

Similarly, Bernstein's second New York Philharmonic recording of Ives's Symphony No. 2, issued in 1990, is every bit as lively and alert to eccentric detail as his previous account, taped three decades earlier. But the patience and insight revealed in the more recent account are persuasive, and the disc also includes breathtaking versions of Ives's "Central Park in the Dark" and "The Unanswered Question."

Deutsche Grammophon's inexpensive, generously filled "Essential Leonard Bernstein" compilation, from 2001, includes pieces cited elsewhere as favorites of my colleagues. What makes the set compulsory for me is its inclusion of two brief celebratory works: "Slava!," a tribute to the cellist and conductor Mstislav Rostropovich, and "A Musical Toast," dedicated to the conductor André Kostelanetz. These express in microcosm practically everything we value about Bernstein's music; whacking timpani in them repeatedly during high school and college made me a fan for life.

Vivien Schweitzer

MAHLER: SYMPHONY NO. 5 Vienna Philharmonic, conducted by Bernstein (Deutsche Grammophon 477 633-4; CD).

MAHLER: SYMPHONY NO. 1, SYMPHONY NO. 10: ADAGIO New York Philharmonic, conducted by Bernstein (Sony Classical SMK 60732; CD).

BRAHMS: SYMPHONIES NOS. 2, 4 Boston Symphony Orchestra, conducted by Bernstein (Medici Arts 2072138; DVD).

'CHICHESTER PSALMS,' 'ON THE TOWN: THREE DANCE EPISODES,' 'ON THE WATERFRONT' Bournemouth Symphony Orchestra, conducted by Marin Alsop (Naxos 8.559177; CD).

BERNSTEIN: 'CHICHESTER PSALMS,' SYMPHONIES NOS. 1, 2 Christa Ludwig, mezzo-soprano; Lukas Foss, pianist; Wiener Jeunesse-Chor, Israel Philharmonic Orchestra, conducted by Bernstein (Deutsche Grammophon 457 757-2; CD).

"IF you love music, you are a believer, however dialectically you try to wiggle out of it," Leonard Bernstein said. He was a fervent believer in the music of Mahler, who had earlier champions in conductors like Otto Klemperer and Dimitri Mitropoulos but benefited enormously in the postwar years from Bernstein's enthusiastic advocacy and impassioned performances.

Bernstein, who related strongly to Mahler's angst, demonstrated a visceral empathy with his music. His live Deutsche Grammophon recording of Mahler's Symphony No. 5, conducting the Vienna Philharmonic just a few years before his death in 1990, illustrates the power of his Romantic, emotive approach. Bernstein harnessed the impeccable technique and glorious sound of the Vienna musicians in a performance full of demonic excitement, sweeping tragedy and blazing climaxes, with the velvet sound of the strings used to poignant effect in the famous Adagietto.

A 1966 recording of Mahler's Symphony No. 1 ("Titan"), reissued in Sony's Bernstein Century series features a younger Bernstein conducting the New York Philharmonic, with which he began his long

tenure as music director in 1958. The lithe, propulsive performance is more restrained than some of his later Mahler interpretations, but there is plenty of tumult and brooding intensity.

Bernstein also had an affinity with Brahms, whose music he began conducting as a student in 1940, studying the composer's works at Tanglewood with his mentor, the renowned Serge Koussevitsky. Bernstein led the Boston Symphony Orchestra in passionate, fiery performances of Brahms's Symphonies Nos. 2 and 4 at Tanglewood in 1972. His charisma on the podium during those concerts can be enjoyed on a Medici Arts DVD.

Bernstein the composer has a champion in Marin Alsop, who decided to become a conductor after hearing him lead the New York Philharmonic when she was 9. On a Naxos disc, she conducts an uplifting performance of his colorful "Chichester Psalms" with the Bournemouth Symphony Chorus and Orchestra (of which she was principal conductor from 2002 to 2008). Bernstein described the "Psalms," for which he set Hebrew texts, as the "most B flat majorish tonal piece I've ever written." The recording also includes lively renditions of his Three Dance Episodes from "On the Town" (a musical theater piece) and the Symphonic Suite from "On the Waterfront," which uses material (including some that was cut) from his 1954 film score.

Bernstein, who often conducted his own works, led the Israel Philharmonic in his Symphonies Nos. 1 ("Jeremiah") and 2 ("The Age of Anxiety") for a 1978 Deutsche Grammophon recording. Lukas Foss is the fine piano soloist in the episodic Second Symphony, an evocative and theatrical work inspired by an Auden poem about four loners bonding in a New York bar. It includes a jazzy piano riff originally written for but discarded from "On the Town." Conducting the symphony, which he revised in 1965, Bernstein (who was the pianist at the 1949 premiere) vividly illuminates the booze-fueled nocturnal adventures of the four characters.

http://www.nytimes.com/2008/09/12/arts/music/12bern.html?_r=1&th&emc=th&oref=slogin

'STREET ART STREET LIFE'

Finding Art in the Asphalt

By HOLLAND COTTER

If I say “street life,” and you think noise-lights-action, you may find “Street Art Street Life: From the 1950s to Now” at the Bronx Museum of the Arts a puzzling show.

There is noise — a pop song, the clatter of metal across concrete — but not much. Lights and action are confined to videos, several of them bleached, grainy, way predigital. The bulk of the work is photography. Some of the pictures are snazzy: Jamel Shabazz’s color portraits of sidewalk supermodels from the 1980s; photomontages by Fatimah Tuggar that transport New York to Africa and vice versa.

But most are black and white and made on the fly. They belong to a genre known as street photography. They are documents of the past: shots of everyday people in the 1950s living out their private lives in public, as city dwellers are wont to do; shots of artists in the 1960s and ’70s using the street as a studio, theater and laboratory as artists rarely do anymore, at least in New York.

With its immaculate, almost exaggeratedly stripped-down installation, the show is clearly intended not to recreate the feel of art on the street, but to record the fact of it. History, not buzz, is the subject. Even the newest art here seems to exist in some unspecified “then.”

The show’s organizer, Lydia Yee, now at the Barbican Art Gallery in London, was a senior curator at the Bronx Museum for many years. She has touched on the theme of street life and street art there before, in shows about the Bronx itself and about the influence of hip-hop on art. Now she broadens the time frame and the geographical reach and opts for a focused but muted, even contemplative look.

The view is a little too muted. The show would have benefited from a more adventurous choice of artists and work; most of what's here is straight from the canon. But the basic approach, serious, even somber, seems right for right now, a time when the streets of New York are being transformed by high-speed gentrification and art, market minded, is staying indoors. The show begins in post-World War II America, when certain photographers — Robert Frank, William Klein, Garry Winogrand — turned the camera into a critical instrument as well as a recording tool, an invasive device for probing the American dream. Mr. Frank's "Trolley, New Orleans" from around 1955 says a lot: whites in front, blacks in back; kids are dressed like little adults; adults frown and stare.

If Mr. Frank recorded street life as he found it, Mr. Klein provoked it into action. I don't know what he said to the teenager in "Gun No. 1, New York" (1954) to make him shove a pistol into the camera lens, but whatever it was, it worked. He turned the street into theater.

Beyond this point artists themselves become performers, and the street becomes their stage. They're in front of the camera, not behind. Beginning in the 1960s, the era of protest marches and be-ins and "power to the people," this becomes an international phenomenon.

In Berlin, Joseph Beuys sweeps up trash and with it, symbolically, ideology from Karl-Marx-Platz the day after a May Day demonstration. In Vienna the feminist artist Valie Export walks a man on a leash like a dog through the center of town. In New York, Claes Oldenburg turns street junk into sculpture, while the artists known collectively as Fluxus give free guided tours of "exotic" SoHo, which in the 1970s was still basically just a giant warehouse.

Photographs of such events are often uncredited, taken by an anonymous someone. But occasionally that someone was an artist who simply preferred not to use that title. Such was the case with the photographer Peter Moore (1932-93), a tirelessly vigilant recorder of off-the-radar art activity.

Not all that many people in 1979 were scouring the streets to find and preserve on film examples of Jean-Michel Basquiat's early graffiti. But Moore did so, and the results are here in a handful of pictures drawn from an archive of many thousands he took over the years. At the time they were often regarded as illustrational material, magazine fodder. Today they look like what they always really were: art in the service of art.

The show is most stimulating and valuable when it brings us less than instantly familiar material. A 1979 video of the musician David Van Tieghem dancing through Lower Manhattan with a set of drumsticks and "playing" the city as he goes is a treat. And it's great to be reminded of extraordinary endurance pieces performed by the artist Tehching Hsieh.

For one, done in 1981 and 1982, he lived outdoors in the city for a solid year, never going inside, equipped with only what he could carry on his back. The show includes relics of the project, an extreme street version of Outward Bound: a video, some photographs and one of the photocopied maps of Manhattan on which he made notations of precisely where he had slept, dined and defecated on a given day.

One of the stirring things about the video of Mr. Hsieh's performance when seen today is the incidental evidence it gives of how radically the city has changed in a quarter-century. By 1981 it was a pretty run-down; the 1970s had been a rough time. But partly for that reason artists could still afford to live and work here and make the streets of neighborhoods like the East Village and the Lower East Side extensions of their lives and their art.

This is no longer possible to the same degree or in the same way, and maybe it is no longer desired. The art world is more professionalized now; there's more money, and it is spread around a little more evenly.

And artists, at least in Manhattan, aren't concentrated in neighborhoods anymore. The show tacitly acknowledges this.

There is an air of regret in Zoe Leonard's ashen photograph of a blocked-up tenement window and in Martin Wong's gorgeous dove-gray painting of a gated storefront church. Both are poems of abandonment, not paeans to life on the street.

Possibly the situation is different elsewhere. The show seems to say so. People dance in the streets of Mexico City in a video by Daniel Guzmán. The South African artist Robin Rhode uses Johannesburg as raw material for his performance-based digital animations. Jasmeen Patheja and her collective, Blank Noise Project, turn the public spaces of New Delhi into settings for charged political encounters on the issue of violence against women.

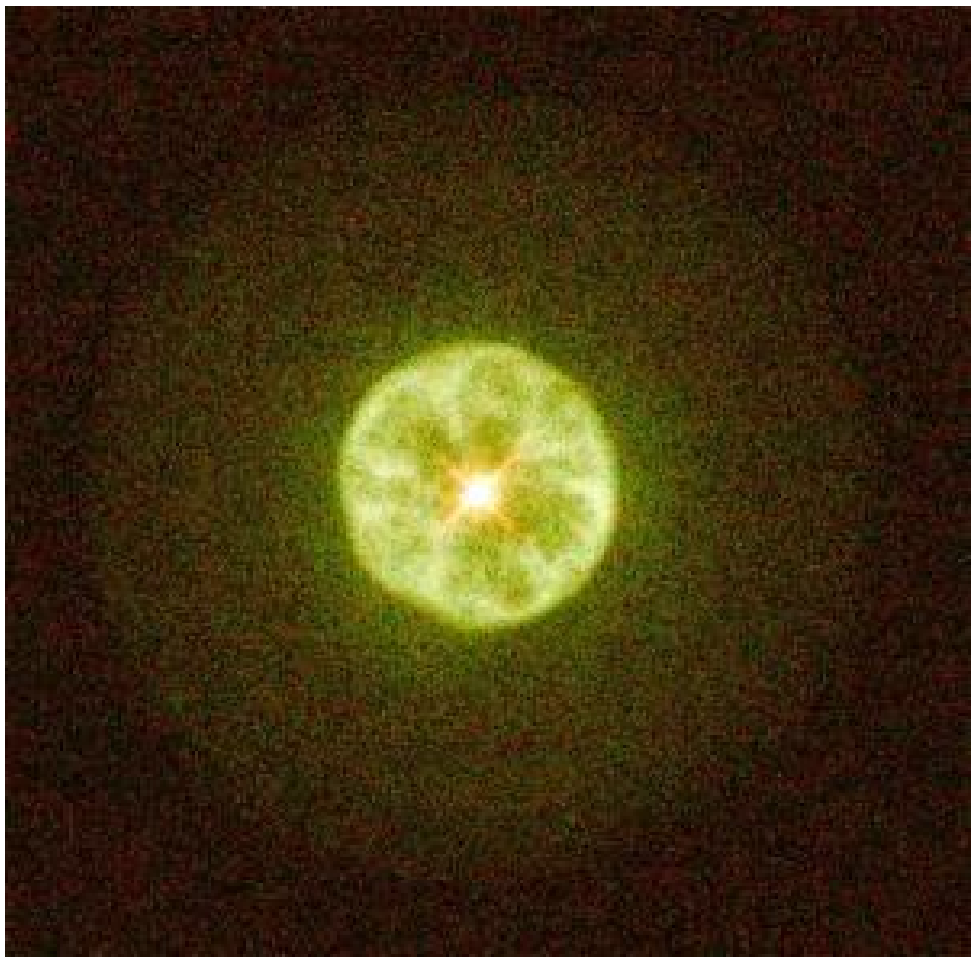
And New York still has its moments. In his short video "Phat Free" (1995-99), David Hammons, kicking a metal bucket down a sidewalk, makes the city his own by making some noise. And Xaviera Simmons's project "Bronx as a Studio," commissioned by the Public Art Fund, was conceived for the curbside. For it she hung out in the neighborhood around the museum last summer and invited passers-by to sit — or dance, or hopscotch, or do pretty much any street thing they wanted — for a portrait. The deal: She kept a copy of the picture, and they got one too.

Of course last summer was "then." So to kick off the show in the now, the museum will celebrate the opening on Sunday with a street fair on the Grand Concourse right outside its doors (noon to 5 p.m.; inside in the event of rain). It will have all of the usual features: food, drink, tchotchkes for sale. But there will also be a live D.J., dancing and an interactive computer setup designed by Ms. Tuggar. With it people — anyone — can collage images of the Bronx in whatever patterns they want, print the result and take it home: street art, 21st-century style.

"Street Art Street Life: From the 1950s to Now" opens Sunday at the Bronx Museum of the Arts, 1040 Grand Concourse, at 165th Street, Morrisania, and remains on view through Jan. 25; (718) 681-6000; bronxmuseum.org.

http://www.nytimes.com/2008/09/12/arts/design/12stre.html?th&emc=th

Beautiful Death: Halos Of Planetary Nebulae Revealed



IC 3568. (Credit: Howard Bond (STScI), NASA)

ScienceDaily (Sep. 12, 2008) — Stars without enough mass to turn into exploding supernovae end their lives blowing away most of their mass in a non-explosive, but intense stellar wind. Only a hot stellar core remains in the form of a white dwarf; the rest of the star is dispersed into the interstellar medium, enriching it with chemically processed elements, such as carbon, that is found in all living organisms on Earth.

These elements were cooked in the stellar furnace during a stellar life span covering billions of years. The high-energy radiation from the hot white dwarf makes the blown gas to shine for a short period of time, and the result is one of the most colourful and beautiful astronomical objects: a planetary nebula.

The complex history of mass loss

The events which lead to the formation of a planetary nebula develop in two phases that finally induce a structure composed of a denser, inner region –the planetary nebula itself– and an external fainter halo, that consists of the ionized stellar wind. All together, the blowing of this material is performed in a relatively short time, in astronomical terms, and the planetary nebula is visible only during a few thousand years. For this reason there are not many of these objects available for study.

External halos of planetary nebulae are faint and difficult to study, but they can provide a wealth of information on the physical properties of the final mass loss stage of the dying star. Although there is progress in understanding both stellar evolution and mass loss theoretically, observational details of, in particular, the last phase of the mass loss process have remained obscure. Classical astronomical spectrographs and other instruments are able to study only a few points of such faint and extended objects, making the analysis of these halos an extremely cumbersome, or even impossible task.

Integral field spectroscopy to the rescue

Through the new technique of integral field spectroscopy it is possible to obtain hundreds of spectra across a relatively large area of the sky, and this opens new prospects for the analysis of extended objects, such as planetary nebulae. Calar Alto Observatory has one of the world's best integral field spectrographs, PMAS (Potsdam Multi-Aperture Spectrophotometer), attached to its 3.5 m telescope.

In a research article, that was just published in the journal Astronomy and Astrophysics, a research team from the Astrophysical Institute in Potsdam, lead by C. Sandin, has used PMAS to study the two-dimensional structure of a selected set of five planetary nebulae in our Galaxy: the Blue Snowball Nebula (NGC 7662), M2-2, IC 3568, the Blinking Planetary Nebula (NGC 6826) and the Owl Nebula (NGC 3587).

The halos of planetary nebulae revealed

For four of these objects the research team derived a temperature structure, which extended all the way from the central star and out into the halo, and found, in three cases, that the temperature increases steeply in the inner halo. According to Sandin, "The appearance of such hot halos can be readily explained as a transient phenomenon which occurs when the halo is being ionized." Another remarkable result of this study is that it has been possible, for the first time, to measure the mass loss history of the final evolution of the stars which produced the planetary nebulae. Sandin says that "In comparison to other methods which measure mass loss rates, our estimates are made directly on the gas component of the stellar wind." The results allow important insights on how mass is lost in time, and the researchers found that "the mass loss rate increases by a factor of about 4-7 during the final, say, 10 000 years of mass loss."

The research team plans to continue with this study of the final evolutionary phases of low mass stars, and have observed planetary nebulae in the Magellanic Clouds. As the authors argue "on the theoretical side the results of our studies should provide a challenging basis for further improvement of models of stellar winds."

Adapted from materials provided by Calar Alto Observatory-CAHA.

http://www.sciencedaily.com:80/releases/2008/09/080911142411.htm

An Advance On New Generations Of Chemotherapy And Antiviral Drugs

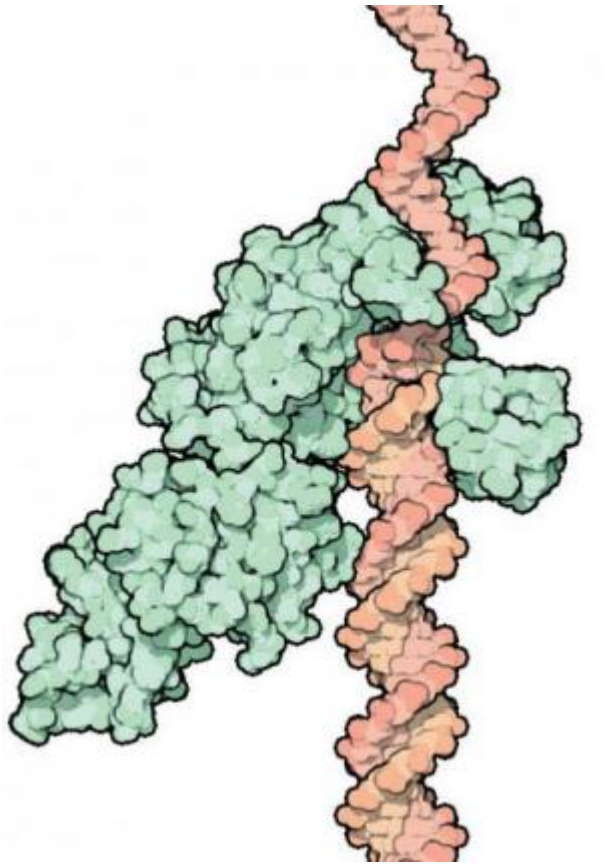


Illustration of DNA polymerase moving along the length of a DNA strand. Researchers are targeting new chemotherapy drugs that efficiently block uncontrolled DNA replication while minimizing side effects. (Credit: The Protein Data Bank)

ScienceDaily (Sep. 12, 2008) — Researchers are describing progress toward developing a new generation of chemotherapy agents that target and block uncontrolled DNA replication — a hallmark of cancer, viral infections, and other diseases — more effectively than current drugs in ways that may produce fewer side effects.

In the article, Anthony J. Berdis updates and reviews worldwide research efforts to develop drugs that target DNA polymerases, the enzymes responsible for assembling DNA from its component parts. Several promising strategies are already in use that inhibit uncontrolled DNA replication, particularly in anticancer therapy, but most produce severe side effects and are hampered by drug resistance, the researcher notes.

Berdis says that one of the more promising strategies to date involves the use of so-called nucleoside analogues, artificial pieces of DNA that inhibit replication by substituting for natural segments.

Most nucleoside analogues directly target the active site of the polymerase enzyme, a non-specific approach that can also harm healthy cells which contain the enzyme. Berdis describes an alternative approach in which the drugs directly target damaged DNA while avoiding healthy DNA, side-stepping the polymerase enzymes of normal cells. The development, which shows promise in preliminary lab studies, could lead to improved nucleoside analogues with fewer side effects, he says.

Journal reference:

1. Berdis et al. **DNA Polymerases as Therapeutic Targets**. *Biochemistry*, 2008; 47 (32): 8253 DOI: 10.1021/bi801179f

Adapted from materials provided by American Chemical Society.

http://www.sciencedaily.com/releases/2008/09/080908102923.htm

How To Differentiate Benign From Malignant Bile Duct Strictures?

ScienceDaily (Sep. 12, 2008) — The main etiology of bile duct strictures closely related to the liver is a malignancy (cancer). However, the differentiation of benign and malignant strictures is notoriously difficult.

The consequences for the patient are considerable because cancer in this anatomical location requires extensive surgery with removal of a large part of the liver. Extensive work-up including multi-slice computed tomography (CT), colour Doppler ultrasonography and magnetic resonance imaging (MRI) may improve the diagnostic dilemma. However, up to date, no single investigation reliably differentiates malignant from benign bile duct strictures.

A research article to be published on August 28, 2008 in the World Journal of Gastroenterology addresses this question. The research team led by Prof. van Gulik from the Surgical Department, analyzed a patient cohort that underwent resection for presumed malignancy of the bile duct, during the period 1998 to 2006. The final histologic diagnosis of 68 patients was correlated with the preoperative clinical, laboratory and radiological findings. Fifteen percent patients were found to have a benign lesion.

The findings of the different imaging studies revealed that only one feature, i.e. involvement of the blood vessels, showed a significant association with malignany. All other features including clinical presentation, laboratory tests, brush cytology, and other imaging studies were unable to differentiate malignant and benign strictures.

Invasion of the blood vessels was based on the findings of colour Doppler ultrasonography defined as an increase of flow compatible with stenosis, or absence of flow compatible with occlusion. Furthermore, vascular involvement was identified on contrast enhanced CT as vascular stenosis or occlusion of the portal vein and/or the hepatic artery. In 21 patients, the portal vein and/or branches of the hepatic artery were involved in the tumor process, and all these patients were finally diagnosed to have a malignant lesion.

Despite using recent, state-of-the-art imaging modalities, 15% patients with presumed malignancy underwent an extensive operation but were ultimately diagnosed to have benign strictures. Due to the relatively low incidence of vascular involvement (31% in this series), the absence of this finding is not conclusive. The article demonstrates that the differentiation of bile duct strictures remains difficult and that more research is needed to solve this diagnostic problem.

Journal reference:

1. Kloek JJ, van Delden OM, Erdogan D, ten Kate FJ, Rauws EA, Busch OR, Gouma DJ, van Gulik TM. **Differentiation of malignant and benign proximal bile duct strictures: The diagnostic dilemma**. *World J Gastroenterol*, 2008; 14(32): 5032-5038 [link]

Adapted from materials provided by World Journal of Gastroenterology, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2008/09/080909094740.htm

Vitamin B12 May Protect The Brain In Old Age

Vitamin B12, a nutrient found in meat, fish and milk, may protect against brain volume loss in older people. (Credit: iStockphoto/Nikolay Suslov)

ScienceDaily (Sep. 11, 2008) — Vitamin B12, a nutrient found in meat, fish and milk, may protect against brain volume loss in older people, according to a study published in the September 9, 2008, issue of Neurology.

For the study, 107 people between the ages of 61 and 87 underwent brain scans, memory testing and physical exams. Researchers also collected blood samples to check vitamin B12 levels. Brain scans and memory tests were also performed again five years later.

The study found that people who had higher vitamin B12 levels were six times less likely to experience brain shrinkage compared with those who had lower levels of the vitamin in their blood. None of the people in the study had vitamin B12 deficiency.

"Many factors that affect brain health are thought to be out of our control, but this study suggests that simply adjusting our diets to consume more vitamin B12 through eating meat, fish, fortified cereals or milk may be something we can easily adjust to prevent brain shrinkage and so perhaps save our memory," said study author Anna Vogiatzoglou, MSc, with the University of Oxford in the United Kingdom. "Research shows that vitamin B12 deficiency is a public health problem, especially among the elderly, so more vitamin B12 intake could help reverse this problem. Without carrying out a clinical trial, we acknowledge that it is still not known whether B12 supplementation would actually make a difference in elderly persons at risk for brain shrinkage."

"Previous research on the vitamin has had mixed results and few studies have been done specifically with brain scans in elderly populations. We tested for vitamin B12 levels in a unique, more accurate way by looking at two certain markers for it in the blood," said Vogiatzoglou.

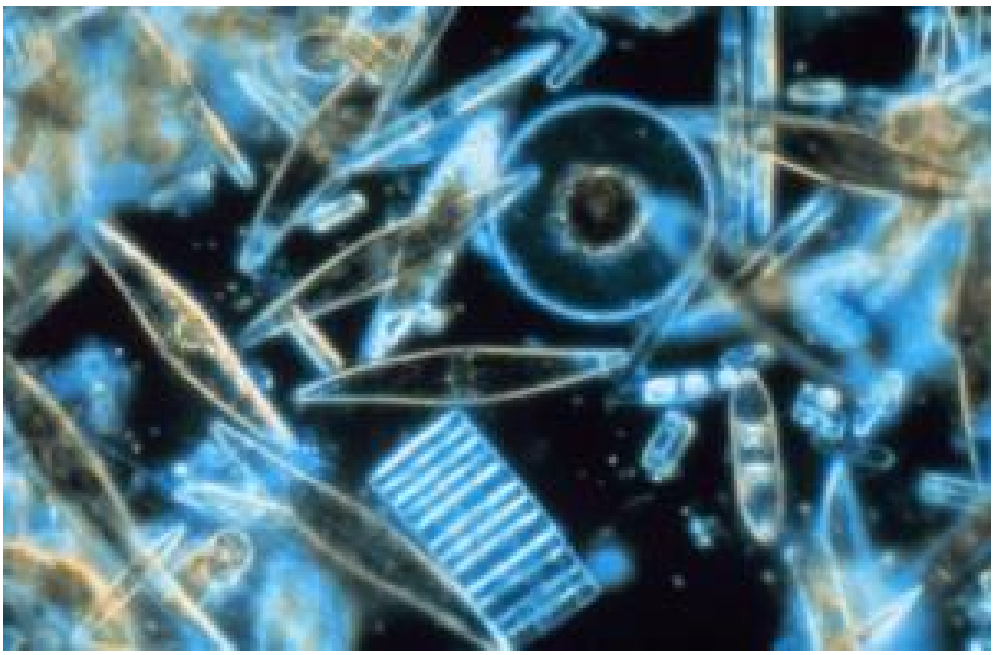
Vogiatzoglou says the study did not look at whether taking vitamin B12 supplements would have the same effect on memory.

The study was supported by the UK Alzheimer's Research Trust, the Medical Research Council, the Charles Wolfson Charitable Trust, the Norwegian Foundation for Health and Rehabilitation through the Norwegian Health Association, Axis-Shield plc and the Johan Throne Holst Foundation for Nutrition Research. The research was part of the program of the Oxford Project to Investigate Memory and Aging at the University of Oxford.

Adapted from materials provided by American Academy of Neurology.

http://www.sciencedaily.com/releases/2008/09/080908185121.htm

Toward Improved Antibiotics Using Proteins From Marine Diatoms



Researchers report a step toward development of a new type of antibiotic using proteins from marine diatoms. The above diatoms were living between crystals of sea ice in McMurdo Sound, Antarctica. (Credit: NOAA)

ScienceDaily (Sep. 11, 2008) — Researchers in Florida are reporting an advance toward tapping the enormous potential of an emerging new group of antibiotics identical to certain germ-fighting proteins found in the human immune system. Their study may help fight the growing epidemic of drug-resistant infections.In the new study, D. Matthew Eby, Glenn Johnson, and Karen Farrington point out that scientists have long eyed the germ-fighting potential of antimicrobial peptides (AMPs). These small proteins fight a wide range of bacteria and fungi in the body and have the potential to be developed into powerful drugs to overcome infections that are resistant to conventional drugs.

But scientists report difficulty producing effective AMPs because the antibiotics are fragile and easily destroyed in the body. An effective way to stabilize them is needed, they say.

In laboratory studies, the researchers showed that the coating protected the antibiotics from destruction by other chemicals while allowing the release of a controlled antibiotic dose for an extended period of time. These features are key to the effective use of AMPs as antibiotics, they say.

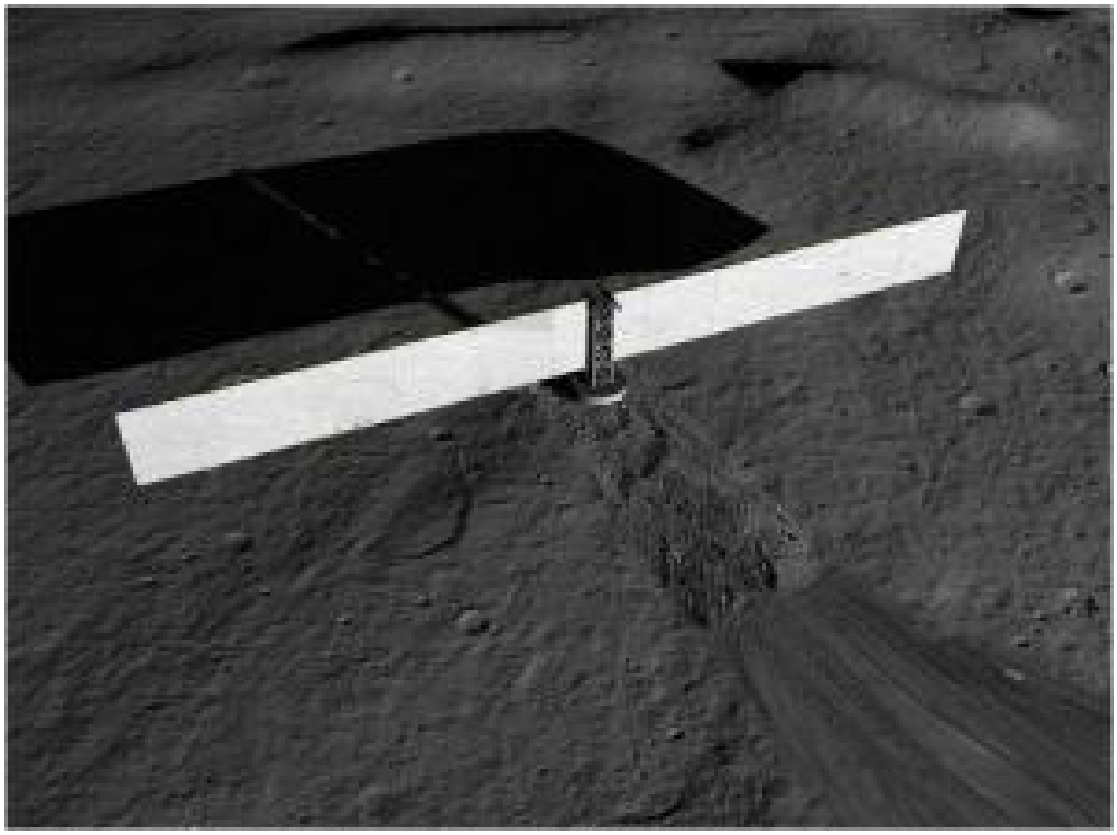
Journal reference:

1. Eby et al. **Synthesis of Bioinorganic Antimicrobial Peptide Nanoparticles with Potential Therapeutic Properties**. *Biomacromolecules*, 2008; 9 (9): 2487 DOI: 10.1021/bm800512e

Adapted from materials provided by American Chemical Society.

http://www.sciencedaily.com/releases/2008/09/080908101615.htm

NASA Developing Fission Surface Power Technology



An artist's concept of a fission surface power system on the surface of the moon. The nuclear reactor has been buried below the lunar surface to make use of lunar soil as additional radiation shielding. The engines that convert heat energy to electricity are in the tower above the reactor, and radiators extend out from the tower to radiate into space any leftover heat energy that has not been converted to electricity. The power system would transmit a steady 40 kW of electric power, enough for about eight houses on Earth, to the lunar outpost. (Credit: Courtesy of NASA)

ScienceDaily (Sep. 11, 2008) — NASA astronauts will need power sources when they return to the moon and establish a lunar outpost. NASA engineers are exploring the possibility of nuclear fission to provide the necessary power and taking initial steps toward a non-nuclear technology demonstration of this type of system.

A fission surface power system on the moon has the potential to generate a steady 40 kilowatts of electric power, enough for about eight houses on Earth. It works by splitting uranium atoms in a reactor to generate heat that then is converted into electric power. The fission surface power system can produce large amounts of power in harsh environments, like those on the surface of the moon and Mars, because it does not rely on sunlight. The primary components of fission surface power systems are a heat source, power conversion, heat rejection and power conditioning and distribution.

"Our goal is to build a technology demonstration unit with all the major components of a fission surface power system and conduct non-nuclear, integrated system testing in a ground-based space simulation facility," said Lee Mason, principal investigator for the test at NASA's Glenn Center in Cleveland. "Our long-term goal is to demonstrate technical readiness early in the next decade, when NASA is expected to decide on the type of power system to be used on the lunar surface."

Glenn recently contracted for the design and analysis of two different types of advanced power conversion units as an early step in the development of a full system-level technology demonstration. These power conversion units are necessary to process the heat produced by the nuclear reactor and efficiently convert it to electrical power.

The first design concept by Sunpower Inc., of Athens, Ohio, uses two opposed piston engines coupled to alternators that produce 6 kilowatts each, or a total of 12 kilowatts of power. The second contract with Barber Nichols Inc. of Arvada, Colo., is for development of a closed Brayton cycle engine that uses a high speed turbine and compressor coupled to a rotary alternator that also generates 12 kilowatts of power.

"Development and testing of the power conversion unit will be a key factor in demonstrating the readiness of fission surface power technology and provide NASA with viable and cost-effective options for nuclear power on the moon and Mars," said Don Palac, manager for Glenn's Fission Surface Power Project.

After a one year design and analysis phase, a single contractor will be selected to build and test a prototype power conversion unit. When complete, the power conversion unit will be integrated with the other technology demonstration unit's major components. Glenn will develop the heat rejection system and provide the space simulation facility. Glenn will also work in conjunction with the Department of Energy and NASA's Marshall Space Flight Center in Huntsville, Ala. Marshall will develop and provide a non-nuclear reactor simulator with liquid metal coolant as the heat source unit for this technology demonstration.

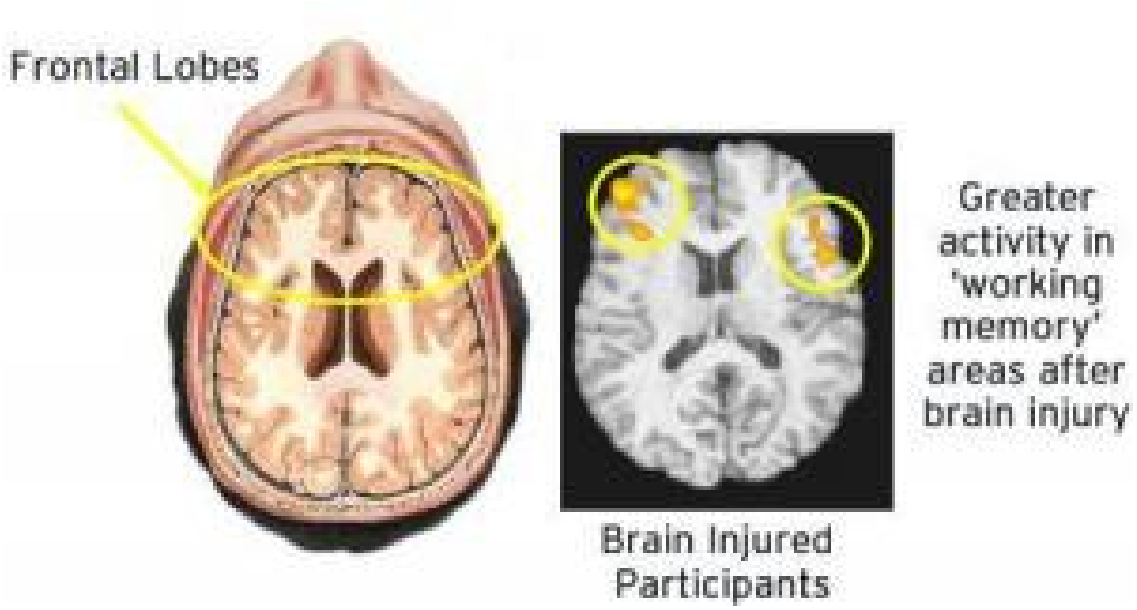
A nuclear reactor used in space is much different than Earth-based systems. There are no large concrete cooling towers, and the reactor is about the size of an office trash can. The energy produced from a space reactor is also much smaller but more than adequate for the projected power needs of a lunar outpost.

Testing of the non-nuclear system is expected to take place at Glenn in 2012 or 2013. These tests will help verify system performance projections, develop safe and reliable control methods, gain valuable operating experience, and reduce technology and programmatic risks. This technology demonstration is being conducted as part of NASA's Exploration Technology Development Program.

Adapted from materials provided by NASA/Glenn Research Center.

http://www.sciencedaily.com/releases/2008/09/080910161016.htm

Injured Brains 'Work Harder' To Perform At Same Level As Healthy People



The Baycrest study used functional magnetic resonance imaging (fMRI) to assess brain activity during performance of a mentally challenging task involving the control and manipulation of information held in mind. This "executive" or high level cognitive operation is important to many daily tasks, such as problem solving and organization. (Credit: Image courtesy of Baycrest Centre for Geriatric Care)

ScienceDaily (Sep. 11, 2008) — People who make a full recovery from head injury often report "mental fatigue" and feeling "not quite the same" – even though they scored well on standard cognitive tests.

Now brain imaging experts with Baycrest's Rotman Research Institute in Toronto have found a distinct "brain signature" in patients who have recovered from head injuries that shows their brains may have to work harder than the brains of healthy people to perform at the same level.

The patients in the study had diffuse axonal injury (DAI), the most common consequence of head injuries resulting from motor vehicle accidents, falls, combat-related blast injuries, and other situations where the brain is rattled violently inside the skull causing widespread disconnection of brain cells.

"Our imaging data revealed that the DAI patient brains had to work harder to perform at the same level as healthy, non-injured brains. Specifically, the brain injury patients showed a greater recruitment of regions of the prefrontal cortex and posterior cortices compared to healthy controls," said Dr. Gary Turner, who led the study as a part of his doctoral studies at Baycrest and the University of Toronto with senior author and Rotman scientist Dr. Brian Levine. The study is published in the Sept. 9th issue of Neurology, the medical journal of the American Academy of Neurology.

Even though the head injury patients performed as well as the healthy controls on a series of working memory tests that measured their ability to organize, plan and problem solve, the fact their brains had to work harder is an indication of "reduced cognitive efficiency", explained Dr. Turner, who is now completing a post-doctoral fellowship with the Helen Wills Neuroscience Institute at the University of California, Berkeley, where he is working to develop assessments and programs to enhance cognitive skills in people with head injury and normal aging patients.

Using standard techniques for imaging resting brain function, doctors typically look for reduced blood flow in certain regions to indicate neural damage. The Baycrest study used functional magnetic resonance

imaging (fMRI) to assess brain activity during performance of a mentally challenging task involving the control and manipulation of information held in mind. This "executive" or high level cognitive operation is important to many daily tasks, such as problem solving and organization.

"Our study adds to an emerging line of evidence that increased blood flow to areas not normally recruited during challenging mental tasks is related to reduced cognitive efficiency in patients with head injury," added Dr. Levine, who is internationally-recognized for his research on recovery and reorganization of brain function after traumatic brain injury.

The eight patients in the Baycrest study had been in motor vehicle accidents several years prior, sustaining significant brain injuries that left them comatose for various lengths of time; yet all patients made good recoveries as evidenced by a return to pre-injury employment or school. Their fMRI scans were compared to 12 healthy adults, matched to the patients for age and education.

The Baycrest study is the first to recruit patients and healthy controls that were evenly matched in cognitive performance from the outset. The study included only head injury patients with DAI and not other large brain lesions – thus yielding the strongest evidence to date that head injury patients' brains work harder than those of non-injured people despite equivalent performance on tests – and that this is caused by DAI and not by other accompanying brain damage that can occur with significant head injury.

Implications

Approximately 1.4 million Americans sustain head injuries each year, with associated costs estimated at $40 billion (according to the Centers for Disease Control and Prevention). The bulk of these costs are attributable to cognitive and behavioural changes, yet these changes are not well understood because DAI is widespread and difficult to pinpoint using standard brain imaging techniques. According to calculations in the Canadian Institute for Health Information's 2007 Report – The Burden of Neurological Diseases, Disorders and Injuries in Canada – over 200,000 Canadians sustain head injuries each year.

Drs. Turner and Levine say their findings are an important step in the future development of therapies that will help brain injury patients become more efficient in their cognitive processing. "Using neuroimaging methods to measure 'cognitive efficiency' in the brain, as indicated by altered functional recruitment of brain regions during a memory task, may one day become a standard metric of rehabilitation outcome," said Dr. Levine.

The study was funded by a grant from the NIH – National Institute of Child Health and Human Development. Baycrest, an academic health sciences centre affiliated with the University of Toronto, is internationally renowned for its care of aging adults and its excellence in aging brain research, clinical interventions, and promising cognitive rehabilitation strategies.

Journal reference:

1. Gary R. Turner, and Brian Levine. **Augmented neural activity during executive control processing following diffuse axonal injury**. *Neurology*, 2008; 71 (11): 812 DOI: 10.1212/01.wnl.0000325640.18235.1c

Adapted from materials provided by Baycrest Centre for Geriatric Care.

http://www.sciencedaily.com/releases/2008/09/080908185125.htm

Cryopreservation Techniques Bring Hopes For Women Cancer Victims And Endangered Species

Cryopreservation promises to restore fertility for women after diseases such as ovarian cancer that lead to destruction of reproductive tissue. The same technique can also be used to maintain stocks of farm animals, and protect against extinction of endangered animal species. (Credit: iStockphoto)

ScienceDaily (Sep. 11, 2008) — Emerging cryopreservation techniques are increasing hope of restoring fertility for women after diseases such as ovarian cancer that lead to destruction of reproductive tissue. The same techniques can also be used to maintain stocks of farm animals, and protect against extinction of endangered animal species by maintaining banks of ovarian tissue or even nascent embryos that can be used to produce offspring at some point in the future.

Until now these clearly related fields of research concerning preservation of animal and human ovarian tissue have been largely separate, but are now coming together to reinforce each other, following a highly successful workshop on cryopreservation of ovarian tissue, organised by the European Science Foundation (ESF). The human and animals cryopreservation fields have much to teach each other, and progress in both is likely to be accelerated as a result of growing collaboration, according to the ESF workshop's convenor Claus Yding Andersen.

Both parties can learn from each other," said Andersen. "Experiments which cannot be performed in women can be done in animal species," he noted, pointing out that much of the progress in humans has come as a result of animal experiments. But it is in humans where most successful transplantations of frozen ovarian tissue after thawing have been carried out, and where greatest experience in the field has been gained. Therefore the ESF conference considered how this could be applied to conservation of endangered species. "The vast experience in women, with several children born as a result of transplantation of frozen/thawed ovarian tissue, can be applied in endangered species to know where to implant and how to obtain pregnancies," said Andersen. The techniques will also be valuable in agriculture, for preserving ovaries of farm animals in tissue banks with the potential for subsequent re-creation.

The conference highlighted recent progress in human ovarian cryopreservation, which has led so far to 25 women worldwide having ovarian tissue transplanted. Of these 25, five have given birth to babies following the successful transplantation of the frozen/thawed ovarian tissue, including two in Belgium, one in Israel, and two in Denmark. "We are likely to see a lot more of this coming in the coming years, including development of techniques for fertility preservation using different approaches," said Andersen. Most of these women had lost fertility following treatment for various forms of cancer. Currently more than a thousand women globally have had their tissue cryopreserved in an attempt to preserve fertility. This number is likely to increase in future as the transplantation technology becomes more mature and widely available.

The approach used most widely so far for cryopreservation involves slow freezing, which minimises the damage caused by forming ice crystals to the follicles, the reproductive units containing the individual oocytes (eggs). However a new approach based on vitrification may achieve even better results, with both methods discussed at the ESF conference. Vitrification involves the conversion of ovarian tissue into a glass-like form without the damaging ice crystals, and can be achieved by very rapid freezing, for example by dowsing in liquid nitrogen. This supercools the water in the tissue, achieving a semi-solid form without formation of the crystals that destroy individual cells.

The ESF workshop will help give Europe a healthy base to expand cryopreservation research by unifying the human and animal sectors and applying common expertise and tools." I believe that we had a very good interaction between all participants and the workshop has already established new collaborations and interactions," said Andersen.

The ESF workshop, CryopreservationOf Ovarian Tissue In Cancer Patients, Farm Animals And Endangered Species, was held in Heidelberg, Germany in May 2008. Each year, ESF supports approximately 50 Exploratory Workshops across all scientific domains. These small, interactive group sessions are aimed at opening up new directions in research to explore new fields with a potential impact on developments in science.

Adapted from materials provided by European Science Foundation.

http://www.sciencedaily.com/releases/2008/09/080910090825.htm

1843 Stellar Eruption May Be New Type Of Star Explosion

An artist's conception of the fast blast wave from Eta Carinae's 1843 eruption, which today has caught up with a slow-moving shell ejected in a previous outburst about 1,000 years ago, producing a bright fireworks display that heats the older shell and makes it emit X-rays (orange). The well-known two-lobed "Homunculus" nebula, a slow-moving shell of gas and dust also produced in the 1843 eruption, is shown closer to the star, which is a hot blue supergiant. (Credit: Gemini Observatory artwork by Lynette Cook)

ScienceDaily (Sep. 11, 2008) — Eta Carinae, the galaxy's biggest, brightest and perhaps most studied star after the sun, has been keeping a secret: Its giant outbursts appear to be driven by an entirely new type of stellar explosion that is fainter than a typical supernova and does not destroy the star.

Reporting in the Sept. 11 issue of Nature, University of California, Berkeley, astronomer Nathan Smith proposes that Eta Carinae's historic 1843 outburst was, in fact, an explosion that produced a fast blast wave similar to, but less energetic than, a real supernova. This well-documented event in our own Milky Way Galaxy is probably related to a class of faint stellar explosions in other galaxies recognized in recent years by telescopes searching for extragalactic supernovae.

"There is a class of stellar explosions going off in other galaxies for which we still don't know the cause, but Eta Carinae is the prototype," said Smith, a UC Berkeley postdoctoral fellow.

Eta Carinae (η Car) is a massive, hot, variable star visible only from the Southern Hemisphere, and is located about 7,500 light years from Earth in a young region of star birth called the Carina Nebula. It was observed to brighten immensely in 1843, and astronomers now see the resulting cloud of gas and dust, known as the Homunculus nebula, wafting away from the star. A faint shell of debris from an earlier explosion is also visible, probably dating from around 1,000 years ago.

Presumably blown off by the star's fierce wind, the shells of gas and dust are moving slowly - at speeds of 650 kilometers per second (1.5 million miles per hour) or less - compared to the blast shell of a supernova.

Smith's recent observations using the international Gemini South 8-meter telescope and the Blanco 4-meter telescope at Cerro Tololo Inter-American Observatory in Chile reveal something new: Extremely fast filaments of gas moving five times faster than the debris in the Homunculus nebula were propelled away from Eta Carinae in the same event. The amount of mass in the relatively slow-moving Homunculus was already at the edge of plausibility in terms of what an extreme stellar wind could do physically, Smith said. The much faster and more energetic material he discovered poses even harsher difficulties for current theories.

Instead, the speeds and energies involved are reminiscent of material accelerated by the fast blast wave of a supernova explosion.

The fast speeds in this blast wave could roughly double earlier estimates of the energy released in the 1843 eruption of Eta Carinae, an event that Smith argues was not just a gentle surface eruption driven by the stellar wind, but an actual explosion deep in the star that sent debris hurtling into interstellar space. In fact, the fast-moving blast wave is now colliding with the slow-moving cloud from the 1,000-year-old eruption and generating X-rays that have been observed by the orbiting Chandra Observatory.

"These observations force us to modify our interpretation of what happened in the 1843 eruption," he said. "Rather than a steady wind blowing off the outer layers, it seems to have been an explosion that started deep inside the star and blasted off its outer layers. It takes a new mechanism to cause explosions like this."

If Smith's interpretation is correct, supermassive stars like Eta Carinae may blow off large amounts of mass in periodic explosions as they approach the end of their lives before a final, cataclysmic supernova blows the star to smithereens and leaves behind a black hole.

Much fainter than a supernova, the explosion that generated the fast-moving blast wave around Eta Carinae would have been similar to faint stellar explosions, sometimes called "supernova imposters," now being discovered in other galaxies by Earth-based robotic telescopes and other supernova searches. Such searches have been looking primarily for Type Ia supernovae that could help astronomers understand the accelerating expansion of the universe, but they also find other gems along the way, Smith said.

"Looking at other galaxies, astronomers have seen stars like Eta Carinae that get brighter, but not quite as bright as a real supernova," he said. "We don't know what they are. It's an enduring mystery as to what can brighten a star that much without destroying it completely."

Eta Carinae is a rare supermassive star in our galaxy, probably once having had a mass 150 times that of the sun. Such large stars burn brightly for only a few million years, all the while shedding mass as the intense light pushes the outer layers of the star away in a stellar wind. After 2 to 3 million years of this, Eta Carinae now weighs about 90 to 100 solar masses, having shed about 10 solar masses in its most recent 1843 eruption alone.

"These explosions may be the primary way by which massive stars can shed their outer hydrogen layers before they die," Smith said. "If Eta Carinae is able to shed 10 solar masses every thousand years or so, that's an efficient mechanism for peeling off a large fraction of the star."

Astronomers now believe that Eta Carinae and other luminous blue variable stars are nearing the end of their lives, having burned hydrogen in their cores into helium. If they explode at the stage where they still have an envelope of hydrogen shrouding the helium core, the resulting supernova will look vastly different from one that results from a star that sloughs off all its hydrogen before exploding.

Smith suggests that it is still unclear if supernova impostors are scaled-down versions of supernovae, failed supernovae, precursor events or entirely different kinds of explosions.

"This could be an important clue for understanding the last violent phases in the lives of massive stars," he said, noting that astronomers still cannot accurately predict the fate of stars that are 30 or more times the mass of the sun.

The observations reported in the Nature paper included visible spectra from the Blanco telescope, which is part of the U.S. National Optical Astronomy Observatory (NOAO), and near-infrared spectra taken with the Gemini South telescope. Both telescopes are in Chile's Andes mountains near an elevation of 9,000 feet. NOAO and the Gemini Observatory are operated by the Association of Universities for Research in Astronomy.

The research was supported in part by the National Aeronautics and Space Administration and the National Science Foundation.

Adapted from materials provided by University of California - Berkeley.

http://www.sciencedaily.com/releases/2008/09/080910133659.htm

Geologists Dig Up One Of The Largest Lakes In The World, Dammed By Ice During Last Ice Age

Geologist, Maria Jensen, is digging into an old lake bed, searching for past changes in climate. Here she is in the long Tolokonka cutting beside the River Dvina. (Credit: Image courtesy of Geological Survey of Norway)

ScienceDaily (Sep. 11, 2008) — Geologists are digging in the bed on the western bank of what was once a 700-800 kilometre-long lake along the 62nd parallel in Russia. Large lakes, dammed up by a huge ice sheet one or more times during the last Ice Age, used to dominate this enormous plain.

They are just beyond the ice margin from the maximum of the last Ice Age, where it has been mapped 100 kilometres north of the town of Kotlas in north-western Russia.

Here, at Tolokonka, in a four kilometre-long cutting beside the River Dvina, an international team of scientists is busy studying the past changes in climate.

“Lakes have probably been situated here in two periods during the last Ice Age. We’ve found river delta deposits which suggest that the oldest lake formed some 65 000 years ago,” Eiliv Larsen, a geologist at the Geological Survey of Norway (NGU) said.

He is in charge of fieldwork being done in Russia as part of the SciencePub project during the International Polar Year. Along with colleagues from NGU, the University Centre in Svalbard (UNIS) and Hertzen University in St. Petersburg, he is continually finding new pieces to fit into the last Ice Age jig-saw puzzle.

Right on the margin

The enormous lake stretched from Kotlas in the west to the village of UstNem in the east, just a few tens of kilometres from the Ural Mountains. Last year, the scientists found remnants of a lake near UstNem.

Now, the same lake has been found 700-800 kilometres further west, in the long cutting at Tolokonka. The mighty River Dvina, meandering north-westwards through the flat landscape to Archangel, dominates this region today.

"We're trying to find out just what these lakes have looked like. Where did the sediments come from and how did the lakes influence the environment and the climate in the region? Even though we're just beyond the ice margin, we're finding traces of the snout of a glacier that calved into the lake from the north. This probably took place around 20 000 years ago and this

Future climate

The scientists have said that it is very interesting to find out what took place when the ice finally melted, the dams burst and the enormous volumes of dammed up fresh water poured into the Arctic Ocean. This must have had consequences for the climate system and the oceanic circulation, for example.

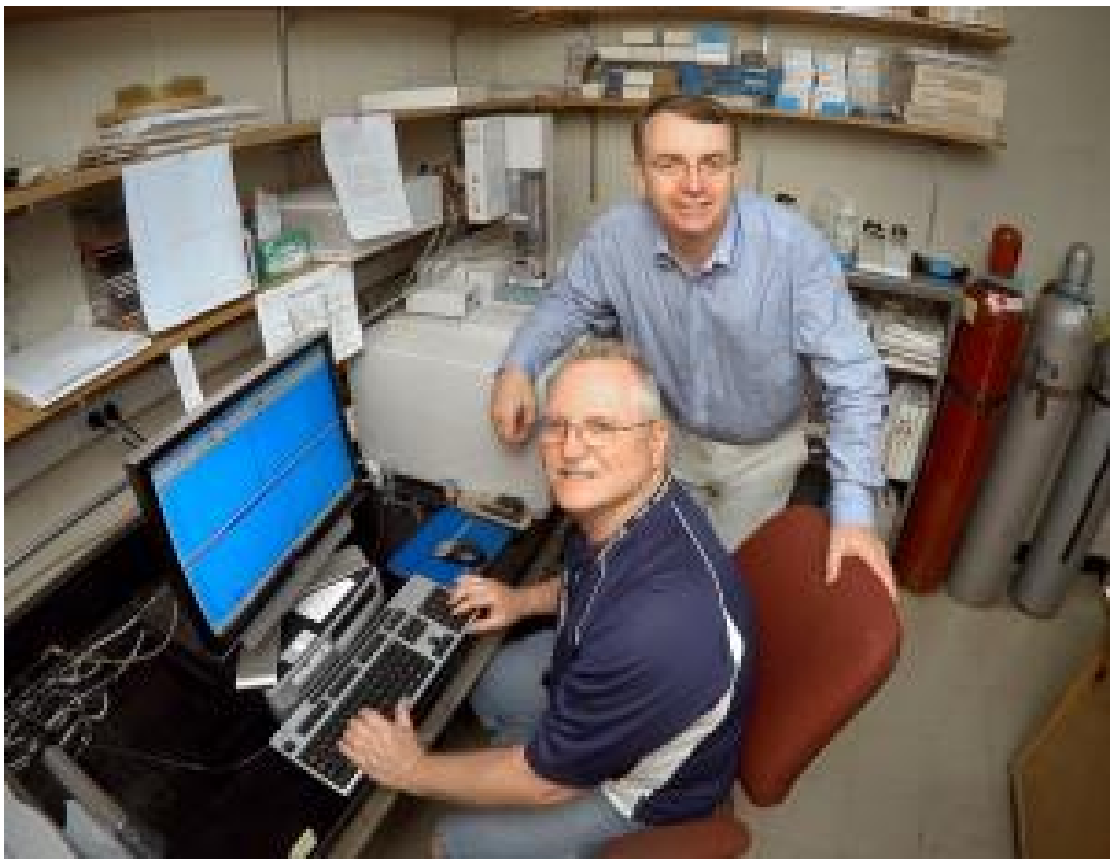
"We ourselves are urged on by curiosity. When we started working in these parts of Russia 12 or 13 years ago, very little research had been done on the Ice Age. The results of our work now form part of the framework which climate researchers are using to calculate the future climate," says Eiliv Larsen.

He generally uses a keyhole as a metaphor. "From a distance, you see hardly anything of the inside of the room, but the closer you manage to put your eye to the keyhole, the more of the room becomes apparent. It's the same with the research here in north-western Russia, we're uncovering more and more of the Ice Age history and hence the past climate changes," he says.

Adapted from materials provided by Geological Survey of Norway.

http://www.sciencedaily.com/releases/2008/09/080908073744.htm

Enzyme Detectives Uncover New Reactions: Implications For Engineering Biofuels



Whittle (seated) and John Shanklin (standing). (Credit: Image courtesy of DOE/Brookhaven National Laboratory)

ScienceDaily (Sep. 11, 2008) — If your experiment doesn't go the way you expect, take a closer look -- something even more interesting may have happened. That strategy has led scientists at the U.S. Department of Energy's (DOE) Brookhaven National Laboratory to discover a fundamental shift in an enzyme's function that could help expand the toolbox for engineering biofuels and other plant-based oil products. The results will be published online the week of September 8, 2008, in the Proceedings of the National Academy of Sciences.

The Brookhaven scientists were trying to understand the factors that affect where carbon-carbon double bonds are placed in fatty acids, the building blocks of oils and fats, when they are "desaturated" -- that is, when a desaturase enzyme removes hydrogen from the carbon chain.

"Placing double bonds in different positions allows you to change the structure of the fatty acids to make products with different potential applications," explained Brookhaven biochemist John Shanklin, who led the research. The ultimate goal: engineering designer plant oils to be used as biofuels and/or raw materials to reduce the use of petroleum.

To try to change the position of a double bond, the Brookhaven team modified a desaturase enzyme, changing three of the 363 amino acids in its protein sequence. But when they tested the modified enzyme and looked for the expected product with its altered double-bond position, it wasn't there.

They could have moved on and made different amino acid changes to accomplish the initial goal. But Brookhaven research associate Edward Whittle was determined to figure out what was going on with the unusual result. "The substrate, or starting material, had been used up, so something was being produced -- substrates can't just disappear," Whittle said. "If it wasn't the product we were looking for, what was it?"

Whittle's detective work uncovered a remarkable discovery. Instead of producing a shift in double-bond position, the enzyme modification had yielded three completely new products -- two variations of a hydroxylated product called an allylic alcohol and a fatty acid containing two double bonds. "This was a profound shift in enzyme function," noted Shanklin, who has been working with modified enzymes for 15 years. "Usually you make changes very gradually, getting a few percent of a new product mixed with the original product. This was more like throwing a switch, making the change in function close to complete."

The discovery is also notable because the starting enzyme, like other soluble (membrane-independent) desaturases, can ordinarily perform only its one specified reaction -- desaturation. This is unlike desaturase enzymes that reside within the cell membrane, which appear to be more versatile, performing a range of reactions. The soluble and membrane enzymes, however, do share one key feature: both perform reactions that require the production of a highly reactive form of oxygen.

"Since both classes of enzymes produce activated oxygen, in theory the soluble enzymes, like their membrane counterparts, should be able to perform a variety of reactions as well," Shanklin said. "Our work demonstrates that this is indeed the case. Making small changes to the enzyme's amino acid sequence has unlocked the soluble desaturase's potential to facilitate a wider range of chemistry than has been seen before," Shanklin said.

The challenge is to figure out how these structural changes to the enzyme lead to the observed changes in reaction chemistry. Computer-generated models combining the known structure of the starting enzyme in conjunction with its new substrates are helping the scientists understand how the enzyme works. The next step is to obtain real 3-D crystal structures of enzyme-substrate complexes, using the National Synchrotron Light Source at Brookhaven Lab, to see how they match up with the predictions.

Analyzing the structures of soluble enzymes is much simpler than obtaining structures for membrane enzymes. So, in effect, this work is a fast-track approach for correlating structure with function, which should help scientists gain general mechanistic insights relevant to both classes of enzymes. "Understanding how nature has figured out how to do this very difficult chemistry, and how to control that chemistry," Shanklin said, "would be extremely satisfying from a purely scientific perspective. But applying this knowledge could have benefits for us all."

"Right now, the materials we use -- the plastics, foams, nylons -- have been limited by the structures of petroleum-based chemical feedstocks. But if we understand how to engineer designer desaturase-like plant enzymes, we can tailor-make feedstocks with optimal properties, instead of relying on the properties of preexisting raw materials," said Shanklin. "We'd no longer have to say, 'this is what we have, so this is what we can make.' Instead, we could make the best feedstock for a particular application by designing the raw materials that will yield it."

This research was funded by the Office of Basic Energy Sciences within DOE's Office of Science, and by the Natural Sciences and Engineering Research Council of Canada. In addition to Shanklin and Whittle, the research team includes Amy Tremblay and Peter Buist of Carleton University in Ottawa, Canada.

Adapted from materials provided by DOE/Brookhaven National Laboratory.

http://www.sciencedaily.com/releases/2008/09/080908185129.htm

Immaturity Of The Brain May Cause Schizophrenia

The immaturity of the dentate gyrus -- located in the hippocampus of the brain -- may be an underlying cause for schizophrenia. (Credit: iStockphoto/Vasiliy Yakobchuk)

ScienceDaily (Sep. 11, 2008) — The underdevelopment of a specific region in the brain may lead to schizophrenia in individuals. According to research published today in BioMed Central's open access journal Molecular Brain, dentate gyrus, which is located in the hippocampus in the brain and thought to be responsible for working memory and mood regulation, remained immature in an animal model of schizophrenia.

Professor Tsuyoshi Miyakawa of Fujita Health University, National Institute for Physiological Sciences (NIPS), and Kyoto University led a research team in Japan, with support from the CREST program of Japan Science and Technology Agency (JST).

First, the team investigated behaviors by conducting a systematic and well-defined behavioral test battery with alpha-CaMKII mutant mice, an animal model of schizophrenia. These mice showed abnormal behaviors similar to those of schizophrenic patients.

Next, the team found the dentate gyrus neurons in hippocampus of the brain of these mice were not matured morphologically and physiologically. By a gene expression analysis, changes of gene expression related to the maturation of dentate gyrus neurons were also found in the brains of schizophrenic patients.

Taken together, the immaturity of the dentate gyrus may be an underlying cause for schizophrenia.

Among their findings, mice heterozygous for a null mutation of the alpha-isoform of calcium/calmodulin-dependent protein kinase II show profoundly dysregulated behaviors, including a severe working memory deficit and an exaggerated infradian rhythm (cycle of increases and decreases in locomotor activity in

their home cage; 2-3 weeks/cycle), which are comparable to the symptoms observed in patients with schizophrenia, bipolar disorder and other psychiatric disorders.

Despite extensive research, the brain mechanisms of schizophrenia remain largely unknown. According to Professor Miyakawa, one reason for this is that clinical diagnosis in the area of psychiatry is based solely on subjective observations and not on biologically or objectively solid criteria, "As a result of this limitation, most of the psychiatric disorders currently diagnosed as a single disorder are likely to comprise several biologically distinct heterogeneous populations. Therefore, the identification and investigation of more reliable biomarkers that characterize a single subpopulation of a specific psychiatric disorder are essential for increasing the understanding of the pathogenesis/pathophysiology of such disorders."

The authors note that, "'Immature dentate gyrus' could provide a basis for such biomarkers that may help produce new diagnosis and treatment for schizophrenia patients".

Journal reference:

1. Nobuyuki Yamasaki, Motoko Maekawa, Katsunori Kobayashi, Yasushi Kajii, Jun Maeda, Miho Soma, Keizo Takao, Koichi Tanda, Koji Ohira, Keiko Toyama, Kouji Kanzaki, Kohji Fukunaga, Yusuke Sudo, Hiroshi Ichinose, Masashi Ikeda, Nakao Iwata, Norio Ozaki, Hidenori Suzuki, Makoto Higuchi, Tetsuya Suhara, Shigeki Yuasa, Tsuyoshi Miyakawa. **Alpha-CaMKII deficiency causes immature dentate gyrus, a novel candidate endophenotype of psychiatric disorders**. *Molecular Brain*, 2008, 1:6 (10 September 2008) [link]

Adapted from materials provided by BioMed Central Limited, via AlphaGalileo.

http://www.sciencedaily.com/releases/2008/09/080910133341.htm

Oldest Sheep Contribute Most To Population Growth When Climate Changes Making Conditions Harsh

Oldest sheep make larger contributions to population growth when conditions are harsh. (Credit: Owen Jones)

ScienceDaily (Sep. 11, 2008) — Populations of wild animals face the challenge of surviving in a changing climate. Researchers at Imperial College London and Université Claude Bernard Lyon have shown how a sheep population on a remote island off the west coast of Scotland responds to two consequences of climate change: altered food availability and the unpredictability of winter storms.

Dr. Thomas Ezard, lead author of the study, revealed, "When times are good and food is plentiful, lambs contribute almost twice as much to changes in population size than when times are hard. On the flip side, the oldest sheep contribute most to population growth when conditions are harsh."

The work suggests that the dynamics of populations are influenced not only by the weather but also by the ability of individuals to respond to it.

New mathematical breakthroughs have made it possible to show how environmental change affects populations, like these sheep.

The key is appreciating

1. how weather affects individual sheep and
2. how the weather changes from one year to the next.

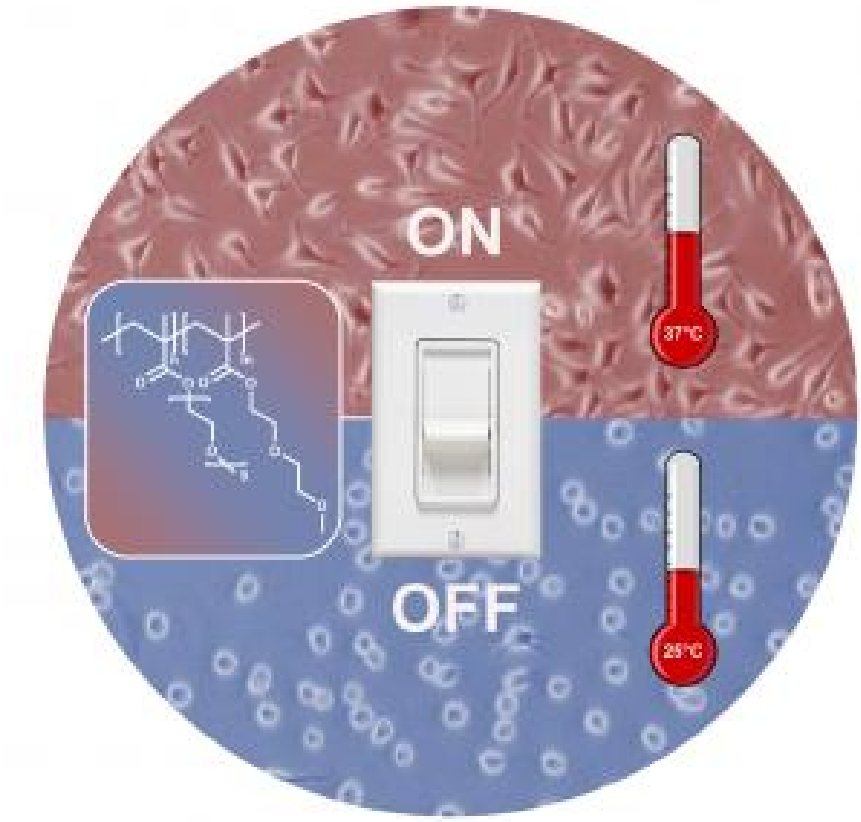
If consecutive years have similar weather, the dynamics of the population will be very different than if conditions are unrelated from one year to the next.

Professor Tim Coulson concluded, "A thorough understanding of the likely effects of climate change on the ecology of wild populations requires linking populations to their environment. This demands application of innovative mathematical methods, as used here."

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

http://www.sciencedaily.com/releases/2008/09/080905153847.htm

Switchable Bio-adhesion



At 37°C, biological cells adhere to the new polymer material (above). When the substrate is cooled to room temperature, the cells try to avoid contact by curling up into almost spherical shapes that can be rinsed off easily (below). (Credit: Copyright Fraunhofer IAP)

ScienceDaily (Sep. 11, 2008) — Researchers have developed a new type of property-changing polymer: It is water-repellent at 37°C, which makes it an ideal culture substrate for biological cells. At room temperature it attracts water, allowing the cells to be detached easily from the substrate.

What effects do new drugs have on the human body – particularly at cellular level? Can doctors administer them without risk, or do they have toxic side effects? Pharmaceutical companies carry out a variety of toxicity tests on new drugs in order to answer such questions. Cell cultures form the basis for these tests: The researchers place isolated cells in small plastic dishes, add a nutrient solution and place the dishes in an incubator heated to 37 degrees Celsius. To provide an ideal breeding ground for the cells, the dishes are made of insulating polystyrene.

Once the cells have multiplied to the required number, the drug is added. However, to examine the cells' reaction to the drug, the researchers then have to remove the cultured cells from the dish. The problem is that the cells often adhere so firmly to the surface of the dish that an enzyme has to be introduced to detach them. "The cells employed in toxicity tests are particularly sensitive, and can be damaged by the added enzyme. This makes it difficult to interpret the test results. It cannot be established without doubt whether the cells' reaction to the drug has been influenced by damage caused by the method used to extract them from the dish" says Dr. Claus Duschl, department head at the Fraunhofer Institute for Biomedical Engineering IBMT in Potsdam-Golm.

A possible solution is the stimuli-responsive polymer developed by a team led by Dr. Jean-François Lutz of the Fraunhofer Institute for Applied Polymer Research IAP, assisted by colleagues at the IBMT and the Max Planck Institute of Colloids and Interfaces. "At 37 degrees Celsius, the usual incubation temperature for cell cultures, this material is water-repellent (hydrophobic) – the cells feel at ease in this environment and respond by multiplying rapidly. If the substrate is cooled to 25 degrees, equivalent to room temperature, the material becomes hydrophilic (attracts water): The cells try to avoid contact with the substrate by reducing their surface area, curling up into almost spherical shapes. This enables them to be rinsed off easily, so there is no longer any need to add an enzyme," explains Lutz.

This is not the first thermoresponsive polymer. The big difference is that it is based on polyethylene glycol (PEG), which unlike other materials of this type is biocompatible. It is thus an ideal substrate for cell cultures. The new material has the added advantage of being water-soluble and non-toxic. Lutz estimates that it will be possible to mass-produce Petri dishes coated with the new property-changing polymer in about two or three years' time.

Adapted from materials provided by Fraunhofer-Gesellschaft.

http://www.sciencedaily.com/releases/2008/09/080908105358.htm

Brightest Gamma-ray Burst Provides Wealth Of Information On How Stars Explode

ScienceDaily (Sep. 11, 2008) — Astronomers from around the world combined data from ground- and space-based telescopes to paint a detailed portrait of the brightest explosion ever seen. The observations reveal that the jets of the gamma-ray burst called GRB 080319B were aimed almost directly at the Earth.

GRB 080319B was so intense that, despite happening halfway across the Universe, it could have been seen briefly with the unaided eye (ESO 08/08). In a paper to appear in the 11 September issue of Nature, Judith Racusin of Penn State University, Pennsylvania (USA), and a team of 92 co-authors report observations across the electromagnetic spectrum that began 30 minutes before the explosion and followed it for months afterwards.

“We conclude that the burst's extraordinary brightness arose from a jet that shot material almost directly towards Earth at almost the speed of light – the difference is only 1 part in 20 000,” says Guido Chincarini, a member of the team.

Gamma-ray bursts are the Universe's most luminous explosions. Most occur when massive stars run out of fuel. As a star collapses, it creates a black hole or neutron star that, through processes not fully understood, drives powerful gas jets outward. As the jets shoot into space, they strike gas previously shed by the star and heat it, thereby generating bright afterglows.

The team believes the jet directed toward Earth contained an ultra-fast component just 0.4 degrees across (this is slightly smaller than the apparent size of the Full Moon). This jet is contained within another slightly less energetic jet about 20 times wider.

The broad component is more typical of other bursts. “Perhaps every gamma-ray burst has a narrow jet, but astronomers miss it most of the time,” says team member Stefano Covino. “We happened to view this monster down the barrel of the very narrow and energetic jet, and the chance for this nearly head-on alignment to occur is only about once a decade,” added his colleague Cristiano Guidorzi.

GRB 080319B was detected by the NASA/STFC/ASI Swift satellite towards the constellation of Boötes, the ”Herdsman”. A host of ground-based telescopes reacted promptly to study this new object in the sky, including ESO’s Very Large Telescope, which was the first to provide the distance of the object, 7.5 billion light-years. The visible light from the burst was detected by a handful of wide-field cameras worldwide that are mounted on telescopes constantly monitoring a large fraction of the sky. One of these was the TORTORA camera mounted on the 0.6-m REM telescope at ESO’s La Silla Observatory (ESO 26/07).

TORTORA’s rapid imaging provides the most detailed look yet at the visible light associated with the initial blast of a gamma-ray burst. "We've been waiting a long time for this one," says TORTORA senior scientist Grigory Beskin of Russia's Special Astrophysical Observatory. The data collected simultaneously by TORTORA and the Swift satellite allowed astronomers to explain the properties of this burst.

Journal reference:

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Adapted from materials provided by European Southern Observatory - ESO.

http://www.sciencedaily.com/releases/2008/09/080910121502.htm

Dirty Air Brings Rain – Then Again, Maybe Not: Scientists Reconcile Contradictory Effects

Smoke from agricultural fires suppresses rainfall from a cloud over the Amazon (right). A similar size cloud (left) rains heavily on the same day some distance away in the pristine air. (Credit: Hebrew University photo)

ScienceDaily (Sep. 11, 2008) — An international team of scientists, headed by Prof. Daniel Rosenfeld of the Institute of Earth Sciences at the Hebrew University of Jerusalem, has come up with a surprising finding to the disputed issue of whether air pollution increases or decreases rainfall. The conclusion: both can be true, depending on local environmental conditions.

The determination of this issue is one with significant consequences in an era of climate change and specifically in areas suffering from manmade pollution and water shortages, including Israel.

In an article appearing in the Sept 5 issue of the journal Science, the scientific team, which included researchers from Germany, has published the results of its research untangling the contradictions surrounding the conundrum. They do this by following the energy flow through the atmosphere and the ways it is influenced by aerosol (airborne) particles. This allows the development of more exact predictions of how air pollution affects weather, water resources and future climates.

Mankind releases huge amounts of particles into the air that are so tiny that they float. Before being influenced by man, air above land contained up to twice as many of these so called aerosol particles as air above oceans. Nowadays, this ratio has increased to as much as a hundredfold.

Natural and manmade aerosols influence our climate – that much is agreed. But which way do they push it? They produce more clouds and more rain, some say. They produce fewer clouds and less rain, say others. This disputed role of aerosols has been the greatest source of uncertainties in our understanding of the climate system, including the question of global warming.

"Both camps are right", says Prof. Meinrat O. Andreae, director of the Max Planck Institute for Chemistry in Germany, a coauthor of the publication. "But you have to consider how many aerosol particles there are." The lead author, Prof. Rosenfeld of the Hebrew University, adds: "The amount of aerosols is the critical factor controlling how the energy is distributed in the atmosphere." Clouds, and therefore precipitation, come about when moist, warm air rises from ground level and water condenses or freezes on the aerosols aloft. The energy responsible for evaporating the water from the earth's surface and lifting the air is provided by the sun.

Aerosols act twofold: On the one hand, they act like a sunscreen reducing the amount of sun energy reaching the ground. Accordingly, less water evaporates and the air at ground level stays cooler and drier, with less of a tendency to rise and form clouds.

On the other hand, there would be no cloud droplets without aerosols. Some of them act as gathering points for air humidity, so called condensation nuclei. On these tiny particles with diameters of less than a thousandth of a millimeter the water condenses – similar to dew on cold ground – releasing energy in the process. This is the same energy that was earlier used to evaporate the water from the earth's surface. The released heat warms the air parcel so that it can rise further, taking the cloud droplets with it.

But if there is a surplus of these gathering points, the droplets never reach the critical mass needed to fall to earth as rain – there just is not enough water to share between all the aerosol particles. Also, with a rising number of droplets their overall surface increases, which increases the amount of sunlight reflected back to space and thus cooling and drying the earth.

In a nutshell, then, the study results show the following: With rising pollution, the amount of precipitation at first rises, than maxes out and finally falls off sharply at very high aerosol concentrations. The practical result is that in relatively clean air, adding aerosols up to the amount that releases the maximum of available energy increases precipitation. Beyond that point, increasing the aerosol load even further lessens precipitation. Therefore, in areas with high atmospheric aerosol content, due to natural or manmade conditions, the continuation or even aggravation of those conditions can lead to lower than normal rainfall or even drought.

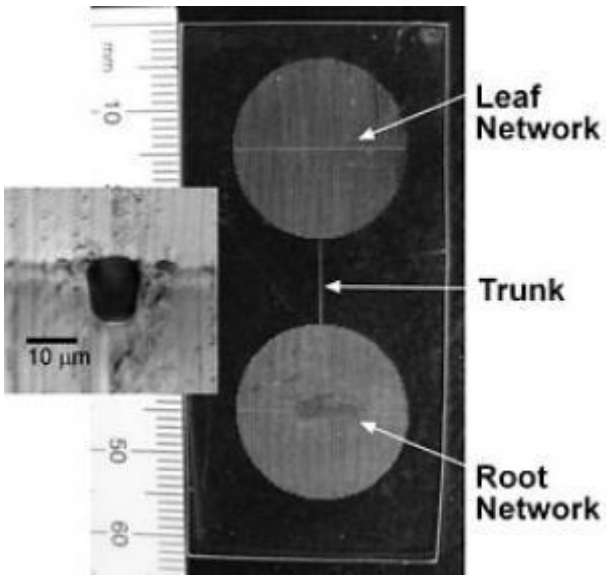
Prof. Rosenfeld states: "These results have great significance for countries like Israel where rainfall is scarce and can be easily affected by over-production of aerosols. Our study should act as a red light to all of those responsible for controlling the amounts of pollution we release into the atmosphere."

"With these results we can finally improve our understanding of aerosol effects on precipitation and climate," summarizes Andreae, "since the direct contradiction of the different aerosol effects has seriously hindered us from giving more accurate predictions for the future of our climate, and especially for the availability of water."

Adapted from materials provided by Hebrew University of Jerusalem.

http://www.sciencedaily.com/releases/2008/09/080908073755.htm

World's First Synthetic Tree: May Lead To Technologies For Heat Transfer, Soil Remediation



A transparent sheet of pHEMA, 1 millimeter thick, is etched with 80 parallel channels of varying lengths arranged to form a circle and connected by a single channel. The inset shows an optical micrograph of the cross-section of one microchannel. (Credit: Abraham Stroock and Tobias Wheeler)

ScienceDaily (Sep. 11, 2008) — In Abraham Stroock's lab at Cornell, the world's first synthetic tree sits in a palm-sized piece of clear, flexible hydrogel -- the type found in soft contact lenses.

Stroock and graduate student Tobias Wheeler have created a "tree" that simulates the process of transpiration, the cohesive capillary action that allows trees to wick moisture upward to their highest branches.

The researchers' work, reported in the Sept. 11 issue of the journal Nature, bolsters the long-standing theory that transpiration in trees and plants is a purely physical process, requiring no biological energy. It also may lead to new passive heat transfer technologies for cars or buildings, better methods for remediating soil and more effective ways to draw water out of partially dry ground.

Of course, the synthetic tree doesn't look much like a tree at all. It consists of two circles side by side in the gel, patterned with evenly spaced microfluidic channels to mimic a tree's vascular system.

In nature, trees use water in tubular tissues, called xylem, like ropes that pull more water out of the ground, delivering it to leaves. They manipulate the water in the xylem under negative pressure -- what's called a metastable liquid state -- right on the verge of becoming a vapor.

Xylem-like capillaries are relatively easy to create by microfabrication, but the researchers' choice of a material to act as membranes in the leaf and root to separate the liquid from the atmosphere and the soil was much trickier.

Stroock, assistant professor of chemical and biomolecular engineering, and Wheeler, a graduate student in his lab, used pHEMA hydrogel, or polyhydroxyethyl methacrylate, to form the plant membranes. The hydrogel is a solid embedded with water and has nanometer-scale pores. The material acts as a wick by holding liquid in the pores, through which capillary action creates tension in the water.

By building mimics of xylem capillaries within the gels, the scientists were able to create negative-pressures of the magnitude observed in trees, and to pump water against large resistances and out of subsaturated, or partially dry, sources.

Besides supporting the theory of transpiration as a physical, not biological, process, the synthetic tree also introduces a new way to study water under tension -- a subject interesting to physicists and chemists. Many questions about the metastable state of water could be answered using this new "tree."

"Water is the most studied substance on Earth, and yet there is a big metastable region in its phase diagram waiting to be characterized," Stroock said. His lab is pursuing these studies with support from the National Science Foundation.

The capillary action used in trees might be applicable to developing new passive heat-transfer methods, Stroock said. The heat-transfer technology commonly used for cooling laptops, which uses vaporization to carry the heat to the fan on the edge of the computer, could be scaled up using the technology developed for the synthetic tree.

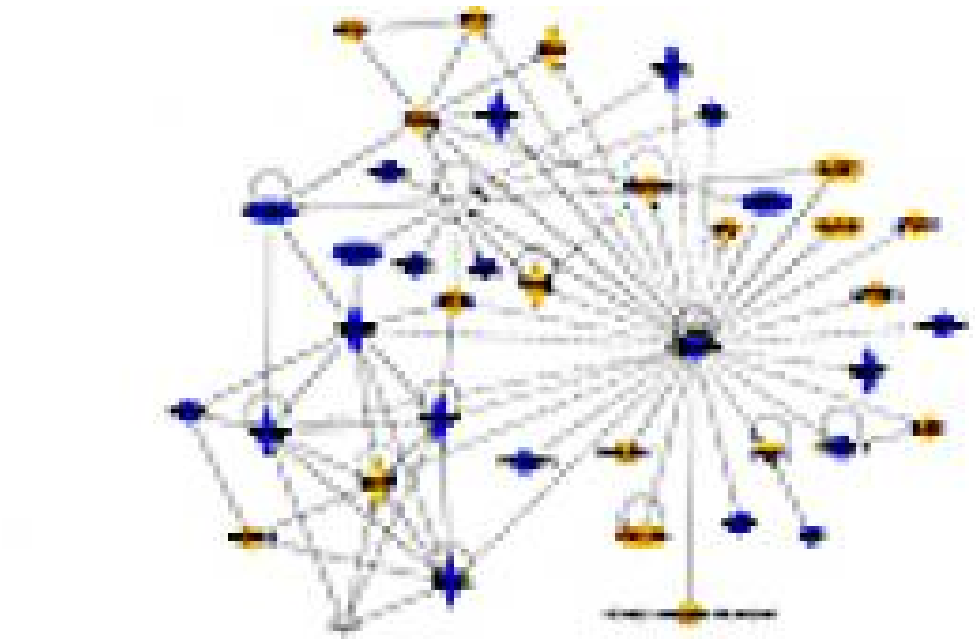
"It would be nice if you could, in a building, put these passive elements that carry heat around very effectively, for example, from a solar collector on the roof, to deliver heat all the way down through the building, then recycle that fluid back up to the roof the same way trees do it -- pulling it back up," Stroock said.

He also envisions the synthetic tree helping to build better soil remediation systems. Instead of having to soak contaminated soil to pump contaminants out, transpiration could help pull the contaminated fluid out of the soil without the use of more liquid. Similarly, the technology could also be used to draw water out of relatively dry soil without having to dig a well down to the water table.

Adapted from materials provided by Cornell University. Original article written by Anne Ju.

http://www.sciencedaily.com/releases/2008/09/080910161900.htm

Calculating How Breast Cancers Will Respond To Tamoxifen



The network of genes involved in cell proliferation. (Credit: Image courtesy of Garvin Institute)

ScienceDaily (Sep. 11, 2008) — A discovery by Australian scientists could help clinicians decide which women with breast cancer will make good candidates for anti-oestrogen therapies, such as tamoxifen, and which will not.

Over 12,000 Australian women are diagnosed with breast cancer each year, roughly 70% of which will have cancers treatable with tamoxifen. Unfortunately, 30% or more of these women may not respond well to such anti-hormone therapy long-term.

Work done by a research team headed by Associate Professor Liz Musgrove and Professor Rob Sutherland of Sydney's Garvan Institute of Medical Research has correlated expression of certain functionally-related oestrogen-regulated genes with predictable clinical outcomes. This expanded knowledge about oestrogen action and endocrine resistance should allow clinicians to make better, more informed, choices in the future.

"What we call 'breast cancer' is actually many different kinds of cancer, some of which appear to be driven by the female hormone oestrogen," said Professor Musgrove. "We found roughly 800 genes that are regulated by oestrogen, each with a different function in the cell, so you can imagine how complicated the picture can become when you are trying to correlate the effects of all these genes with multiple cancers."

In fact, the scale of such calculations, and complex biochemistry behind them, requires the help of large relational databases, powerful software and the agile minds of bioinformatics specialists to crunch and analyse data.

Out of the undifferentiated pool of oestrogen-regulated genes, the team has identified four groupings of genes, with each group relating to one aspect of breast cancer cell behaviour: cell cycle (proliferation), cell growth (actual size of the cell), cell death and gene transcription.

Professor Musgrove stresses the clinical relevance of the findings. “In collaboration with colleagues at the Peter MacCallum Cancer Centre in Melbourne, we took these 4 groups of genes and asked whether they were related to outcome in a sample of 246 women who’d been treated with tamoxifen. We were able to directly relate 3 out of the 4 groups, all but gene transcription, to whether a woman had done better or worse when treated with tamoxifen.”

“We then went on to ask whether we were looking at three different ways of identifying the same women, or whether the three groups of genes identified distinct groups of women, with different breast cancers. It appears as if they identify distinct groups of women with different cancers.”

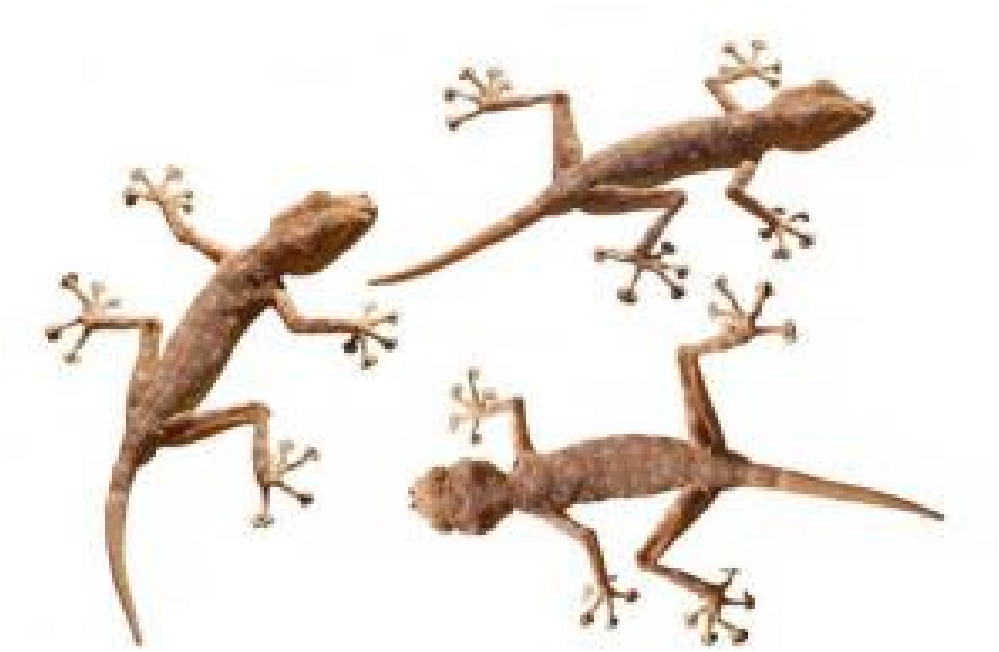
“Developing pure lists of genes that are involved in single processes gives us a good conceptual and experimental framework. In time we hope to understand how these groups of genes interact, and exactly how they affect disease or health.”

The novel findings were published in the August issue of the Public Library of Science journal PLoS ONE.

Adapted from materials provided by Garvin Institute.

http://www.sciencedaily.com/releases/2008/09/080908101645.htm

Engineers Create New Gecko-like Adhesive That Shakes Off Dirt



Researchers are developing a synthetic, gecko-like adhesive, that cleans itself after each use without the need for water or chemicals, much like the remarkable hairs found on the gecko lizard's toes. (Credit: iStockphoto)

ScienceDaily (Sep. 10, 2008) — Researchers at the University of California, Berkeley, are continuing their march toward creating a synthetic, gecko-like adhesive, one sticky step at a time. Their latest milestone is the first adhesive that cleans itself after each use without the need for water or chemicals, much like the remarkable hairs found on the gecko lizard's toes.

"It brings us closer to being able to build truly all-terrain robots, which will in the future be able to scamper up walls and across ceilings in everyday environments rather than only on clean glass," said Ron Fearing, UC Berkeley professor of electrical engineering and computer sciences and head of the research team developing the new material. "We can envision robots being able to go anywhere they are needed, perhaps in the search for survivors after a disaster."

The adhesive's development is reported online in Langmuir, a peer-reviewed journal of the American Chemical Society that covers a wide range of topics, including surface properties, nanostructures and biomimetic materials.

For years, scientists have been trying to develop a man-made version of the toe hairs that make the lizard's acrobatic feats possible. Earlier this year, Fearing's group developed another gecko-inspired adhesive using polymer microfibers that could easily attach to and detach from clean surfaces.

But researchers said replicating the gecko's ability to walk through dirty surfaces yet keep its feet clean enough to climb walls has been tricky. In 2005, research led by Kellar Autumn, associate professor of biology at Lewis & Clark College in Portland, Ore., and one of the nation's leading experts on gecko biomechanics, revealed for the first time that a gecko keeps its feet sticky but clean by shedding dirt particles with every step.

"It goes completely against our everyday experience with sticky tapes, which are 'magnets' for dirt and can't be reused," said Fearing. "With our gecko adhesive, we have been able to create the first material that is adhesive and yet cleans itself a little bit with every contact."

In the new study, supported by the National Science Foundation, the UC Berkeley researchers designed the adhesive with microfibers made from stiff polymers. Using microspheres that were 3 to 10 micrometers in diameter to simulate contaminants, the researchers were able to show that the microfibers pushed the microsphere particles toward the fiber tips when the adhesive was not in contact with a surface.

When the fibers were pressed against a smooth surface, the contaminants made greater contact with the surface than with the fibers. Since adhesion strength is proportional to contact area, the microsphere particles preferentially adhered to the glass rather than to the synthetic gecko fibers.

With each simulated step, designed to provide a force similar to a gecko's step, more and more microspheres were deposited onto the surface. After 30 simulated steps, the adhesive shed about 60 percent of the smaller-sized contaminants onto the glass surface.

"This new material likes to adhere to surfaces, but it does not like to collect dirt particles," said Jongho Lee, UC Berkeley graduate student in mechanical engineering and lead author of the new study. "We were able to recover one-third of the shear adhesion strength of clean samples after multiple steps."

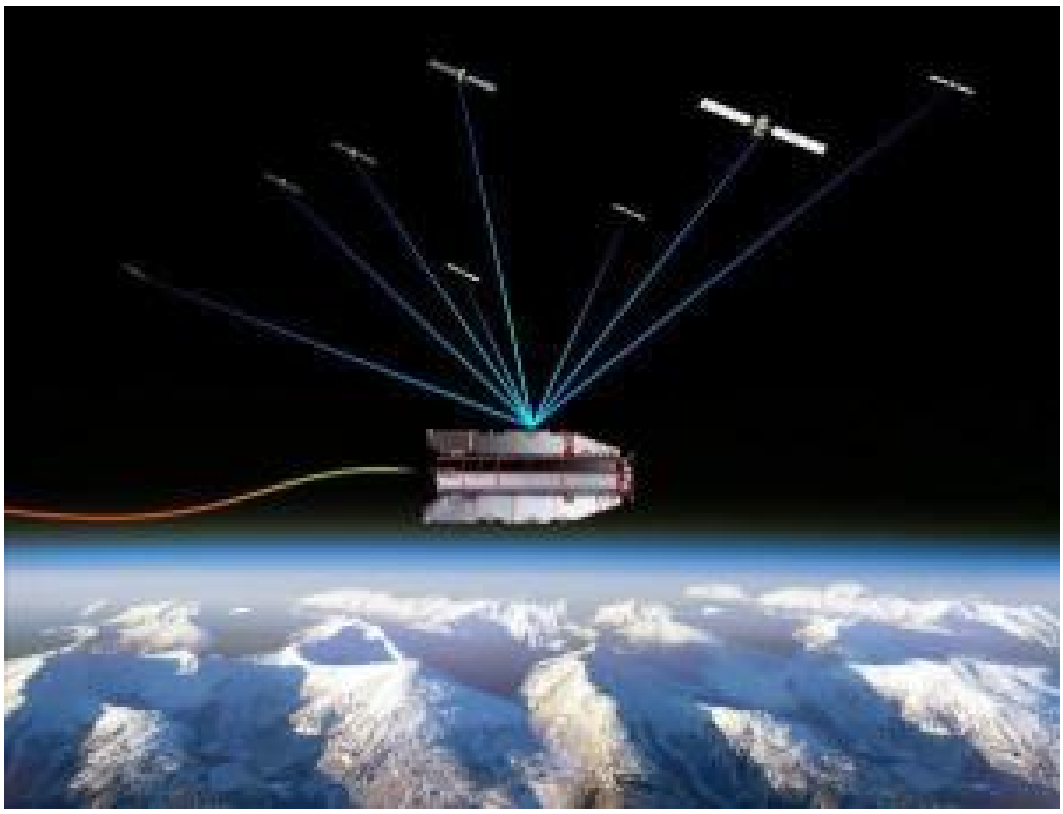
The larger contaminants were harder to shake off because they contact a larger number of fibers, and then adhere better to the fibers than to the glass. The researchers said that to resolve this challenge, they will need to understand more features of the gecko toe, such as whether the size of the gaps between bundles of toe hairs helps remove dirt.

Fearing said the next phase of the research will focus on achieving adhesion over rough surfaces.

Adapted from materials provided by University of California - Berkeley.

http://www.sciencedaily.com/releases/2008/09/080910090610.htm

Sleek Probe To Map Earth's Gravity



The position of GOCE will be tracked by GPS satellites to obtain low-resolution gravity-field data. (Credit: ESA - AOES Medialab)

ScienceDaily (Sep. 10, 2008) — The European Space Agency is launching a new satellite to map variations in the Earth's gravity field with unprecedented accuracy. The satellite will give UK scientists vital information about ocean circulation and sea level change needed to improve climate forecast models.

The Gravity field and steady-state Ocean Circulation Explorer (GOCE) is the first of three Earth Explorer core missions in ESA's Earth Observation Envelope Programme. Data from GOCE will allow scientists to create a detailed model of the Earth's gravity field, or geoid.

"GOCE will yield details of the Earth's gravity field to an accuracy and resolution that is simply unobtainable by existing terrestrial and space techniques," says Professor Philip Moore from Newcastle University, who specialises in gravity research.

By comparing a model of the geoid with ocean surface height from other satellite data, oceanographers can track the speed and direction of ocean currents around the globe.

At school, most of us learn that acceleration due to gravity is 9.8 metres per second squared wherever you are on the planet. It turns out it's not quite as simple as this. The shape of the Earth, mountains, trenches deep beneath the ocean and the ground beneath our feet all affect the gravity field, meaning it's not identical everywhere.

"Ocean circulation is important in climate forecast models. Currents carry large quantities of heat from the equator to the poles, such as the system in the north Atlantic, which helps to keep Europe's climate relatively mild. Combined with more than 15 years of existing data on sea-surface height, the new GOCE

geoid will help us more accurately measure the role of ocean currents in transporting heat and water around the globe," says GOCE mission scientist, Mark Drinkwater, from ESA.

"Data from GOCE will provide information on ocean currents in remote regions such as the southern hemisphere for the first time," says Keith Haines from the University of Reading, an expert in ocean circulation.

GOCE has other uses. An accurate geoid is crucial for defining exactly what height above sea-level actually means. Different countries have their own definitions of sea level, meaning that height is defined differently country to country. With GOCE, scientists will be able to say if two points are at the same height, however far apart they are. This will be important for large-scale surveying and engineering projects such as bridge, tunnel or pipeline building between islands or across seas.

The instrument that GOCE will use to measure gravity is called a gradiometer. It is made up of three pairs of accelerometers that measure tiny differences in gravity at many points as GOCE orbits the Earth. Because the strength of gravity decreases with altitude, the satellite will be in a much lower orbit than other orbiting spacecraft, cutting through the edge of the Earth's atmosphere just 150 miles above the surface of the planet. This makes GOCE one of ESA's most challenging missions to date.

The torpedo-shaped satellite will launch from the Plesetsk Cosmodrome in Russia into a polar sun-synchronous orbit – its solar panels will always face the sun. Unlike other spacecraft, the panels are in a fixed position on GOCE. This means that the whole satellite will have to turn to face the sun. To do this, GOCE has ion thrusters which act like a cruise control, making minute adjustments to its position to combat the effects of air drag at the edge of space. The sun's energy will charge and accelerate xenon atoms into ions to power the thrusters.

Earth observation is crucial for monitoring changes in the environment. The Natural Environment Research Council makes a large investment in scientific Earth observation programmes, investing around £45m in ESA annually. Most of this is used to support Earth Explorer missions under ESA's Earth Observation Envelope Programme. The Earth Explorer missions are designed to answer important scientific questions as well as demonstrate breakthrough technology in Earth observation.

The GOCE mission - costing €340m - involved a large collaboration of European organisations, including UK scientists and engineers working for QinetiQ, Logica and SciSys.

For more information, visit: http://www.esa.int/goce

Adapted from materials provided by Natural Environment Research Council (NERC), via AlphaGalileo.

http://www.sciencedaily.com/releases/2008/09/080910103709.htm

World's Largest-ever Study Of Near-Death Experiences

Contrary to popular perception, death is not a specific moment, scientists say. It is a process that begins when the heart stops beating, the lungs stop working and the brain ceases functioning. (Credit: iStockphoto/Felix Möckel)

ScienceDaily (Sep. 10, 2008) — The University of Southampton is launching the world's largest-ever study of near-death experiences this week.

The AWARE (AWAreness during REsuscitation) study is to be launched by the Human Consciousness Project of the University of Southampton - an international collaboration of scientists and physicians who have joined forces to study the human brain, consciousness and clinical death.

The study is led by Dr Sam Parnia, an expert in the field of consciousness during clinical death, together with Dr Peter Fenwick and Professors Stephen Holgate and Robert Peveler of the University of Southampton. Following a successful 18-month pilot phase at selected hospitals in the UK, the study is now being expanded to include other centres within the UK, mainland Europe and North America.

"Contrary to popular perception," Dr Parnia explains, "death is not a specific moment. It is a process that begins when the heart stops beating, the lungs stop working and the brain ceases functioning - a medical condition termed cardiac arrest, which from a biological viewpoint is synonymous with clinical death.

"During a cardiac arrest, all three criteria of death are present. There then follows a period of time, which may last from a few seconds to an hour or more, in which emergency medical efforts may succeed in restarting the heart and reversing the dying process. What people experience during this period of cardiac arrest provides a unique window of understanding into what we are all likely to experience during the dying process."

A number of recent scientific studies carried out by independent researchers have demonstrated that 10-20 per cent of people who go through cardiac arrest and clinical death report lucid, well structured thought processes, reasoning, memories and sometimes detailed recall of events during their encounter with death.

During the AWARE study, doctors will use sophisticated technology to study the brain and consciousness during cardiac arrest. At the same time, they will test the validity of out of body experiences and claims of being able to 'see' and 'hear' during cardiac arrest.

The AWARE study will be complemented by the BRAIN-1 (Brain Resuscitation Advancement International Network - 1) study, in which the research team will conduct a variety of physiological tests in cardiac arrest patients, as well as cerebral monitoring techniques that aim to identify methods to improve the medical and psychological care of patients who have undergone cardiac arrest.

Dr Parnia will formally announce the launch of the AWARE study at an international symposium to be held at the United Nations on September 11.

Adapted from materials provided by University of Southampton.

http://www.sciencedaily.com/releases/2008/09/080910090829.htm

Researchers Identify Natural Tumor Suppressor

ScienceDaily (Sep. 10, 2008) — Researchers from the University of Pennsylvania School of Medicine have identified a key step in the formation – and suppression – of esophageal cancers and perhaps carcinomas of the breast, head, and neck. By studying human tissue samples, they found that Fbx4, a naturally occurring enzyme, plays a key role in stopping production of another protein called Cyclin D1, which is thought to contribute to the early stages of cancer development.

When mutations block production of Fbx4, Cyclin D1 is not broken down, and subsequently contributes to cancer's advance. Fbx4 acts like a bouncer, stopping trouble before it starts by breaking down Cyclin D1 before it can affect the body.

"Cyclin D1 was identified nearly 20 years ago and after that, it became apparent that it was overexpressed in a high percentage of tumors," says J. Alan Diehl, PhD, Associate Professor of Cancer Biology at the University of Pennsylvania's Abramson Family Cancer Research Institute. "But its expression didn't correlate to mutations within Cyclin D1, so we were looking for a protein that regulates accumulation. That's Fbx4."

For this study, researchers screened 116 esophageal tumors and found 16 mutations. Their findings were published in a recent issue of Cancer Cell.

The actual mutations researchers found are located within a highly conserved region of Fbx4 that functions like an on switch. Mutations within that switch region inhibit activation of Fbx4, which means it can't trigger destruction of Cyclin D1.

The results are important in that they show how Cyclin D1 becomes so prevalent in tumors. Before, it was thought that Cyclin D1 was present because of a mutation somewhere in the DNA of a cell. Instead, this study shows that Cyclin D1 naturally occurs, but our bodies have created a natural defense mechanism that breaks it down before cancer develops.

"When Fbx4 is inactivated, it permits the accumulation of its target, CyclinD1," says Diehl.

While it remains important to define the cause of the initial mutations, this study provides researchers with a better understanding of the early stages of cancer which is crucial to finding a way to reverse the process.

Co-authors are Hiroshi Nakagawa and Anil K. Rustgi from the Penn Department of Genetics; Olena Barbash, Petia Zamfirova and Douglas I. Lin of the Abramson Family Cancer Research Institute; and Xiangmei Chen, Ke Yang and Fengmin Lu of Peking University Health Center. The National Institute of Health and the Leukemia & Lymphoma Society provided funding for this research.

Adapted from materials provided by University of Pennsylvania School of Medicine.

http://www.sciencedaily.com/releases/2008/09/080909152017.htm

Manure 'Smells Like Money' As Energy Costs Rise

Tommy Bass, MSU Extension livestock environment associate specialist, stands atop a pile of manure. (Credit: MSU photo by Kelly Gorham)

ScienceDaily (Sep. 10, 2008) — With energy prices driving the cost of agricultural inputs up, nutrient-rich manure is getting another look."Calls to Extension offices from people looking for manure and manure compost have increased in recent months," says Tommy Bass, Montana State University Extension livestock environment associate specialist. Bass said that this shift in perception is good for water quality, too.

"As manure gains value, it is likely to be used more efficiently and effectively. There's a potential for increased revenue for animal feeding operations," he said.Though MSU Extension and conservation professionals have taught for years that manure can be a valuable asset, it's often written it off as a difficult-to-manage byproduct with cumbersome regulations.

Now, with fertilizer prices hovering at $1,000 per ton, the nitrogen and other nutrients in manure look more gold than brown.Bass said that a ton of manure contains between $30 to $40 dollars worth of nutrients for the soil, though they're not all available the first year.

"Expect a quarter to a half of the nitrogen to be available in the first season," he said, "The remainder is partially available the next year and partially lost to the atmosphere."

Fresh scraped and stacked dairy and beef manure can have a total nitrogen content ranging between 12 and 25 pounds of nitrogen per ton of manure, while the same ton may also have 9 to 18 pounds of phosphorus fertilizer equivalent.

"The nutrient content of manure varies for different species and different manure management systems, but it is all valuable," he said.

Nitrogen and phosphorus are not the only valuable nutrients in manure. Potassium and a variety of micro-nutrients are also present.

In addition to specific nutrients, the high organic content of manure and manure compost improves soil quality, and its improved texture improves its water and nutrient holding capacity.

About 70 to 90 percent of phosphorus and potassium can be available the first year. Phosphorus not used by the plant persists longer in the soil and will remain available if erosion and run-off are controlled.

When applying manure based on the nitrogen needs of a crop, phosphorus will inherently be over applied or exceed the crop's annual use of phosphorus, however it can be taken up by crops in subsequent years. Fields with significant residual soil test phosphorus may need a rest from manure applications. In that case only a commercial nitrogen product needs to be applied to meet nutrient requirements and production goals.

Considering possible variation associated in nutrient availability from manure, careful consideration should be given to how it is incorporated into an overall fertility plan."Attempting to replace all the nitrogen required by a high value wheat crop with manure sources carries a risk of lost production, if all the projected nutrients do not become available to the plant," Bass said. However, he recommends using manure strategically as a nutrient source in conjunction with commercial fertilizer.

The cost of applying manure also needs to be considered, he said, along with other costs such as renting or hiring of spreading equipment, fuel and an operator's time.Using manure wisely can offset some commercial fertilizer purchases, while providing additional micronutrients and valuable organic matter to the soil.As with any fertilizer, application rates should be based on a recent soil test and the particular crop's nutrient needs. An overall nutrient management plan is needed to meet production goals and protect natural resources. For some animal feeding operations such a plan is required as part of their permit.

With recognition of the increased fertilizer value of manure, it is being sold or traded for different services or goods around the country. Historically manure usually was only used or shipped within a few miles of its source. In some cases, it is now economically feasible to ship it increased distances. Manure hauling and brokerage businesses have popped up in which the company will clean out manure storage facilities in exchange for the product; they in turn sell it to another party. Other producers sell and trade with neighbors or build partnerships with commercial nurseries and compost manufacturers. Animal feeding operations with their own forage or crop production can benefit greatly from their onsite manure resources.

Manure is also being used to create energy through digesters that produce bio-gas capable of generating electricity or heat for farm and ranch buildings. Whether it is used for fertilizer, as an ingredient in compost or for energy production, the value of manure is being recognized for a variety of beneficial uses.

"To people making a living off the land, manure smells like money," Bass said.

Adapted from materials provided by Montana State University.

http://www.sciencedaily.com/releases/2008/09/080908225153.htm

High Levels Of Physical Activity Can Blunt Effect Of Obesity-related Gene, Study Suggests

ScienceDaily (Sep. 10, 2008) — High levels of physical activity can help to counteract a gene that normally causes people to gain weight, according to a new study by researchers at the University of Maryland School of Medicine. They analyzed gene variants and activity levels of the Old Order Amish in Lancaster County, Pa., and found that the obesity-related FTO gene had no effect on individuals who were the most physically active.

"Our results strongly suggest that the increased risk of obesity due to genetic susceptibility can be blunted through physical activity," the authors conclude. "These findings emphasize the important role of physical activity in public health efforts to combat obesity, particularly in genetically susceptible individuals." The results of the study are being published in the Sept. 8, 2008, issue of the Archives of Internal Medicine.

Soren Snitker, M.D., Ph.D., the senior author and an assistant professor of medicine and pediatrics at the University of Maryland School of Medicine, says, "Our study shows that a high level of physical activity can 'level the playing field,' equalizing the risk of obesity between those who have copies of the FTO gene variant and those who don't."

The FTO gene recently has been linked to obesity and increased body mass index, or BMI, in several large-scale studies. More than half of all people of European descent have one or two copies of a variation of this gene, British scientists reported last year. Individuals with two copies of the gene variant are on average 7 pounds heavier and 67 percent more likely to be obese than those who don't have it.

University of Maryland researchers found this same link between variations of the FTO gene and increased risk of obesity in their study of 704 Amish men and women. But, in examining the gene in this unique group of people with a similar genetic background and active lifestyle, the researchers also found that high levels of physical activity helped to counteract the gene's effects.

"Having multiple copies of FTO gene variants had no effect on body weight for people who were the most physically active, regardless of whether they were men or women. But in less active people, the association between the gene and increased BMI was significant," says Evadnie Rampersaud, Ph.D., the lead author and a former postdoctoral fellow at the University of Maryland School of Medicine who is now at the University of Miami Institute for Human Genomics. "This provides evidence that the negative effects of the FTO variants on increasing body weight can be moderated by physical activity."

Dr. Snitker, of the University of Maryland School of Medicine, says the FTO gene is likely only one of a number of genes linked to obesity and notes that the effect of these genes may have changed over time.

"Some of the genes shown to cause obesity in our modern environment may not have had this effect a few centuries ago when most people's lives were similar to that of present-day Amish farmers," he says. He adds that environmental and lifestyle factors, such as a high-fat diet and lack of exercise, also may serve as triggers for obesity in genetically susceptible people.

"We are just starting to unravel these complex interactions between genomics and environment. It's really a new age of discovery," Dr. Snitker says. "One day, we hope to be able to provide a personally optimized prescription to prevent or treat obesity in people based on their individual genetic makeup."

In this study, which was funded by the National Institutes of Health (NIH), the researchers examined dozens of variations in the FTO gene. They gauged the participants' physical activity level with the help of a device worn on the hip called an accelerometer, which measures body movement. "We were able to get objective measurements of physical activity over seven consecutive 24-hour periods using this device, and that is a real strength of our study," says Dr. Rampersaud.

Participants were classified as having "high activity" or "low activity" levels. The more active people used 900 more kilocalories, or units of energy, a day, which translates into three to four hours of moderately intensive activity, such as brisk walking, housecleaning or gardening.

Despite an active lifestyle, 54 percent of the men in the study were considered overweight (BMI over 25) and 10.1 percent were obese (BMI over 30). Sixty-three percent of the women were overweight, and 30 percent were considered obese. The mean BMI was slightly higher in women (27.8) than in men (25.7).

These figures are in line with previous University of Maryland studies that showed that the Amish are as obese as other Caucasians in the United States. The earlier research also found that the Amish have half the incidence of Type 2 diabetes as well as favorable cholesterol levels, despite a diet high in fat and cholesterol, although the reasons for this remain unclear.

The Old Order Amish are considered ideal for genetic research because they are a genetically homogenous people who trace their ancestry back 14 generations to a small group that came to Pennsylvania from Europe in the mid-1700s. They don't drive cars or have electricity in their homes, eschewing many of the trappings of modern life. Most Amish men are farmers or work in physically demanding occupations such as blacksmithing or carpentry. Women are homemakers who work without the aid of modern appliances and often care for many children.

University of Maryland School of Medicine researchers, led by Alan R. Shuldiner, M.D., have conducted more than a dozen studies of the Amish in Lancaster County, Pa. since 1993, looking at various medical problems, such as diabetes, obesity, osteoporosis and high blood pressure. The latest research is an offshoot of a larger NIH-funded study, the Heredity and Phenotype Intervention (HAPI) Heart Study, examining how genes and lifestyle factors influence the Amish people's risk of developing cardiovascular disease.

Among the co-authors of the FTO gene study are Dr. Shuldiner, who is a professor of medicine, head of the Division of Endocrinology, Diabetes and Nutrition, and director of the Program in Genetics and Genomic Medicine at the School of Medicine; Toni I. Pollin, Ph.D., an assistant professor of medicine; and Braxton D. Mitchell, Ph.D., a professor of medicine.

Journal reference:

1. Rampersaud et al. **Physical Activity and the Association of Common FTO Gene Variants With Body Mass Index and Obesity**. *Archives of Internal Medicine*, 2008; 168 (16): 1791 DOI: 10.1001/archinte.168.16.1791

Adapted from materials provided by University of Maryland Medical Center.

http://www.sciencedaily.com/releases/2008/09/080908185228.htm

How Memories Are Made, And Recalled

Artist's rendering of neuron activity. Researchers have recorded the activity of hundreds of individual neurons making memories. (Credit: iStockphoto/Sebastian Kaulitzki)

ScienceDaily (Sep. 16, 2008) — What makes a memory? Single cells in the brain, for one thing.

For the first time, scientists at UCLA and the Weizmann Institute of Science in Israel have recorded individual brain cells in the act of calling up a memory, thus revealing where in the brain a specific memory is stored and how the brain is able to recreate it.

Reporting in the current online edition of the journal Science, Dr. Itzhak Fried, senior study author and a UCLA professor of neurosurgery, and colleagues recorded the activity of hundreds of individual neurons making memories in the brains of 13 epilepsy patients being treated surgically at UCLA Medical Center.

Surgeons had placed electrodes in the patients' brains to locate the origin of their seizures before surgical treatment — standard procedure in such cases. Fried made use of the same electrodes to record neuron activity as memories were being formed.

The patients watched several video clips of short duration, including such things as landmarks and people, along with other clips of Jerry Seinfeld, Tom Cruise, "Simpsons" character Homer Simpson and others. As the patients watched, the researchers recorded the activity of many neurons in the hippocampus and a nearby region known the entorhinal cortex that responded strongly to individual clips.

A few minutes later, after performing an intervening task, the patients were asked to recall whatever clips came to mind.

"They were not prompted to recall any specific clips," Fried said, "but to use 'free recall' — that is, whatever popped into their heads."

The researchers found that the same neurons that had responded earlier to a specific clip fired strongly a second or two before the subject reported recalling that clip. These neurons did not fire, however, when other clips were recalled. Ultimately, it was possible for the researchers to know which clip a patient was recalling before the patient announced it.

Fried noted that the single neurons that were recorded as they fired were not acting alone but were part of a much larger memory circuit of hundreds of thousands of cells caught in the act of responding to the clips.

The study is significant, he said, because it confirms for the first time that spontaneous memories arise through the activity of the very same neurons that fired when the memory was first being made. This link between reactivation of neurons in the hippocampus and conscious recall of past experience has been suspected and theorized for sometime, but the study now provides direct evidence for such a link.

"In a way, then," Fried said, "reliving past experience in our memory is the resurrection of neuronal activity from the past"

Other authors of the study included first author Hagar Gelbard-Sagiv, Michal Harel and Rafael Malach of the Weizmann Institute and UCLA postdoctoral scholar Roy Mukamel.

The research was funded by the U.S. National Institute of Neurological Disorders and Stroke, as well as the Israel Science Foundation and the U.S.–Israel Binational Science Foundation.

Journal reference:

1. Hagar Gelbard-Sagiv, Roy Mukamel, Michal Harel, Rafael Malach, and Itzhak Fried. **Internally Generated Reactivation of Single Neurons in Human Hippocampus During Free Recall**. *Science*, 2008; DOI: 10.1126/science.1164685

Adapted from materials provided by University of California - Los Angeles. Original article written by Mark Wheeler.

http://www.sciencedaily.com/releases/2008/09/080908101651.htm

Revising And Re-sizing History: New Work Shows Ohio Site To Be An Ancient Water Works, Not A Fort

A field school student excavates at Shawnee Lookout. (Credit: Photo by Melanie Cannon)

ScienceDaily (Sep. 16, 2008) — More than 200 years ago, future U.S. President William Henry Harrison made historical pronouncements that a hilltop site west of Cincinnati was an ancient fort. Discoveries made by University of Cincinnati researchers this summer, though, turn that long-accepted interpretation upside down.

The site known as Miami Fort is no fort at all, and it is also much larger than previously believed – so large, in fact, that its berms stretch to almost six kilometers in length, making it twice as large as any other Native American earthworks in Ohio, and one of the largest in the nation.

Those are discoveries made this summer by members of UC's Ohio Valley Archaeology Field School project, who spent weeks working at the site in Hamilton County's Shawnee Lookout park.

What they found actually offers great insight into the cultural priorities of the Shawnee – the incredible amounts of human labor that went into building the earthworks were done for agricultural purposes, not military. The earthworks were not a fort, but a water management system of dams and canals built to counter the impact of long-term drought.

"This site was originally described by William Henry Harrison as a great military fort. What we've discovered this summer is that it is not in any way, shape or form a military fort," says Ken Tankersley, a UC assistant professor of anthropology and faculty leader of the field school. A total of 28 students worked at the site this summer.

What Harrison – who lived in nearby North Bend, Ohio – interpreted on a hilltop high above the confluence of the Great Miami and Ohio rivers to be fortifications with wooden gates are really an ancient irrigation system that dates back 2,000 years, Tankersley says. The gates were locks and the berms were terraced dams for controlling water flow.

Harrison's observations of what was on top of the hill were also only the tip of what was concealed in thick undergrowth. "The engineering feat is remarkable. There's one place where the dam is almost 200 feet high," describes Tankersley. "It's a remarkable system. The irrigation system is almost six kilometers long."

The extent of the Shawnee Lookout site is nearly twice as large as the site previously thought to be the largest Native American earthworks in the state, Fort Ancient in Warren County.

Tankersley and his students set out to learn more about the site as part of UC's summer field school, which is a highly sought opportunity for students to get hands-on experience at an archaeological site. In discussing the possibilities of working in Shawnee Lookout park, Tankersley consulted with UC's department head in anthropology, Vern Scarborough.

"He's the one who suggested we might want to consider other possibilities for the site," Tankersley says.

"I had a student years ago who I had been with out at Fort Ancient, and in our discussions, he said that we might consider looking at (that site) from a water management point of view," says Scarborough, who himself studies Mayan cultures and their use of water. "When you're talking about building on these elevated settings, that's an important consideration to keep in mind."

To support such a theory, the field school team went in search of evidence. They found convincing amounts of it.

What Harrison had described as gates turned out to be fired logs and clay bricks that were used in damming. On the opposite side of the enclosure, drill cores were sunk by field school personnel deep into the earth and when extracted, revealed ponded water sediments and clay minerals, exactly what you ought to find for an area where water was being captured.

At the highest points that the earthworks extended to were found raceways for moving water across the terrain. The raceways originated in areas that contained artesian springs. Excavation in these areas found limestone rock used to line the areas where the water was captured, with overflow being channeled into the raceways for irrigation.

"Where the artesian springs were found were actually what had been labeled borrow pits, where it was thought the earth they were using in building these structures came from these holes," says Tankersley. "But a problem was that there were far too few of these pits to produce all of the earth that was used in making what they termed fortifications. Once we cored in and took samples, it became very clear that these were actually springs feeding these areas. The Shawnee would build these dams and then allow the spring water to fill these pits, and then they would capture the surface runoff."

Tankersley says there is a historical reason that makes this elaborate project a logical choice for the Shawnee – climatic records show the 500-year period leading up to 500 AD to be an unusually cold and dry era in this region. Drought would have been common during this time frame. Native Americans would have needed reliable alternatives to supplement the meat that would have been the staple of their winter diets, meaning they would have had to cultivate nut-producing trees and other crops on their lands.

This drastic change in interpretation of the structures leads Tankersley to conclude a re-interpretation of Shawnee culture may be in order.

Two points standout: one is that the engineering expertise required to conceive of such a massive irrigation system must have been far greater than what history has traditionally assigned to Native American groups from that time in history, and the second is that the cultural priority of engaging in such a massive undertaking as building these earthworks by hand was done by this culture not because of military motivations but for a more civil cause.

"It makes you rethink the stereotype for indigenous people," Tankersley says. "It was thought they were war-like. But they were sophisticated. As the climate was changing, they could adapt. Instead of engaging in warfare, these people were working in harmony."

Tankersley will be taking the new measurements collected from the Shawnee Lookout site into the lab this fall and use computer simulation to calculate the amount of dirt that had to have been moved to create these structures. "We know it has to be a massive amount," he says.

One more surprise from the site is who the evidence points to as the likely group that engaged in this construction. Physical evidence says it was probably the women of the Shawnees.

Moving massive amounts of dirt would have been done using tumplines that relied on the muscles of the head and neck. Remains found of Shawnee men from the time period show that they were petite and graceful, according to Tankersley. The women, on the other hand, were robust and muscular, and often exhibited developed muscles in the areas on and around the cranium.

"It amazes me that when you think of some of the great engineering feats in pre-history, we've always had this male bias that guys must have been doing this," Tankersley says. "But the evidence we have at hand turns this around and suggests that it is actually must have been the women who were doing this work."

More work remains to be done to further explore the ramifications of what was found this summer. A question that clearly is going to have to be addressed is whether the Shawnee Lookout site was singular in its purposes, or whether other similar Ohio sites from this same era such as Fort Ancient and Fort Hill in Highland County also need to be subjected to historically reinterpretation.

"The focus of our field school coming out here was to examine how people adapted to climate change," Tankersley says. "We knew this was a time period that was cold and dry, but to find out the true story of this massive engineering feat was a wonderful discovery."

Adapted from materials provided by University of Cincinnati.

http://www.sciencedaily.com/releases/2008/09/080912114403.htm

Adding Taxotere To Chemotherapy Regimen Improves Survival In Early Breast Cancer, Study Suggests

ScienceDaily (Sep. 16, 2008) — For patients with early stage breast cancer that has spread to the lymph nodes, adding four cycles of docetaxel (Taxotere) into a sequential regimen of epirubicin followed by cyclophosphamide, methotrexate and fluorouracil (CMF) reduces the risk of recurrence and death, updated long-term results show.

This advantage comes at the cost of an increased, but manageable, toxicity, Italian researchers report at the 33rd Congress of the European Society for Medical Oncology (ESMO) in Stockholm.

Dr. Francesco Cognetti from Istituto Oncologico Regina Elena and colleagues treated 998 patients with node-positive early stage breast cancer with one of two regimens: 486 received four months of treatment with epirubicin, followed by four cycles of treatment with CMF. The remainder received an additional docetaxel treatment between the two chemotherapy stages.

At the congress, Dr. Cognetti reports results from a median follow-up of 62 months, showing a disease-free survival rate of 74% in the docetaxel arm, compared to 68% among women treated with the other regimen.

"At a median follow-up of five years, the overall survival of patients receiving the addition of docetaxel to the standard regimen of epirubicin followed by CMF significantly improved compared to patients randomized in the control arm," he said. "Moreover, the time of disease recurrence results significantly longer in patients enrolled in the experimental arm."

"The trial demonstrates that the introduction of four cycles of docetaxel into a sequential epirubicin-CMF regimen reduces the risk of recurrence and death in node-positive breast cancer patients."

Adapted from materials provided by European Society for Medical Oncology (ESMO), via AlphaGalileo.

http://www.sciencedaily.com/releases/2008/09/080915083801.htm

Moving Quarks Help Solve Proton Spin Puzzle

ScienceDaily (Sep. 16, 2008) — New theory work at the U.S. Department of Energy's Thomas Jefferson National Accelerator Facility has shown that more than half of the spin of the proton is the result of the movement of its building blocks: quarks. The result agrees with recent experiments and supercomputer calculations.

It was thought that the spin of the proton would come from its quarks, but experiments beginning with the European Muon Collaboration in the 1980s have established that the quarks' spin accounts for only one third of the proton's spin. Researchers thus began investigating other sources of the proton's spin.

This research concerns one theoretical model, proposed by Jefferson Lab Chief Scientist Tony Thomas and University of South Carolina Professor Fred Myhrer, that suggests that some of the proton's spin is actually generated as orbital angular momentum by its quarks.

"Rather than the way the quarks are spinning, it's the way they're moving in orbital motion. In fact, more than half of the spin of the proton is orbital motion of the quarks. That's a really fascinating thing," Thomas said.

In this paper, Thomas explored the model's predictions further by extracting more detailed information, including how the orbital angular momentum is generated by the different quarks inside the proton, which has two up quarks and one down quark.

He found that the model seemed to contradict experimental results and the results from highly sophisticated supercomputer calculations of quark behavior, called lattice QCD. The model showed that up quarks carried most of the proton's spin, whereas experiment and lattice QCD point to down quarks.

Thomas said it turns out that the disagreement is only a matter of resolution. The only way to relate such models to the underlying theory of quark interactions is to assume the model's predictions are made at low resolution. However, experiment and supercomputer calculations are made at high resolution.

"In the past, there's been tremendous success starting with the quark model at some very low scale, and then evolving to a higher scale, where you can compare with experiment," Thomas explained. "If you make that generally accepted assumption, then the resulting high-resolution values are in surprisingly good agreement with state-of-the-art lattice QCD calculations, as well as with recent experiments conducted at Hermes and Jefferson Lab. There is a remarkable degree of consistency."

The next step is to compare the model with results from upcoming, more detailed measurements of the orbital angular momentum of the quarks in the proton.

Journal reference:

1. Thomas et al. **Interplay of Spin and Orbital Angular Momentum in the Proton**. *Physical Review Letters*, 2008; 101 (10): 102003 DOI: 10.1103/PhysRevLett.101.102003

Adapted from materials provided by DOE/Thomas Jefferson National Accelerator Facility.

http://www.sciencedaily.com/releases/2008/09/080912101402.htm

Impulsive Eater? Remembering Failures May Help Curb Eating

ScienceDaily (Sep. 16, 2008) — Remember when you pigged out on birthday cake? If you're an impulsive eater, that memory might help you choose a fruit salad next time around.

When it comes to tempting or fattening foods, some people are a lot more impulsive than others. And according to a new study, impulsive people think and act differently than non-impulsive people after they remember a time when they resisted or succumbed to temptation.

Authors Anirban Mukhopadhyay (University of Michigan), Jaideep Sengupta (Hong Kong University of Science and Technology), and Suresh Ramanathan (University of Chicago) assessed the impulsivity of participants in four related studies. They had participants recall instances where they gave in to temptation or resisted it. In addition to making hypothetical food choices, participants also had opportunities to eat cookies or cheeseballs—without knowing their consumption was being tracked. In the case of impulsive people, "…thinking about failure may actually beget success," write the authors.

"We propose and find that chronically non-impulsive individuals display behavior consistency over time—resisting when they recall having resisted earlier. In contrast, impulsive individuals show a switching pattern, resisting current temptations if they recall having succumbed, and vice versa," write the authors.

"So what is it that makes people succumb to temptation, time after sinful time? We suggest that the likelihood of a repeat act of indulgence depends on what people recall doing the previous time they were faced with a similar choice," the authors write. "In general, chronically impulsive people are more likely to feel this conflict between the two forces—of giving in and holding back, while those who tend to be less impulsive are also less likely to experience such a struggle."

The results of this study suggest ways to improve the health of both impulsive and non-impulsive consumers. Both groups did a better job of resisting temptation when they recalled past instances of resisting temptation along with their reasons for resisting.

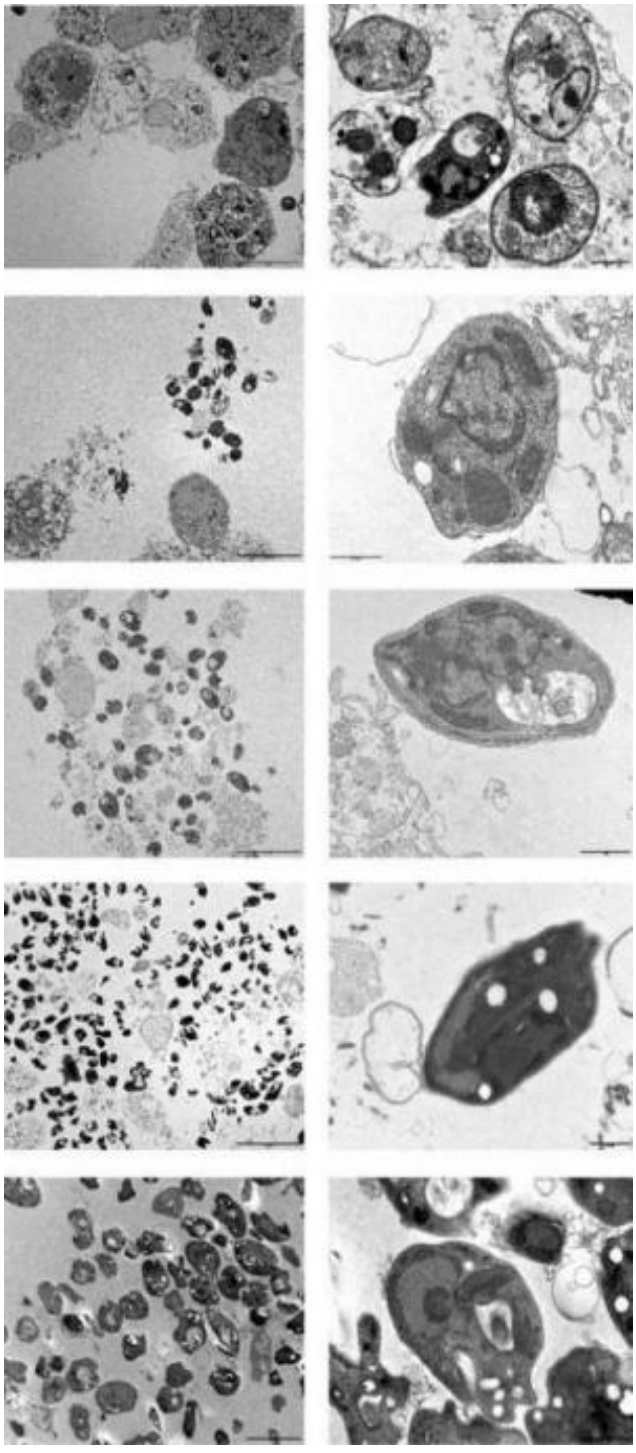
Journal reference:

1. Mukhopadhyay et al. **Recalling Past Temptations: An Information□Processing Perspective on the Dynamics of Self□Control**. *Journal of Consumer Research*, December 2008; 080812162241439 DOI: 10.1086/591105

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

http://www.sciencedaily.com/releases/2008/09/080915170743.htm

Purifying Parasites From Host Cells With Light



Electron micrographs (left=low, right=high magnification) highlighting the purification of Leishmania parasites (dark shapes) from their host cells. (Credit: MCP)

ScienceDaily (Sep. 16, 2008) — Researchers have developed a clever method to purify parasitic organisms from their host cells, which will allow for more detailed proteomic studies and a deeper insight into the biology of organisms that cause millions of cases of disease each year.

Many infectious pathogens, like those that cause Toxoplasmosis or Leishmaniases, have a complex life cycle alternating between free-living creature and cell-enclosed parasite. A thorough analysis of the proteins that help these organisms undergo this lifestyle change would be tremendously useful for drug or vaccine development; however, it's extremely difficult to separate the parasites from their host cell for detailed study.

As reported in the September Molecular & Cellular Proteomics, Toni Aebischer and colleagues worked around this problem by designing special fluorescent Leishmania mexicana (one of the many Leishmaniases parasites). They then passed infected cells through a machine that can separate cell components based on how much they glow. Using this approach, the researchers separated the Leishmania parasites with only about 2% contamination, far better than current methods.

They then successfully identified 509 proteins in the parasites, 34 of which were more prominent in parasites than free –living Leishmania. The results yielded many characteristics of these organisms, such as a high presence of fatty acid degrading enzymes, which highlights adaptation to intracellularly available energy sources. The identified proteins should provide a good data set for continued selection of drug targets, and the success of this method should make it a good resource for other cellular parasites like malaria.

Journal reference:

1. Daniel Paape, Christoph Lippuner, Monika Schmid, Renate Ackermann, Martin E. Barrios-Llerena, Ursula Zimny-Arndt, Volker Brinkmann, Benjamin Arndt, Klaus Peter Pleissner, Peter R. Jungblut, and Toni Aebischer. **Transgenic, Fluorescent Leishmania mexicana Allow Direct Analysis of the Proteome of Intracellular Amastigotes**. *Molecular & Cellular Proteomics*, 2008; 7 (9): 1688 DOI: 10.1074/mcp.M700343-MCP200

Adapted from materials provided by American Society for Biochemistry and Molecular Biology, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2008/09/080912132958.htm

New Geomorphological Index Created For Studying Active Tectonics Of Mountains

ScienceDaily (Sep. 16, 2008) — To build a hospital, nuclear power station or a large dam you need to know the possible earthquake risks of the terrain. Now, researchers from the Universities of Granada and Jaen, alongside scientists from the University of California (Santa Barbara, USA), have developed, based on relief data from the southern edge of the Sierra Nevada, a geomorphological index that analyses land form in relation to active tectonics, applicable to any mountain chain on the planet.

Active tectonics comprise the most up-to-date deformation processes that affect the Earth's crust, resulting in earthquakes or recent deformations in the planet's faults and folds. This phenomena is analysed in geology research carried out before commencing engineering works.

Depending on the type of project (nuclear power stations or power stations, radioactive storage, natural gas or CO_2, large dams and tunnels, hydroelectricity projects...) and the type of earthquake (single or multiple), the time period for evaluating active tectonics varies between 10,000 and 100,000 years for studies prior to beginning construction work.

The study, which is now published in the magazine Geomorphology and is the result of the doctoral thesis of Rachid El Hamdouni, Professor of the Departament of Civil Engineering at the University of Granada, defines a new geomorphological index called Relative Active Tectonics Indexpos, which identifies four classes of active tectonics (from low to very high) and uses six geomorphological indicators.

"The main use of this new index is that it establishes a close relationship between this, the land forms, and direct evidence of active faults", El Hamdouni explained.

A seismic map for southern Spain

The indices are calculated with the help of Geographical Information Systems and teledetection programs in large areas which identify geomorphological anomalies possibly related to active tectonics. "This is really useful in southern Spain where studies on active tectonics are not very widely distributed", Chacón pointed out.

The study has focused on the Padul-Dúrcal fault and a series of associated fault structures on the edge of the Sierra Nevada, where over the last 30 years seismic activity has been recorded by the Observatory of the Andalusian Institute of Geophysics and Prevention of Seismic Disasters. Chacón explained that the map obtained with the new index depends exclusively on the land forms and divides the area studied into four parts, "of which two thirds of the total area is classed as having high or very high tectonic activity".

The Sierra Nevada is an Alpine mountain chain "with variable active tectonic gradients caused by the collision of Africa with Europe which has given rise to anticlines aligned from east to west, as well as the transverse extension with variable vertical gradients around 0.5 mm/year in normal faults", Chacón specified.

Adapted from materials provided by University of Granada - Communications Department.

http://www.sciencedaily.com/releases/2008/09/080911142421.htm

Steady Work And Mental Health: Is There A Connection?

ScienceDaily (Sep. 16, 2008) — Despite low overall unemployment, Canada's manufacturing industry has cut 88,000 jobs this year, with nearly all the losses occurring in Ontario. Also, part-time employment has grown by 3.5 per cent in 12 months, much faster than the 0.9 per cent growth in full time work. A new report from the World Health Organization (WHO) on the social determinants of health demonstrates that these kind of employment changes can affect more than your wallet. Research from the Centre for Addiction and Mental Health (CAMH)'s Dr. Carles Muntaner in the WHO report highlights the profound impact of employment conditions on health.

Dr. Muntaner and his research team found that poor mental health outcomes are associated with precarious employment (e.g. temporary contracts or part-time work with low wages and no benefits). When compared with those with full-time work with benefits, workers who report employment insecurity experience significant adverse effects on their physical and mental health.

The research team have also found that stress at work is associated with a 50 per cent excess risk of coronary heart disease, and there is consistent evidence that jobs with high demands, low control, and effort-reward imbalance are risk factors for mental and physical health problems (major depression, anxiety disorders, and substance use disorders). Canada and a number of other wealthy countries such as the U.K., the United States, Australia and New Zealand all face similar challenges, Dr. Muntaner notes, because there's a greater tolerance for inequities than in some other countries such as Sweden and Denmark.

"Access to healthcare is not the only determinate of a healthy community," says Dr. Muntaner. "All aspects of our lifestyle, including how we work, are intrinsically linked to our wellbeing and our quality and length of life. If the face of Canada's ever-changing labour market, we must understand and improve the relationship between health and work." In the report entitled Closing the Gap in a Generation: Health Equity through Action on the Social Determinants of Health, three overarching recommendations to achieve health equality are made, including improving employment and working conditions, and the report contributors call for – and outline steps to achieve - global, national and local actions to improve employment and working conditions.This landmark study from the WHO is the culmination of three year's work by an eminent group of policy makers, academics, former heads of state and former ministers of health who have been investigating the differences between and within countries that result from the social environment where people are born, live, grow, work and age – the social determinants of health. Together, they comprise the WHO's Commission on the Social Determinants of Health, which has produced Closing the Gap in a Generation: Health Equity through Action on the Social Determinants of Health.

The data and recommendations on workplace came from the Employment Conditions Knowledge Network (EMCONET), one of nine Knowledge Networks established to inform the final report, chaired by Dr. Muntaner, Addictions Nursing Research Chair and scientists in CAMH's Social Equity and Health (SHE) research section, and Joan Benach, (SHE) adjunct scientist.The Commission presented this new report to the WHO's director-general, and Dr. Muntaner recently presented the workplace data in a keynote speech at the "5th World Conference on the Promotion of Mental Health and the Prevention of Mental and Behavioral Disorders" in Melbourne, Australia on September 12, 2008.

Visit WHO | Commission on Social Determinants of Health - Final Report for more information.

Adapted from materials provided by Centre for Addiction and Mental Health.

http://www.sciencedaily.com/releases/2008/09/080915105727.htm

Economic Value Of Insect Pollination Worldwide Estimated At U.S. $217 Billion

According to the study, the decline of pollinators would have main effects on three main crop categories (following FAO terminology); fruits and vegetable were especially affected with a loss estimated at €50 billion each, followed by edible oilseed crops with €39 billion. (Credit: Copyright André Künzelmann/UFZ)

ScienceDaily (Sep. 15, 2008) — INRA and CNRS French scientists and a UFZ German scientist found that the worldwide economic value of the pollination service provided by insect pollinators, bees mainly, was €153 billion* in 2005 for the main crops that feed the world.

This figure amounted to 9.5% of the total value of the world agricultural food production. The study also determined that pollinator disappearance would translate into a consumer surplus loss estimated between €190 to €310 billion. The results of this study on the economic valuation of the vulnerability of world agriculture confronted with pollinator decline are published in the journal Ecological Economics.

According to the study, the decline of pollinators would have main effects on three main crop categories (following FAO terminology); fruits and vegetable were especially affected with a loss estimated at €50 billion each, followed by edible oilseed crops with €39 billion.

Among biodiversity concerns, the decline of pollinators has become a major issue, but its impact remains an open question. In particular, the economic value of the pollination service they provide had not been assessed on solid ground to date. Based upon the figures of the literature review published in 2007 on pollinator dependence of the main crops used for food, the study uses FAO and original data to calculate the value of the pollinator contribution to the food production in the world. The total economic value of pollination worldwide amounted to €153 billion in 2005, which represented 9.5% of the value of the world agricultural production used for human food that year.

Three main crop categories (following FAO terminology) were particularly concerned; fruits and vegetable were especially affected with a loss estimated at €50 billion each, followed by edible oilseed crops with €39 billion. The impact on stimulants (coffee, cocoa…), nuts and spices was less, at least in economic terms.

The scientists also found that the average value of crops that depend on insect pollinators for their production was on average much higher than that of the crops not pollinated by insects, such as cereals or sugar cane (€760 and €150 per metric ton, respectively). The vulnerability ratio was defined as the ratio of the economic value of insect pollination divided by the total crop production value. This ratio varied considerably among crop categories with a maximum of 39% for stimulants (coffee and cocoa are insect-pollinated), 31% for nuts and 23% for fruits. There was a positive correlation between the value of a crop category per production unit and its ratio of vulnerability ; the higher the dependence on insect pollinators, the higher the price per metric ton.

From the standpoint of the stability of world food production, the results indicate that for three crop categories – namely fruits, vegetables and stimulants – the situation would be considerably altered following the complete loss of insect pollinators because world production would no longer be enough to fulfil the needs at their current levels. Net importers, like the European Community, would especially be affected. This study is not a forecast, however, as the estimated values do not take into account all the strategic responses that producers and all segments of the food chain could use if faced with such a loss. Furthermore, these figures consider a total loss of pollinators rather than a gradual decline and, while a few studies that show a linear relationship between pollinator density and production, this must be confirmed.

The consequence of pollinator decline on the well being of consumers, taken here in its economic sense, was calculated based on different price elasticities of demand. The price elasticity represents the effects of price change on consumer purchase, that is, the percent drop in the amount purchased following a price increase of 1%. In the study, researchers assumed that a realistic value for the price-elasticities would be between -0.8 and -1.5 (for a value of -0.8, the consumer would buy 0.8% less of the product when its price increases by 1%). Under these hypotheses, the loss of consumer surplus would be between €190 and €310 billion in 2005.

These results highlight that the complete loss of insect pollinators, particularly that of honey bees and wild bees which are the main crop pollinators, would not lead to the catastrophic disappearing of world agrioculture, but would nevertheless result in substantial economic losses even though the figures consider only the crops which are directly used for human food. The adaptive strategies of economic actors – such as re-allocation of land among crops and use of substitutes in the food industry – would likely limit somewhat the consequences of pollinator loss. Yet researchers did not take into account the impact of pollination shortage onto seeds used for planting, which is very important for many vegetable crops as well as forage crops and thereby the whole cattle industry, non-food crops and, perhaps most importantly, the wild flowers and all the ecosystemic services that the natural flora provides to agriculture and to society as a whole.

*€153 billion is approximately 217 billion US dollars using Sept 15, 2008 conversion rates.

Adapted from materials provided by Helmholtz Association of German Research Centres.

http://www.sciencedaily.com/releases/2008/09/080915122725.htm

Vaccine Against HER2-positive Breast Cancer Offers Complete Protection In Lab

ScienceDaily (Sep. 15, 2008) — Researchers at Wayne State University have tested a breast cancer vaccine they say completely eliminated HER2-positive tumors in mice - even cancers resistant to current anti-HER2 therapy - without any toxicity.

The study, reported in the September 15 issue of Cancer Research, a journal of the American Association for Cancer Research, suggests the vaccine could treat women with HER2-positive, treatment-resistant cancer or help prevent cancer recurrence. The researchers also say it might potentially be used in cancer-free women to prevent initial development of these tumors.

HER2 receptors promote normal cell growth, and are found in low amounts on normal breast cells. But HER2-positive breast cells can contain many more receptors than is typical, promoting a particularly aggressive type of tumor that affects 20 to 30 percent of all breast cancer patients. Therapies such as trastuzumab and lapatinib, designed to latch on to these receptors and destroy them, are a mainstay of treatment for this cancer, but a significant proportion of patients develop a resistance to them or cancer metastasis that is hard to treat.

This treatment relied on activated, own-immunity to wipe out the cancer, says the study's lead investigator, Wei-Zen Wei, Ph.D., a professor of immunology and microbiology at the Karmanos Cancer Institute.

"The immune response against HER2-positive receptors we saw in this study is powerful, and works even in tumors that are resistant to current therapies," she said. "The vaccine could potentially eliminate the need to even use these therapies."

The vaccine consists of "naked" DNA – genes that produce the HER2 receptor – as well as an immune stimulant. Both are housed within an inert bacterial plasmid. In this study, the researchers used pulses of electricity to deliver the injected vaccine into leg muscles in mice, where the gene produced a huge quantity of HER2 receptors that activated both antibodies and killer T cells.

"While HER2 receptors are not usually seen by the immune system when they are expressed at low level on the surface of normal cells, a sudden flood of receptors alerts the body to an invasion that needs to be eliminated," Wei said. "During that process, the immune system learns to attack cancer cells that display large numbers of these receptors."

They also used an agent that, for a while, suppressed the activity of regulatory T cells, which normally keeps the immune system from over-reacting. In the absence of regulatory T cells, the immune system responded much more strongly to the vaccine. Then, when the researchers implanted HER2-positive breast tumors in the animals, the cancer was eradicated.

"Both tumor cells that respond to current targeted therapies and those that are resistant to these treatments were eradicated," Wei said. "This may be an answer for women with these tumors who become resistant to the current therapies."

Wei's lab is the first to develop HER2 DNA vaccines, and this is the second such vaccine Wei and her colleagues have tested more extensively. The first, described in a study in 1999, formed the model of a vaccine now being tested by a major Pharmaceutical company in early phase clinical trials in the U.S. and in Europe in women with HER2-positive breast cancer.

In order to ensure complete safety, Wei says the current test vaccine uses HER2 genes that are altered so that they cannot be oncogenic. The receptors produced do not contain an "intracellular domain" – the part

of the receptor that is located just below the cell surface and transmits growth signals to the nucleus. The first vaccine was also safe, she says, but contained a little more of the native HER2 receptor structure. "With this vaccine, I am quite certain the receptor is functionally dead," she said.

"The greatest power of vaccination is protection against initial cancer development, and that is our ultimate goal with this treatment," Wei said.

Adapted from materials provided by American Association for Cancer Research, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2008/09/080915083343.htm

Key To Keeping Older People Fit For Longer

Exercise in research: the study found that older people could benefit more from lower-resistance exercise than higher-resistance work. (Credit: Image courtesy of Engineering and Physical Sciences Research Council)

ScienceDaily (Sep. 15, 2008) — A carefully framed combination of moderate exercise and nutritional supplements could help older people maintain an active lifestyle for longer.

A Manchester Metropolitan University study has found that taking carbohydrate and protein supplements just before and just after low-resistance exercise could boost muscle performance and slow muscle wastage in people over retirement age.

Moreover, this combination appears to deliver greater fitness benefits than undertaking heavy-resistance training with or without changing one's nutritional habits.

This was the first-ever study of the combination of structured exercise and nutritional supplements to focus wholly on older people. Undertaken as part of the SPARC (Strategic Promotion of Ageing Research Capacity) initiative, the findings will be discussed at this year's BA Festival of Science in Liverpool on Thursday 11th September. SPARC is supported by the Engineering and Physical Sciences Research Council (EPSRC) and the Biotechnology and Biological Sciences Research Council (BBSRC).

This groundbreaking study involved a carefully selected sample of around 60 healthy, independent-living adults aged 65 and over.

The volunteers were randomly divided into groups who underwent different 12 week programmes of physical exercise and nutritional supplementation. Everyone was then re-assessed at the end of the programme.

Some groups undertook low-resistance exercise once a week; others undertook high-resistance exercise twice a week. Within each group, some of the volunteers took protein and carbohydrate supplements while others did not.

When all the participants were re-assessed at the end of the 12 week programme, it was observed that muscle size and strength had increased in all groups.

However, the results suggested that older people would derive the most benefits if they took appropriate supplements coupled with low-intensity exercise.

"Maintaining muscle performance and arresting muscle wastage can offer older people real improvements in their quality of life," says Dr Gladys Pearson, who led the research. "Though we still need to assess precisely what level of exercise gives the best results, we believe we've shown that regular low-resistance exercise complemented by the right nutritional supplements could boost the well-being of the UK's ageing population."

Dr Pearson and her team now aim to look at the effectiveness of novel combinations of strength training and nutritional supplementation as a way of speeding recovery and improving mobility for old and young orthopaedic surgery patients.

The 12-month study 'Healthy Diet v Dietary Supplementation: Improving Physical Fitness and Quality of Life in Older People' received financial support from SPARC of £28,245. Additional support was received from Manchester Metropolitan University.

Adapted from materials provided by Engineering and Physical Sciences Research Council.

http://www.sciencedaily.com/releases/2008/09/080911111522.htm

Global Shortages Of Radio Isotopes For Cancer Diagnosis May Be A Thing Of The Past

ScienceDaily (Sep. 15, 2008) — Thanks to a newly-developed technology at the Delft University of Technology in the Netherlands, global shortages of radio isotopes for cancer diagnosis could be a thing of the past. This is the message from Prof. Bert Wolterbeek of Delft University of Technology's Reactor Institute Delft (RID) in an article in university journal Delta.

It has made global headlines recently: hospitals are facing a shortage of radio isotopes which means that patients will have to wait longer for cancer diagnosis. Only a handful of reactors around the world manufacture the isotope, technetium-99m, which is used to treat about forty million patients annually. Three of these reactors are currently unable to supply any due to maintenance work, including Europe's most important: the Dutch reactor in Petten.

Additional isotope manufacturers would reduce the risk of shortages considerably. The current process requires enriched uranium. And that is the kind of material for which manufacturers need a special permit due to nuclear non-proliferation treaties. Prof. Bert Wolterbeek of the RID is working on a radical solution to this problem. He is developing a method for producing the sought-after isotope without uranium. If these experiments prove to be applicable in an industrial environment, many more factories could manufacture the material.

"Technetium-99m, the material in question, is currently made by highly enriched uranium fission," Wolterbeek explains. "One of the products created is radioactive molybdenum-99, the raw material for technetium-99m. Manufacturers supply this molybdenum to hospitals secured in rods. A hospital can 'harvest' the technetium-99m isotope from a rod for a week as the molybdeen-99 slowly decays into technetium-99m."

Yet molybdenum-99 can also be manufactured from molybdenum-98, a stable isotope made of natural molybdenum, a material which mining companies already extract from the ground. Wolterbeek has patented a technique in which he bombards this raw material with neutrons in order to make molybdenum-99. The molybdenum atoms are not just 'activated' by the neutron bombardment, but are also separated from the surrounding atoms by the energy transfer. The resultant molybdenum-99 can then be dissolved in water. This means that the isotope can be produced in highly concentrated form. And this aspect is crucial. Wolterbeek: "The activity concentration of the radioactive material needs to be high, otherwise patients will be given too high a chemical dose to form a clear radiation image."

Wolterbeek wishes to hold larger-scale tests in conjunction with Urenco. The head of the Stable Isotopes department at this reprocessing company, Charles Mol, envisages the technology from Delft University of Technology being used to open up a "highly interesting market". In his view, scientists around the globe are desperately searching for alternative manufacturing methods as the use of enriched uranium will cease at some point due to nuclear non-proliferation treaties. "Another reason," he says, "is that the current manufacturing process produces a huge amount of radioactive waste. And any alternative method using low-enriched uranium could produce even more waste."

Adapted from materials provided by Delft University of Technology.

http://www.sciencedaily.com/releases/2008/09/080911142423.htm

Viruses Collectively Decide Bacterial Cell's Fate

Joshua Weitz, an assistant professor in Georgia Tech's School of Biology, recently showed that bacteria-infecting viruses make collective decisions about whether to kill host cells immediately after infection or enter a latent state to remain within the host cell. (Credit: Georgia Tech Photo: Gary Meek)

ScienceDaily (Sep. 15, 2008) — A new study suggests that bacteria-infecting viruses – called phages – can make collective decisions about whether to kill host cells immediately after infection or enter a latent state to remain within the host cell.

The research, published in the September 15 issue of the Biophysical Journal, shows that when multiple viruses infect a cell, this increases the number of viral genomes and therefore the overall level of viral gene expression. Changes in viral gene expression can have a dramatic nonlinear effect on gene networks that control whether viruses burst out of the host cell or enter a latent state.

"What has confounded the virology community for quite some time is the observation that the cell fate of a bacteria infected by a single virus can be dramatically different than that infected by two viruses," said Joshua Weitz, an assistant professor in the School of Biology at the Georgia Institute of Technology. "Our study suggests that viruses can collectively decide whether or not to kill a host, and that individual viruses 'talk' to each other as a result of interactions between viral genomes and viral proteins they direct the infected host to produce."

To study viral infections, Weitz teamed with postdoctoral fellow Yuriy Mileyko, graduate student Richard Joh and Eberhard Voit, who is a professor in the Wallace H. Coulter Department of Biomedical Engineering, the David D. Flanagan Chair Georgia Research Alliance Eminent Scholar in Biological Systems and director of the new Integrative BioSystems Institute at Georgia Tech.

Nearly all previous theoretical studies have claimed that switching between "lysis" and "latency" pathways depends on some change in environmental conditions or random chance. However, this new study suggests that the response to co-infection can be an evolvable feature of viral life history.

For this study, the researchers analyzed the decision circuit that determines whether a virus initially chooses the pathway that kills the host cell – called the lytic pathway – or the pathway where it remains dormant inside the host cell – called the lysogenic pathway.

When the lytic pathway is selected, the virus utilizes bacterial resources to replicate and then destroys the host cell, releasing new viruses that can infect other cells. In contrast, in the lysogenic pathway, the viral genome inserts itself into the bacterial genome and replicates along with it, while repressing viral genes that lead to lysis. The virus remains dormant until host conditions change, which can result in a switch to the lytic pathway.

The decision of the genetic circuit that controls whether a virus initially chooses lysis or lysogeny is not random. Instead, cell fate is controlled by the number of infecting viruses in a coordinated fashion, according to the new study, which was funded by the Defense Advanced Research Projects Agency, the National Science Foundation and the Burroughs Wellcome Fund.

"In the case of perhaps the most extensively studied bacteriophage, lambda phage, experimental evidence indicates that a single infecting phage leads to host cell death and viral release, whereas if two or more phages infect a host the outcome is typically latency," explained Weitz, who is a core member of the new Integrative BioSystems Institute at Georgia Tech. "We wanted to know why two viruses would behave differently than a single virus, given that the infecting viruses possess the same genetic decision circuit."

To find out, the researchers modeled the complex gene regulatory dynamics of the lysis-lysogeny switch for lambda phage. They tracked the dynamics of three key genes – cro, cI and cII – and their protein production. The decision circuit involved both negative and positive feedback loops, which responded differently to changes in the total number of viral genomes inside a cell. The positive feedback loop was linked to the lysogenic pathway and the negative feedback loop was linked to the lytic pathway.With a single virus, cro dominated and the lytic pathway prevailed. If the number of co-infecting viruses exceeded a certain threshold, the positive feedback loop associated with cI dominated, turning the switch to the lysogenic pathway. The differences in bacterial cell fate were stark and hinged upon whether or not one or two viruses were inside a given cell.

The researchers found that the cII gene acted as the gate for the system. Increasing the number of viruses drove the dynamic level of cII proteins past a critical point facilitating production of cI proteins leading to the lysogenic pathway."The decision circuit is a race between two pathways and in the case of a single virus, the outcome is biased toward lysis," explained Weitz. "In our model, when multiple viruses infect a given cell, the overall production of regulatory proteins increases. This transient increase is reinforced by a positive feedback loop in the latency pathway, permitting even higher production of lysogenic proteins, and ultimately the latent outcome."

The central idea in the model proposed by Weitz and collaborators is that increases in the overall amount of viral proteins produced from multiple viral genomes can have a dramatic effect on the nonlinear gene networks that control cell fate."Many questions still remain, including to what extent subsequent viruses can change the outcome of previously infected, but not yet committed, viruses, and to what extent microenvironments inside the host impact cell fate," added Weitz. "Nonetheless, this study proposes a mechanistic explanation to a long-standing paradox by showing that when multiple viruses infect a host cell, those viruses can make a collective decision rather than behaving as they would individually."

Adapted from materials provided by Georgia Institute of Technology, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2008/09/080915121231.htm

Mother's Stress Linked To Her Child Becoming Overweight

Steve Garasky and Brenda Lohman are two of the authors of a new study by a team of current and former ISU faculty establishing a link between a mother's stress and the chance of their children becoming overweight. Here, they observe lunch being served in ISU's Child Development Lab School. (Credit: Photo by Bob Elbert, ISU News Service)

ScienceDaily (Sep. 15, 2008) — A mother's stress may contribute to her young children being overweight in low income households with sufficient food, according to a new Iowa State University study that is published in the September issue of Pediatrics, the professional journal of the American Academy of Pediatrics.The study analyzed data collected from 841 children in 425 households in the 1999-2002 National Health and Nutrition Examination Survey.

Iowa State faculty members Steve Garasky, a professor of human development and family studies; Brenda Lohman, an assistant professor of human development and family studies; and Susan Stewart, an associate professor of sociology, all collaborated on the study. Lead researcher Craig Gundersen, a member of the agricultural and consumer economics faculty at the University of Illinois; and Joey Eisenmann, a member of the kinesiology and pediatrics faculty at Michigan State University, were also previous ISU faculty members on the research team.The researchers used mothers' responses to interview questions to determine their mental, physical, financial and family structure levels of stress -- producing a cumulative stress index. The child's weight status was determined by their Body Mass Index (BMI), age and sex. Subjects were also broken into two age groups: three to 10 and 11 to 17 years of age. Household food insecurity status -- whether or not there is enough food to sustain healthy, active lifestyles for all household members -- was also measured from the mothers' interview responses.

The link between mom's stress and child's weight

In households with no maternal stress, low-income children in food secure households had a 33.0 percent probability of being overweight, while those in food insecure households had a 34.8 percent probability. As maternal stress levels increased, the probability of becoming overweight increased in children from food secure households, but decreased among those in food insecure households. When the maternal stress was found to be at twice the average level of the study sample, children in food-secure households had a 43.7 percent greater probability of being overweight or obese when compared with children in food insecure households."We were not able to observe what people are eating in these data. That's definitely part of future work," Garasky said. "But at this point we have to conclude that in stressful environments, children in households with adequate food -- maybe it is 'comfort food,' or maybe it's just larger quantities of more traditional food -- are possibly acting on the desire to eat more, and maybe even eat differently, than those from food insecure households."

For children over the age of 10, the relationship between household stress, food security and weight was found to be statistically insignificant -- meaning it was young children who were most affected."If you see the developmental differences in a 6-year-old vs. a 16-year-old, the 6-year-old relies more on the food choices in the households, while the 16-year-old spends more time away from home and has a network of friends or lunch plans at schools where they have more food options," Lohman said. "It could also be that the adolescents are also able to cope with their mother's stress and handle it better through their support mechanisms -- siblings, friends, or teachers -- and the younger kids don't have those same networks, so they might internalize the mother's stressors more."

Future research will measure dad's stress too

The researchers have future plans to measure the stress levels of fathers in determining overall household stress. Garasky says they started with mothers because single-parent families make up a high percentage of low-income households, and the vast majority of those single parents are mothers.

"And then it's the premise that mom is traditionally the primary caregiver," he said. "So if you want to link one person to circumstances of a child, it's more natural to link to mom."

"Unfortunately we did not have access to information about fathers' stressors and behaviors in this data set," Lohman said. "Yet in most modern households, fathers may be doing as much or more of the cooking than in the past. So I agree that future work must address stress levels of fathers too."

Garasky says the study's results prove that the home environment may be contributing to the growing epidemic of childhood obesity.

"There's a lot more going on than just asking kids to eat less or exercise more," he said.

"Recognizing the complexity of the issue allows us to recognize that we have more options to help children," he said. "If we can reduce mom's stress -- whether it be mental health or financial issues -- the direct effect on mom is helping her, and that's good. But we can also hope to see indirect effects on other household members and children. For example, their reduced probability of becoming obese is another benefit to helping mom."The research was funded through a grant from the National Research Initiative program of the Cooperative State Research, Education, and Extension Service of the U.S. Department of Agriculture.

Adapted from materials provided by Iowa State University.

http://www.sciencedaily.com/releases/2008/09/080909122755.htm

Ice Core Studies Confirm Accuracy Of Climate Models

ScienceDaily (Sep. 15, 2008) — An analysis has been completed of the global carbon cycle and climate for a 70,000 year period in the most recent Ice Age, showing a remarkable correlation between carbon dioxide levels and surprisingly abrupt changes in climate.

The findings, just published in the online edition of the journal Science, shed further light on the fluctuations in greenhouse gases and climate in Earth's past, and appear to confirm the validity of the types of computer models that are used to project a warmer climate in the future, researchers said.

"We've identified a consistent and coherent pattern of carbon dioxide fluctuations from the past and are able to observe the correlation of this to temperature in the northern and southern hemispheres," said Ed Brook, an associate professor of geosciences at Oregon State University. "This is a global, interconnected system of ocean and atmosphere, and data like these help us better understand how it works."

The analysis was made by studying the levels of carbon dioxide and other trace gases trapped as bubbles in ancient ice cores from Antarctica.

In the last Ice Age, as during most of Earth's history, levels of carbon dioxide and climate change are intimately linked. Carbon dioxide tends to rise when climate warms, and the higher levels of carbon dioxide magnify the warming, Brook said. These natural cycles provide a "fingerprint" of how the carbon cycle responds to climate change.

In contrast to the relatively low levels of carbon dioxide in the Ice Age, the burning of fossil fuels since the Industrial Revolution has led to levels of greenhouse gases that by comparison are off the charts. The level of atmospheric carbon dioxide today is about 385 parts per million, or more than double that of some of the lower levels during the Ice Age. These changes have taken place at a speed and magnitude that has not occurred in hundreds of thousands of years, if not longer. Past studies of ice cores have suggested that Earth's temperature can sometimes change amazingly fast, warming as much as 15 degrees in some regions within a couple of decades.

The question everyone wants to know is what all this will mean in terms of future climate change.

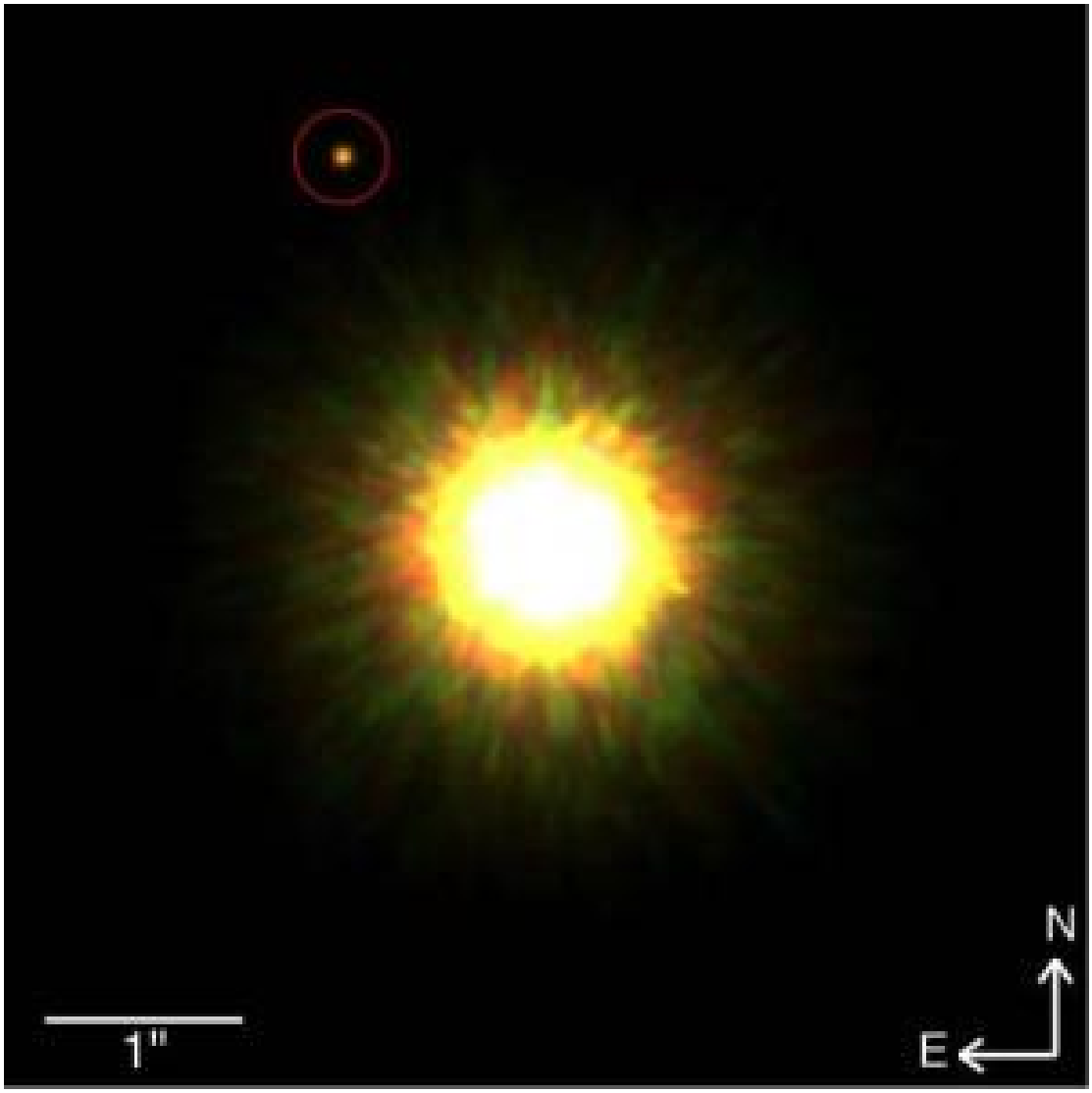
"Before humans were affecting the Earth, what we are finding is regular warm and cold cycles, which both began and ended fairly abruptly," Brook said. "This study supports the theory that a key driver in all this is ocean currents and circulation patterns, which create different patterns of warm and cold climates depending on the strength of various parts of the global ocean circulation system."

This issue is of more than academic interest – one of the primary circulation patterns is referred to scientifically as "meridional overturning circulation." When that current is moving large amounts of warm water from the equator to the north, it helps to warm the high latitude parts of the Northern Hemisphere, and particularly the North Atlantic region. When the system stops or dramatically slows, as it has repeatedly in the past, Greenland and Europe get much colder while the Antarctic regions become warmer, Brook said."In every historic sequence we observed, the abrupt warming of Greenland occurred about when carbon dioxide was at maximum levels," Brook said. "And that was during an Ice Age, and at levels of atmospheric carbon dioxide that are far lower than those we have today."

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

http://www.sciencedaily.com/releases/2008/09/080911150048.htm

First Picture Of Likely Planet Around Sun-like Star



Gemini adaptive optics image of 1RSX J160929.1-210524 and its likely ~8 Jupiter-mass companion (within red circle). This image is a composite of J-, H- and K-band near-infrared images. All images obtained with the Gemini Altair adaptive optics system and the Near-Infrared Imager (NIRI) on the Gemini North telescope. (Credit: Image courtesy of Gemini Observatory)

ScienceDaily (Sep. 15, 2008) — Astronomers have unveiled what is likely the first picture of a planet around a normal star similar to the Sun.

Three University of Toronto scientists used the Gemini North telescope on Mauna Kea in Hawai‘i to take images of the young star 1RXS J160929.1-210524 (which lies about 500 light-years from Earth) and a candidate companion of that star. They also obtained spectra to confirm the nature of the companion, which has a mass about eight times that of Jupiter, and lies roughly 330 times the Earth-Sun distance away from its star. (For comparison, the most distant planet in our solar system, Neptune, orbits the Sun at only about 30 times the Earth-Sun distance.) The parent star is similar in mass to the Sun, but is much younger.

"This is the first time we have directly seen a planetary mass object in a likely orbit around a star like our Sun," said David Lafrenière, lead author of a paper submitted to the Astrophysical Journal Letters and also posted online. "If we confirm that this object is indeed gravitationally tied to the star, it will be a major step forward."

Until now, the only planet-like bodies that have been directly imaged outside of the solar system are either free-floating in space (i.e. not found around a star), or orbit brown dwarfs, which are dim and make it easier to detect planetary-mass companions.

The existence of a planetary-mass companion so far from its parent star comes as a surprise, and poses a challenge to theoretical models of star and planet formation. "This discovery is yet another reminder of the truly remarkable diversity of worlds out there, and it's a strong hint that nature may have more than one mechanism for producing planetary mass companions to normal stars," said Ray Jayawardhana, team member and author of a forthcoming book on extrasolar planets entitled Worlds Beyond.

The team's Gemini observations took advantage of adaptive optics technology to dramatically reduce distortions caused by turbulence in Earth's atmosphere. The near-infrared images and spectra of the suspected planetary object indicate that it is too cool to be a star or even a more massive brown dwarf, and that it is young. Taken together, such findings confirm that it is a very young, very low-mass object at roughly the same distance from Earth as the star.

Even though the likelihood of a chance alignment between such an object and a similarly young star is rather small, it will take up to two years to verify that the star and its likely planet are moving through space together. "Of course it would be premature to say that the object is definitely orbiting this star, but the evidence is extremely compelling. This will be a very intensely studied object for the next few years!" said Lafrenière.

Team member Marten van Kerkwijk described the group's search method. "We targeted young stars so that any planetary mass object they hosted would not have had time to cool, and thus would still be relatively bright," he said. "This is one reason we were able to see it at all."

The Jupiter-sized body has an estimated temperature of about 1800 Kelvin (about 1500ºC), much hotter than our own Jupiter, which has a temperature of about 160 Kelvin (-110ºC), and its likely host is a young star of type K7 with an estimated mass of about 85% that of the Sun. For more characteristics of the star and planet see this table from the paper.

The work that led to this discovery is part of a survey of more than 85 stars in the Upper Scorpius association, a group of young stars formed about 5 million years ago.It uses the Gemini telescope's high-resolution adaptive optics capabilities to determine the different types of companions that can form around young stars: stars, brown dwarfs, or planetary mass objects. "This discovery certainly has us looking forward to what other surprises nature has in stock for us," said Van Kerkwijk.

The preprint of the paper is available at http://arxiv.org/abs/0809.1424

Adapted from materials provided by Gemini Observatory.

http://www.sciencedaily.com/releases/2008/09/080915162420.htm

Aerobic Exercise For The Wheelchair-bound

Students from the University of Texas partnered with alumnus to create an arcade experience for the wheelchair bound. (Credit: Stephanie Peco)

ScienceDaily (Sep. 15, 2008) — University of Texas at Austin alumnus, Chris Stanford (MSEE '91), and Electrical & Computer Engineering undergraduates are working on making exercise fun for wheelchair users. For the last year, Stanford has been partnering with engineering seniors to test his idea for a virtual reality treadmill for the disabled.

"Not many people realize," says Stanford who has been confined to a wheelchair since 1988, "the special health risks faced by wheelchair users. Everything is more difficult, including eating right and getting enough exercise. Because of this, the incidence of obesity, diabetes, and cardiovascular disease is several times the rate of the general population."

Stanford's solution, called TrekEase, approximates an arcade driving game. Users back a manual wheelchair into a frame, engage the flywheel for resistance, and start the driving software.

"When Chris approached me last year about using [TrekEase] as one of our senior design projects," says UT-ECE professor Jon Valvano "I was enthusiastic. It's an interesting engineering challenge. He came in with a mechanical system that had already been vetted for safety. The students added software and sensors that make the experience interactive."

Users can control speed and direction. A new group of students is continuing the project this semester. They plan to enhance the existing design so the system detects tilt making flight simulation possible and to work on the packaging so it will be affordable and easily reproducible.

"There is no way I could've done this by myself. I don't have the skill set," says Stanford." The students are amazing. They step up to every challenge."

Adapted from materials provided by University of Texas at Austin, Electrical & Computer Engineering, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2008/09/080910160800.htm

Laminin Builds The Neuromuscular Synapse

ScienceDaily (Sep. 15, 2008) — Like a plug and a socket, a nerve and a muscle fiber mesh at the neuromuscular junction. New work reveals that an extracellular matrix protein called laminin shapes both sides of the junction to ensure they fit together.

A neuromuscular junction, or synapse, in a newborn mouse is functional but simple, with a globular nerve terminal meeting a flat, oval structure on the muscle fiber. As the animal matures, the nerve terminal branches into a claw shape, and the muscle side contorts into a matching conformation. But what coordinates these changes so the two sides mirror each other? The researchers think that one molecule in the synapse sculpts both sides.

Their chief suspect was the synapse-spanning protein laminin. Made by muscle and forming part of the sheath that covers muscle, the laminin protein has different domains called alpha, beta, and gamma chains. Previous work had shown that the beta2 chain of laminin spurs differentiation of the nerve terminal. The team has now found evidence that the alpha chains of laminin influence post-synaptic patterning. For example, maturation of the muscle side slowed in mice lacking the alpha5 chain of laminin in their muscles.

The researchers discovered that cell surface receptor molecules that recognize and bind laminin, are corralled by laminin on the muscle side of the synapse. These receptors, in turn, gather other receptors that respond to signals from the nerve. Overall, the work suggests that the beta and alpha chains of laminin together influence pre-synaptic and post-synaptic development, thus providing a way to coordinate maturation of the sending and receiving sides of the synapse.

Journal reference:

1. Nishimune, H., et al. . *Journal of Cell Biology*, (in press) DOI: 10.1083/jcb.200805095

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

http://www.sciencedaily.com/releases/2008/09/080915083339.htm

Putting A 'Korset' On The Spread Of Computer Viruses: Invention Stays One Step Ahead Of Anti-virus Software

Prof. Avishai Wool (Credit: Image courtesy of American Friends of Tel Aviv University)

ScienceDaily (Sep. 15, 2008) — Anti-virus companies play a losing game. Casting their nets wide, they catch common, malicious viruses and worms (known to the industry as "malware"), but it may take days before their software updates can prepare your computer for the next attack. By then it could be too late. And some insidious programs prove immune to anti-virus software, residing inside your computer for months or even years, collecting personal information and business secrets.

But Prof. Avishai Wool and his graduate student Ohad Ben-Cohen of Tel Aviv University's Faculty of Engineering are taking a different approach. They recently unveiled a unique new program called the "Korset" to stop malware on Linux, the operating system used by the majority of web and email servers worldwide. Prof. Wool's technology puts a new spin on Internet security, and once it reaches its full potential it could put anti-virus software companies out of business. The research was presented at the Black Hat Internet security conference in Las Vegas this summer.

Stopping the Virus Before It Starts

Prof. Wool and Ben-Cohen have built an open-source software solution for servers that run on Linux. "We modified the kernel in the system's operating system so that it monitors and tracks the behavior of the programs installed on it," says Prof. Wool. Essentially, he says, they have built a model that predicts how software running on a server should work.

If the kernel senses abnormal activity, it stops the program from working before malicious actions occur. "When we see a deviation, we know for sure there's something bad going on," Prof. Wool explains.

Prof. Wool also cites the problems with costly anti-virus protection. “Our methods are much more efficient and don’t chew up the computer’s resources,” he says. He adds that his motive is to make the Internet a safer place, not to open a new company to compete with current anti-virus software manufacturers.

Generally speaking, says Prof. Wool, anti-virus companies catch viruses “in the wild” and then send them to isolated computer labs for study. The companies then determine the unique patterns or “signatures” the malware creates. It is this signature that is sent as an anti-virus update to anti-virus subscribers. The problem is that updates take too much time to perfect and then distribute, leaving a wide window of opportunity for computer villains to attack.

“There is an ongoing battle between computer security experts and the phenomenal growth of viruses and network worms flooding the Internet,” he continues. “The fundamental problem with viruses remains unsolved and is getting worse every day.”

The Expert’s Tips on Secure Habits

Even if end-users do everything they can to protect their computers by using anti-virus programs and firewalls, there will always be a period when your computer is vulnerable to attack, says Prof. Wool.

How to stay protected? Never click on links purporting to be from PayPal, your bank or credit card company, he warns. “Most legitimate companies like banks never ask their clients to click on links in an email,” he says. “Be suspicious if a company asks you to do this -- access your account through bookmarks you’ve set up, or directly through the company’s homepage.”

Securing New Frontiers

Prof. Wool has built a number of useful technologies applicable to both today’s and tomorrow’s networked world. With his graduate student Danny Nebenzahl, he created a “vaccine” that can protect specific software programs like Microsoft’s Outlook against unseen attacks. The basic research published in 2006 is now making its way into mainstream products.

Prof. Wool is also collaborating with Prof. Jacob Scheuer, investigating the use of fiber optics and lasers to strengthen cryptographic tools used in banking and Internet security.

Adapted from materials provided by American Friends of Tel Aviv University.

http://www.sciencedaily.com/releases/2008/09/080909111037.htm

Violence Against Women Impairs Children's Health

ScienceDaily (Sep. 15, 2008) — Violence against women in a family also has serious consequences for the children's growth, health, and survival. Kajsa Åsling Monemi from Uppsala University has studied women and their children in Bangladesh and Nicaragua and shows, among other things, that children whose mothers are exposed to violence grow less and are sick more often than other children.

Kajsa Åsling Monemi, paediatrician, the Department of Women's and Children's Health, monitored more than 3,000 children in Bangladesh from the women's pregnancy tests till when the children were two years old. The study shows that children to women exposed to some form of violence had lower birth weights and grew less as infants and toddlers. They also got sick more often than other children with diseases like diarrhea and pneumonia.

"Both in Bangladesh and Nicaragua deaths before the age of five were more common among children whose mothers had been exposed to violence than among children of women who had never been subjected to violence," she reports.

According to Kajsa Åsling Monemi, there are several possible explanations for why violence against a mother can affect her children's health. During pregnancy the fetus grows less, and after birth the mother's mental health is crucial both for her emotional contact with the children and for her ability to care for the children. What's more, women who have been subjected to violence often have weaker social networks and often lack economic resources to seek medical care for their children, for example. This means that the children's health is dependent on the economic resources and the protection that the environment can offer.

"My studies indicate that the health consequences of violence against women within the family in a global perspective are greater than we previously knew," says Kajsa Åsling Monemi.

The Doctoral thesis is entitled, The Impact of Violence Against Women on Child Growth, Morbidity and Survival: Studies in Bangladesh and Nicaragua.

Adapted from materials provided by Uppsala University.

http://www.sciencedaily.com/releases/2008/09/080911103916.htm

Scientists Watch As Listener's Brain Predicts Speaker's Words

ScienceDaily (Sep. 15, 2008) — Scientists at the University of Rochester have shown for the first time that our brains automatically consider many possible words and their meanings before we've even heard the final sound of the word.

Previous theories have proposed that listeners can only keep pace with the rapid rate of spoken language—up to 5 syllables per second—by anticipating a small subset of all words known by the listener, much like Google search anticipates words and phrases as you type. This subset consists of all words that begin with the same sounds, such as "candle", "candy," and "cantaloupe," and makes the task of understanding the specific word more efficient than waiting until all the sounds of the word have been presented.

But until now, researchers had no way to know if the brain also considers the meanings of these possible words. The new findings are the first time that scientists, using an MRI scanner, have been able to actually see this split-second brain activity. The study was a team effort among former Rochester graduate student Kathleen Pirog Revill, now a postdoctoral researcher at Georgia Tech, and three faculty members in the Department of Brain and Cognitive Sciences at the University of Rochester.

"We had to figure out a way to catch the brain doing something so fast that it happens literally between spoken syllables," says Michael Tanenhaus, the Beverly Petterson Bishop and Charles W. Bishop Professor. "The best tool we have for brain imaging of this sort is functional MRI, but an fMRI takes a few seconds to capture an image, so people thought it just couldn't be done."

But it could be done. It just took inventing a new language to do it.

With William R. Kenan Professor Richard Aslin and Professor Daphne Bavelier, Pirog Revill focused on a tiny part of the brain called "V5," which is known to be activated when a person sees motion. The idea was to teach undergraduates a set of invented words, some of which meant "movement," and then to watch and see if the V5 area became activated when the subject heard words that sounded similar to the ones that meant "movement."

For instance, as a person hears the word "kitchen," the Rochester team would expect areas of the brain that would normally become active when a person thought of words like "kick" to momentarily show increased blood flow in an fMRI scan. But the team couldn't use English words because a word as simple as "kick" has so many nuances of meaning. To one person it might mean to kick someone in anger, to another it might mean to be kicked, or to kick a winning goal. The team had to create a set of words that had similar beginning syllables, but with different ending syllables and distinct meanings—one of which meant motion of the sort that would activate the V5 area.

The team created a computer program that showed irregular shapes and gave the shapes specific names, like "goki." They also created new verb words. Some, like "biduko" meant "the shape will move across the screen," whereas some, like "biduka," meant the shape would just change color.

After a number of students learned the new words well enough, the team tested them as they lay in an fMRI scanner. The students would see one of the shapes on a monitor and hear "biduko," or "biduka." Though only one of the words actually meant "motion," the V5 area of the brain still activated for both, although less so for the color word than for the motion word. The presence of some activation to the color word shows that the brain, for a split-second, considered the motion meaning of both possible words before it heard the final, discriminating syllable—ka rather than ko.

"Frankly, we're amazed we could detect something so subtle," says Aslin. "But it just makes sense that your brain would do it this way. Why wait until the end of the word to try to figure out what its meaning is? Choosing from a little subset is much faster than trying to match a finished word against every word in your vocabulary."

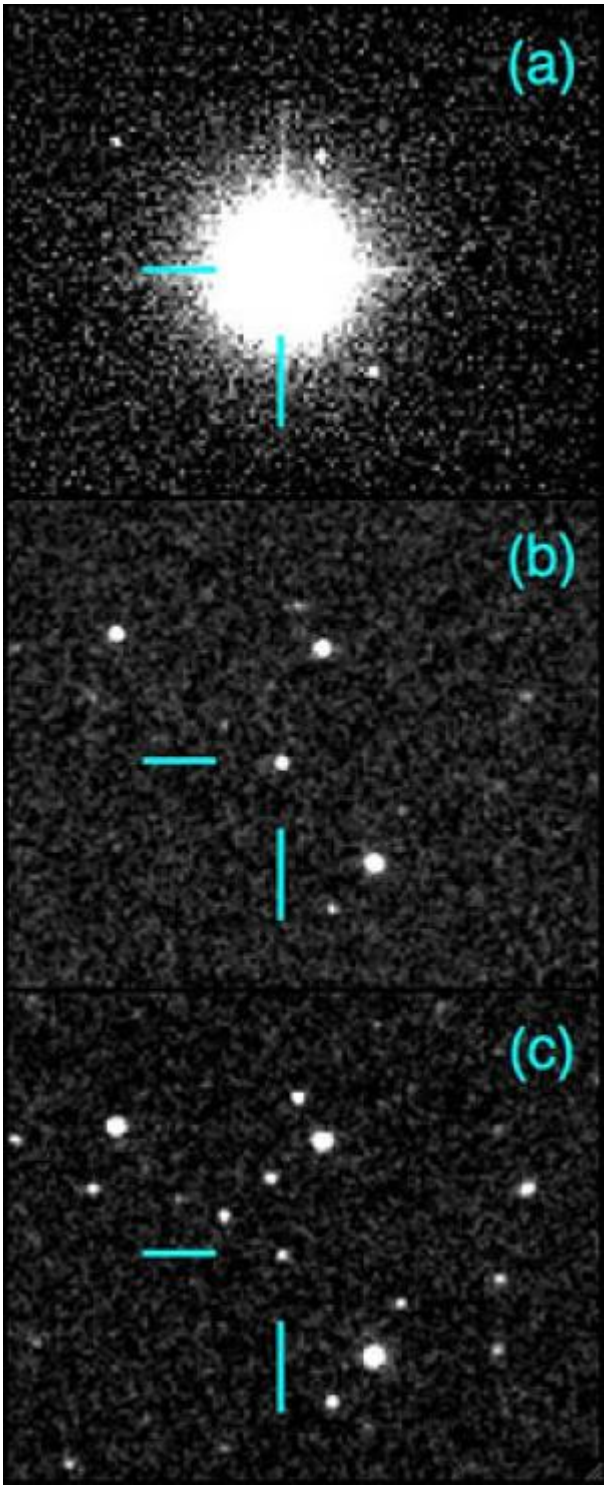
The Rochester team is already planning more sophisticated versions of the test that focus on other areas of the brain besides V5—such as areas that activate for specific sounds or touch sensations. Bavelier says they're also planning to watch the brain sort out meaning when it is forced to take syntax into account. For instance, "blind venetian" and "venetian blind" are the same words but mean completely different things. How does the brain narrow down the meaning in such a case? How does the brain take the conversation's context into consideration when zeroing in on meaning?

"This opens a doorway into how we derive meaning from language," says Tanenhaus. "This is a new paradigm that can be used in countless ways to study how the brain responds to very brief events. We're very excited to see where it will lead us."

Adapted from materials provided by University of Rochester.

http://www.sciencedaily.com/releases/2008/09/080911140815.htm

Brightest Stellar Explosion Heralds New Type Of Long-distance Astronomy



In the seconds after it first pointed at GRB 080319B, the infrared telescope PAIRITEL was blinded by the brilliant explosion (a). As the gamma-ray burst began to fade, PAIRITEL was able to track the light from the explosion for many hours (b and c). (Credit: Joshua Bloom/UC Berkeley)

ScienceDaily (Sep. 15, 2008) — A flash of light that blinded even small telescopes six months ago was the brightest astronomical explosion ever observed - visible to the naked eye despite originating halfway across the universe.

The gamma-ray burst, catalogued as GRB 080319B, was the result of a massive star's explosion 7.5 billion years ago that sent a pencil-beam of intense light on a direct collision course for Earth. It is the only known gamma-ray burst to have had a visible component bright enough to see with the naked eye.

"This was the brightest optical and infrared event that mankind has ever recorded," said Joshua Bloom, an assistant professor of astronomy at the University of California, Berkeley, and first author of an analysis of the event submitted to The Astrophysical Journal (ApJ) less than a week after the burst and accepted this week. "When more of these events are detected, we will open up the possibility of studying the infant universe with this new tool."

The gamma-ray burst was first detected by NASA's Swift satellite on March 19, after which many Earth- and space-based telescopes slewed into position to observe the rapidly fading light. Situated within the constellation Bootes, its flash eventually was pinpointed at a distance of about 7.5 billion light years.

Bloom's group, using a robotic telescope in Arizona, began observing the intense infrared light just 54 seconds after the event

began. The telescope, called the Peters Automated Infrared Imaging Telescope (PAIRITEL), was operating autonomously on a direct link from the Swift satellite. Bloom's graduate students Daniel Perley and Adam A. Miller analyzed the data.

"This was the most powerful event ever seen in human existence," enthused Bloom's coauthor Alex Filippenko, UC Berkeley professor of astronomy. "A star that blew up and could be seen - barely - with the naked eye on a dark, moonless night, even though seven and a half billion light years away, is just astonishing."

Filippenko calculated that if the supernova were located about 6,000 light years from Earth, the gamma-ray burst would have appeared as bright as the sun. Perley noted, too, that the burst at its peak was about 200 million times brighter than the entire galaxy in which it occurred.

Filippenko said that it is unlikely that anyone actually saw the flash, because it lasted only a few tens of seconds and appeared on a night with a bright moon. Astronomers know it reached a magnitude of 5.6, close to the limits of human vision, because a Polish observing program known as Pi of the Sky took several photos of the gamma-ray burst's afterglow at the Las Campanas Observatory in Chile.

The Katzman Automatic Imaging Telescope (KAIT) at Lick Observatory also followed the fading afterglow of the burst, as did the Gemini South telescope in Chile. Bloom and his colleagues combined these observations with Swift data and Pi of the Sky images to complete their analysis.

The assimilation of new information about the event was particularly noteworthy. Less than six days after the event, Bloom's group submitted a 42-page paper written during a planned mountain retreat. Miller, then new to the fast-paced gamma-ray burst field said, "It was quite an introduction to research - my heart was racing for a week. I'm glad we decided to write instead of ski!"

Another paper, submitted weeks after Bloom's paper and largely confirming those results, appears in the Sept. 11 issue of Nature and is authored by graduate student Judith Racusin of Pennsylvania State University and her colleagues.

Authors of the ApJ paper also included Weidong Li, Nathaniel R. Butler, D. Kocevski, Ryan J. Foley, R. Chornock, D. L. Starr, B. Macomber and D. Poznanski of UC Berkeley; D. A. Kann and S. Klose of the Thuringer Landessternwarte Tautenburg in Germany; H.-W. Chen of the University of Chicago; J. X. Prochaska of the University of California Observatories/Lick Observatory, based at UC Santa Cruz; M. F. Skrutskie of the University of Virginia, Charlottesville; S. Lopez of the Universidad de Chile in Santiago, Chile; P. Hall of Toronto, Ontario, Canada; K. Glazebrook of the Centre for Astrophysics and Supercomputing at Swinburne University of Technology in Hawthorn, Australia; and C. H. Blake of the Harvard-Smithsonian Center for Astrophysics.

Adapted from materials provided by University of California - Berkeley.

http://www.sciencedaily.com/releases/2008/09/080910141829.htm

World-first To Predict Premature Births

ScienceDaily (Sep. 15, 2008) — Australian researchers and a pathology company have joined forces to develop a world-first computerised system which may reveal a way to predict premature birth with greater accuracy.

The University of Melbourne, the University of Newcastle and Symbion Pathology are combining expertise in medical research, engineering and pathology to develop a computer program to predict women at risk of a premature birth.

About 17,000 pre-term births occur in Australia each year. Premature birth is responsible for 70 per cent of new born baby deaths and 50 per cent of cerebral palsy cases.

According to Professor Roger Smith from the University of Newcastle*, identifying patterns in hormone levels could be the key to determining high risk pregnancies.

"The mechanisms that regulate the onset of human labour are still unknown, which makes it difficult to predict the event. However by detecting patterns in hormone levels, we could see when a pregnancy was going 'off course'," said Professor Smith.

"This would identify women who may benefit from medical treatments currently available to prevent premature birth."

Professor David Smith from the Melbourne School of Engineering at the University of Melbourne recently received an Australian Research Council (ARC) Linkage Grant of $390,000 to fund the project for three years.

"We are creating software and other computational methods to analyse pathology samples, determine patterns in blood hormone levels, and display the results," Professor David Smith said. "The program will not only identify women at risk of giving birth early - it will also identify women not at risk, who could have their pregnancies managed by midwives in hospital or a home birth setting."

Researchers hope to have the computer program fully developed in three years. Once completed, it will be tested by Professor Roger Smith and his team at John Hunter Hospital. Both researchers paid tribute to Symbion Pathology, whose support has allowed this research.

"Symbion Pathology's backing has been critical to this project. Symbion has provided equipment, personnel and test results, which have enabled us to develop early findings and attract funding through ARC Linkage Grant scheme," Professor Roger Smith said.

Professor Roger Smith leads the Mothers and Babies Research Centre within the University of Newcastle's Priority Research Centre for Reproductive Science. He also leads the Hunter Medical Research Institute (HMRI) Pregnancy and Reproduction Research Program. HMRI is a partnership between the University of Newcastle, Hunter New England Health and the community. Professor David Smith leads the Engineering Computational Biology Group at the Melbourne School of Engineering, the University of Melbourne.

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

http://www.sciencedaily.com/releases/2008/09/080904102749.htm

Superconductivity Can Induce Magnetism

Andrea Bianchi, Department of Physics. (Credit: Image courtesy of University of Montreal)

ScienceDaily (Sep. 15, 2008) — When an electrical current passes through a wire it emanates heat – a principle that's found in toasters and incandescent light bulbs. Some materials, at low temperatures, violate this law and carry current without any heat loss. But this seemingly trivial property, superconductivity, is now at the forefront of our understanding of physics.

In the journal Science, Andrea Bianchi, a professor in the Department of Physics at the Université de Montréal, and his colleagues show that, contrary to previous belief, superconductivity can induce magnetism, which has raised a new quantum conundrum.

Using the Swiss spallation neutron source (SINQ) of the Paul-Scherrer Institute (PSI) in Villigen, the international research group led by Michel Kenzelmann, a scientist at the Paul Scherrer Institute and professor at the Swiss Federal Institute of Technology Zurich, found a superconductor displaying two fascinating quantum properties. First, the material in the superconducting state shows magnetic order, which is a surprise given how superconductivity and magnetism cannot easily be accommodated in the same material.

Second, SINQ's experiments show that the electron pairs that form the superconducting state have a non-zero momentum, contrary to what is observed in all other known superconductors. Such a state has been theoretically predicted years ago, but it had never been microscopically detected.

Magnetism and Superconductivity

The transport of electric current in a conductor is associated with the displacement of electrons: Collisions between these electrons and the crystal ions cause resistance and release heat. In superconductors below the transition superconducting transition temperature, the electrons are form pairs, which allow them, thanks to quantum mechanics, to synchronize their motion with the ions, and all occupy the same quantum state. Electrons in their normal state can be seen as rush-hour pedestrians in a public plaza, yet electron pairs are like couples waltzing to the rhythm of the music without colliding.

The electron has a charge, but like a tiny magnet, it also has a magnetic moment called spin. In a singlet superconductor, the electron pairs are formed by electrons of opposite spin, which cancels the pair's magnetic moment. But when the material is placed in a strong magnetic field, the spins are forced to orient themselves along the field, as the field acts on each spin individually. Usually, this breaks the pairs

and destroys superconductivity. The magnetic fields inside a magnetically ordered material tends to act in the same manner and thus that superconductivity and magnetism tend to avoid each other, although they are not always mutually exclusive.

According to Michel Kenzelmann, "Superconductivity and magnetism are like two groups of predators fighting over the same territory."

Superconductivity with magnetic consequences

In the experiment reported in Science, the scientists cooled a single crystal of CeCoIn5, a metal compound consisting of cerium, cobalt and indium, to a temperature of minus 273.1 degrees, close to absolute zero. To their great surprise, they discovered that magnetism and superconductivity coexist and disappear at the same time when they heat the sample or increase the magnetic field.

This discovery is extraordinary, since magnetic order exists exclusively when this sample is in the superconducting state. In this unique case, magnetism and superconductivity do not compete with each other. Instead, superconductivity generates magnetic order.

"Our results clearly indicate that superconductivity is a condition required to establish this magnetic order," says Kenzelmann. "Our work finally offers the possibility of understanding how superconducting pairs are formed in materials where this is caused by a magnetic interaction. We also hope that our results will allow the development of new technological applications in the near future."

New pairs

The research team also made a second discovery, which is detailed in the Science article – how electron pairs in the superconducting state in a strong magnetic field have a finite momentum. In all other known superconductors, the pairs form a state with zero momentum. Predicted by theorists a few decades ago, the observation of such a state in this experiment is the first experimental proof for such a new state of matter.

These two results allow for the first time to directly address questions about the relationship between magnetism and superconductivity. The answers that will be provided in the years ahead will allow a better understanding of this fascinating aspect of quantum mechanics and could even lead to the discovery of new technologically-important superconducting materials.

Journal reference:

1. M. Kenzelmann et al. **Coupled Superconducting and Magnetic Order in CeCoIn5**. *Science*, 2008; DOI: 10.1126/science.1161818

Adapted from materials provided by University of Montreal.

http://www.sciencedaily.com/releases/2008/09/080911150055.htm

Automated Bus Uses Magnets To Steer Through City Streets

The driver controlled braking and speed, while magnets guided steering as this bus made a demonstration run along a San Leandro street. (Credit: Bill Stone/California PATH, UC Berkeley photo)

ScienceDaily (Sep. 15, 2008) — The thought of a bus moving along city streets while its driver has both hands off the wheel is alarming. But a special bus introduced today (Friday, Sept. 5), steered not by a driver, but by a magnetic guidance system developed by engineers at the University of California, Berkeley, performed with remarkable precision.

The 60-foot research bus was demonstrated along a one-mile stretch of E. 14th Street in San Leandro that was embedded with a series of magnets. Special sensors and processors on board the bus detected the magnets in the pavement and controlled the steering based upon the information it received. The driver maintained control of braking and acceleration, but the steering was completely automated, allowing the bus to pull into stops to within a lateral accuracy of 1 centimeter, or about the width of an adult pinky finger.

Researchers say such precision docking would help shave precious seconds off of the time to load and unload passengers at each stop, adding up to a significant increase in reliability and efficiency over the course of an entire bus route. For example, precision docking could potentially negate the need to deploy wheelchair ramps and make passenger queuing more efficient.

Moreover, the ability to more precisely control the movement of the bus reduces the width of the lane required for travel from 12 feet - the current standard - to 10 feet, researchers say.

The California Department of Transportation (Caltrans) has provided $320,000 to fund this Automated Bus Guidance System demonstration project, conducted by the California Partners for Advanced Transit and Highways (PATH) program based at UC Berkeley.

"Today's demonstration marks a significant step in taking the technology off of the test track at UC Berkeley's Richmond Field Station towards deployment onto real city streets," said Wei-Bin Zhang, PATH transit research program leader at UC Berkeley. "We have seen increasing interest among transit agencies in this technology because of its potential to bring the efficiency of public bus service to a level approaching that of light rail systems, but at a much lower overall cost."

California PATH researchers have been studying magnetic guidance systems as a means of controlling vehicle movement for nearly 20 years with significant funding from Caltrans and the U.S. Department of Transportation. They have showcased how the technology can control a platoon of passenger cars speeding along high occupancy vehicle (HOV) lanes in Southern California, as well as industrial vehicles such as snowplows and tractor trailers in Northern California and Arizona. Today's test run along E. 14th Street marks the first application of magnetic guidance technology for use in transit buses on a public road.

"It is our mission to improve mobility across California, and maximizing transportation system performance and accessibility through this technology helps us to achieve our mission," said Larry Orcutt, chief of the Caltrans Division of Research and Innovation. "The rising cost of fuel has created greater interest in public transit. This technology could convince more people to get out of their cars and onto buses, and as a result, reduce congestion."

In the system demonstrated today, sensors mounted under the bus measured the magnetic fields created from the roadway magnets, which were placed beneath the pavement surface 1 meter apart along the center of the lane. The information was translated into the bus's lateral and longitudinal position by an on-board computer, which then directed the vehicle to move accordingly. For a vehicle traveling 60 miles per hour, data from 27 meters (88 feet) of roadway can be read and processed in 1 second.

Zhang added that the system is robust enough to withstand a wide range of operating conditions, including rain or snow, a significant improvement to other vehicle guidance systems based upon optics. Researchers also pointed out that magnetic guidance technology allows for a bus to safely follow closely behind another. Extra vehicles, much like extra cars on light rail trains, could thus be added during peak commute times.

In the E. 14th Street demonstration, the magnetic guidance system was only used to control the steering for the bus, but on test tracks it has been used for full vehicle control - including braking and accelerating - creating a true "auto-pilot" system for the bus. At any time, the driver can resume manual control of the bus.

Potential applications for the system include automating bus passage through narrow tollbooths and vehicle routing in bus maintenance yards. The system could be integrated into traditional bus routes, as shown on E. 14th Street, or used as part of more advanced bus rapid transit (BRT) systems that could include a dedicated traffic lane. Many cities throughout the world, including 20 in the United States, have deployed some form of BRT, although only a few include dedicated bus-only lanes.

Today's demonstration included a special industry presentation attended by dozens of representatives from California transit agencies interested in whether PATH's magnetic guidance technology might fit with their own BRT plans.

On some routes in the Bay Area, AC Transit currently operates a version of bus rapid transit that includes electronic signs informing riders of when to expect the next bus. However, the transit agency is currently in the midst of preparing an Environmental Impact Report for a proposed BRT project that could include bus-only lanes along an 18-mile stretch from downtown Berkeley near the UC Berkeley campus south to San Leandro's Bay Fair BART station.

"AC Transit is a leader promoting advanced technologies for transit buses. As such, we are continually investigating new technologies to improve the performance, safety and comfort of buses," said Chris Peeples, president of AC Transit's board of directors. "The magnetic guidance system developed at UC Berkeley can both improve safety and provide a smoother ride for our passengers. The system has the potential to make bus rapid transit routes - particularly those that involve bus-only lanes - as efficient as light rail lines, which in turn will make buses more effective in getting people out of their cars."

AC Transit puts the cost of its BRT proposal at $273 million, while a comparable light rail system would cost around $2 billion. Zhang said that adding the magnetic guidance technology to AC Transit's proposed BRT project would help it run more like a light rail system for an additional $5 million. The Valley Transportation Agency has also compared the costs of BRT and light rail systems for its planned Santa Clara Alum Rock Transit Improvement Project. The estimated cost for BRT came in at $128 million, compared with $393 million for light rail.

AC Transit is joining Caltrans and the U.S. Department of Transportation in funding the next stage of the Automated Bus Guidance System project as it becomes part of the federal Vehicle Assist and Automation Program. The project will expand to AC Transit routes along Interstate 880 and the San Mateo Bridge, and to a dedicated BRT route in Eugene, Ore.

"Ultimately, it's up to the community to decide which transit option is best for its members," said Zhang. "Our job is to develop the technology that can help improve whatever form of transportation is used."

Adapted from materials provided by University of California, Berkeley. Original article written by Sarah Yang.

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http://www.sciencedaily.com/releases/2008/09/080910142425.htm

Rheumatoid Arthritis: Women Experience More Pain Than Men Do, Study Suggests

ScienceDaily (Sep. 15, 2008) — Rheumatoid arthritis is often a more painful experience for women than it is for men, even though the visible symptoms are the same. Scientists are now saying that doctors should take more account of these subjective differences when assessing the need for medication.

For reasons yet unknown, rheumatoid arthritis is roughly three times more common amongst women than men. Moreover, several studies also suggest that rheumatoid arthritis eventually impairs the life quality of female suffers more than it does that of male sufferers. Here, too, the underlying reasons are unclear, but scientists have speculated that the medicines used affect women and men differently.

Researchers at Karolinska Institutet are now to present a study that gives vital clues as to why the prognosis is gender-specific. They have shown that men who undergo standard therapy for rheumatism respond significantly better than women having the same treatment – both objectively, such as in the degree of swelling in the joints, and subjectively in terms of their own experience of the disease.

This and other findings are being presented at a congress currently in progress on gender medicine arranged by Karolinska Institutet.

“Purely objectively, the drug had a somewhat better effect on the men than on the women,” says associate professor Ronald van Vollenhoven, who led the study. “But the greatest difference was of a subjective nature. The women in the study felt sicker even when their joints showed the same improvements.”

According to Dr van Vollenhoven, it is important to take into account subjective difference when judging the severity of the disease. If doctors only consider the physical symptoms, people with severe pain might be deprived of the most effective medicine, which, owing to high costs and the risk of side-effects, is only given to the worst sufferers.

In a follow-up analysis, scientists compared the degree of disease in men and women who had received ‘biological’ medicines, which are only given to people who are considered seriously ill. The results of their study showed that while women and men who had been put on a course of treatment were at the same level as regards the objective manifestations of the disease, women felt themselves to be sicker than the men.

“Women and men have been treated on equal terms from the perspective of the doctors, but it’s possible that no one has been aware of the fact that the pain can be worse for women than for men,” says Dr van Vollenhoven. “Since our objective is to reduce suffering, we should try to take more account of the subjective aspects of rheumatoid arthritis.”

Adapted from materials provided by Karolinska Institutet, via AlphaGalileo.

http://www.sciencedaily.com/releases/2008/09/080912091734.htm

Better Health Through Your Cell Phone

ScienceDaily (Sep. 15, 2008) — In many Third World and developing countries, the distance between people in need of health care and the facilities capable of providing it constitutes a major obstacle to improving health. One solution involves creating medical diagnostic applications small enough to fit into objects already in common use, such as cell phones — in effect, bringing the hospital to the patient.

UCLA researchers have advanced a novel lens-free, high-throughput imaging technique for potential use in such medical diagnostics, which promise to improve global disease monitoring, especially in resource-limited settings such as in Africa. The research, which will be published in the quarterly journal Cellular and Molecular Bioengineering (CMBE) and is currently available online, outlines improvements to a technique known as LUCAS, or Lensless Ultra-wide-field Cell monitoring Array platform based on Shadow imaging.

First published in the Royal Society of Chemistry's journal Lab Chip in 2007, the LUCAS technique, developed by UCLA researchers, demonstrated a lens-free method for quickly and accurately counting targeted cell types in a homogenous cell solution. Removing the lens from the imaging process allows LUCAS to be scaled down to the point that it can eventually be integrated into a regular wireless cell phone. Samples could be loaded into a specially equipped phone using a disposable microfluidic chip.

The UCLA researchers have now improved the LUCAS technique to the point that it can classify a significantly larger sample volume than previously shown — up to 5 milliliters, from an earlier volume of less than 0.1 ml — representing a major step toward portable medical diagnostic applications.

The research team, led by Aydogan Ozcan, assistant professor of electrical engineering at the UCLA Henry Samueli School of Engineering and Applied Science and a member of the California NanoSystems Institute (CNSI), includes postdoctoral scholar Sungkyu Seo, doctoral student Ting-Wei Su, master's student Derek Tseng and undergraduate Anthony Erlinger.

Ozcan envisions people one day being able to draw a blood sample into a chip the size of a quarter, which could then be inserted into a LUCAS-equipped cell phone that would quickly identify and count the cells within the sample. The read-out could be sent wirelessly to a hospital for further analysis.

"This on-chip imaging platform may have a significant impact, especially for medical diagnostic applications related to global health problems such as HIV or malaria monitoring," Ozcan said.

LUCAS functions as an imaging scheme in which the shadow of each cell in an entire sample volume is detected in less than a second. The acquired shadow image is then digitally processed using a custom-developed "decision algorithm" to enable both the identification of the cell/bacteria location in 3-D and the classification of each microparticle type within the sample volume.

Various cell types — such as red blood cells, fibroblasts and hepatocytes — or other microparticles, such as bacteria, all exhibit uniquely different shadow patterns and therefore can be rapidly identified using the decision algorithm.

The new study demonstrates that the use of narrowband, short-wavelength illumination significantly improves the detection of cell shadow images. Furthermore, by varying the wavelength, the two-dimensional pattern of the recorded cell signatures can be tuned to enable automated identification and counting of a target cell type within a mixed cell solution.

"This is the first demonstration of automated, lens-free counting and characterization of a mixed, or heterogeneous, cell solution on a chip and holds significant promise for telemedicine applications," Ozcan said.

Another improvement detailed in the UCLA research is the creation of a hybrid imaging scheme that combines two different wavelengths to further improve the digital quality of shadow images. This new cell classification scheme has been termed "multicolor LUCAS." As the team illustrated, further improvement in image quality can also be achieved through the use of adaptive digital filtering. As result of these upgrades, the volume of the sample solution that can be imaged has been increased, as mentioned, from less than 0.1 ml to 5 ml.

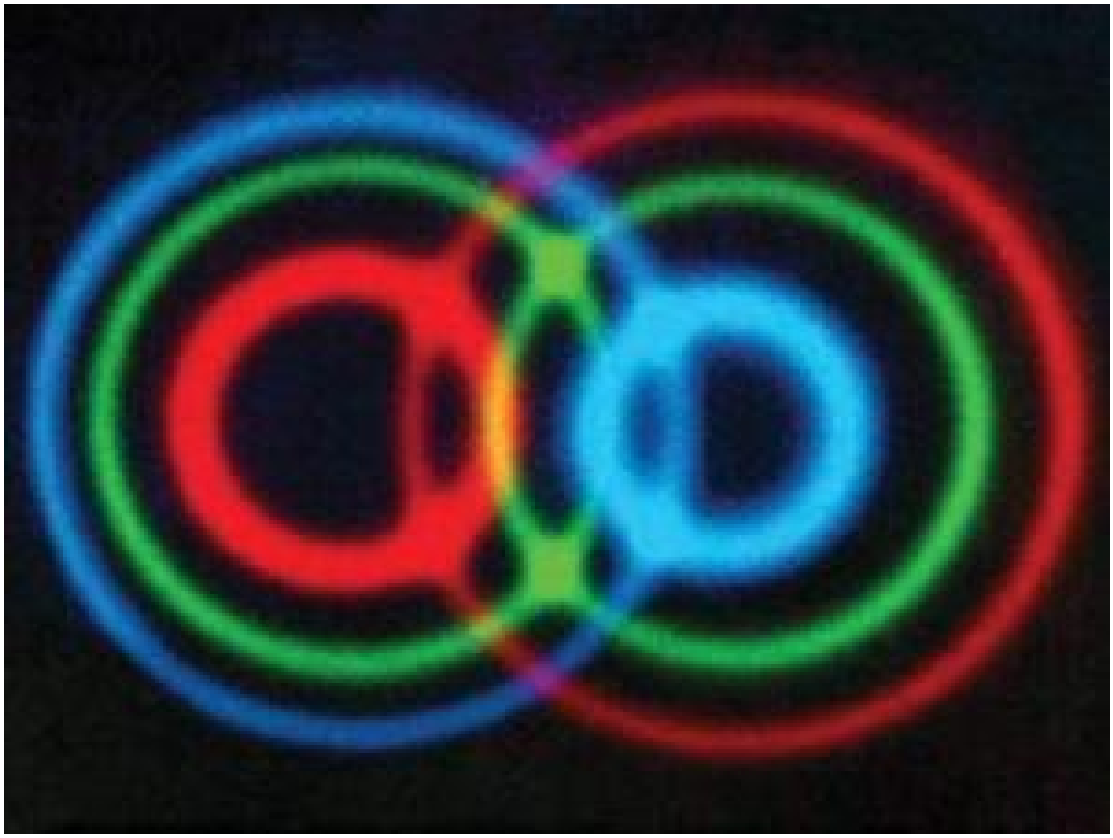
"This is a significant advance in the quest to bring advanced medical care to all reaches of the planet," said Leonard H. Rome, interim director of the CNSI and senior associate dean for research at the David Geffen School of Medicine at UCLA. "The implications for medical diagnostic applications are in keeping with CNSI initiatives for new advances toward improving global health."

Ozcan has already received accolades for this research, including the prestigious 2008 Okawa Foundation Research Award, which he will receive at a ceremony in San Francisco on Oct. 8. The award honors top young researchers working in the fields of information and telecommunications. The CMBE paper has also been selected for the Outstanding Paper award at the upcoming annual meeting of the Biomedical Engineering Society this fall.

Adapted from materials provided by University of California - Los Angeles.

http://www.sciencedaily.com/releases/2008/09/080911103946.htm

Quantum Insights Could Lead To Better Detectors



Entangled photons. (Credit: Photo courtesy of Paul Kwiat and Michael Reck, University of Vienna)

ScienceDaily (Sep. 15, 2008) — A bizarre but well-established aspect of quantum physics could open up a new era of electronic detectors and imaging systems that would be far more efficient than any now in existence, according to new insights by an MIT leader in the field.

MIT Professor of Mechanical Engineering Seth Lloyd has found that a peculiar quantum-physics property called entanglement can be harnessed to make detectors--similar in principle to radar systems used to track airplanes in flight or ships at sea--that are as much as a million times more efficient than existing systems. In addition, beams of entangled light could be swept across a scene to reconstruct a detailed image, with a similar improvement in efficiency.

The new findings, being reported this week in the journal Science, are purely theoretical, but Lloyd says that laboratory experiments have already proven the feasibility of both the light sources and the detectors needed for such a quantum-based photodetection system, so he anticipates that within a year it should be possible to build a laboratory-scale system to demonstrate the new concept.

"It should be possible to have at least a proof-of-principle demonstration within six months to a year," Lloyd said.

For example, military applications could include improved night-vision systems, which send out beams of infrared light--invisible to the naked eye--to sweep across a scene, and then use an infrared detector to reconstruct an image from the light that is reflected back. A more efficient system, using the quantum-entanglement effect, would make it much more difficult for an adversary to detect the fact that such a

system was being used, because there would be so much less infrared light needed to provide the illumination.

Theoretically, such a system could be used to allow medical diagnostic systems such as CT scans to work with a vastly reduced X-ray output, thereby making them much safer for the patient, but such applications would be much further in the future. It could also someday be used for safer microscope imaging of living organisms.

Entanglement is a strange property that was deduced theoretically on the basis of the laws of quantum physics, and has been demonstrated over the last several years in a variety of laboratory experiments. Under certain circumstances, when an atom gives off two photons of light at the same time, the two are "entangled" even as they go off in different directions, so that anything that changes one of the photons simultaneously changes the other as well.

This odd property makes it possible to perform seemingly impossible feats such as "quantum teleportation," in which all of the properties of one subatomic particle are recreated in a different particle some distance away. It has also been demonstrated as a way of producing seemingly foolproof encryption systems for data transmission. But explanations of exactly what underlies the entanglement phenomenon remain controversial.

Lloyd says that he cannot provide a simple, intuitive explanation for why the quantum illumination system described in this report actually works, but is certain that the theoretical calculations demonstrating it are correct. "It is as if the two entangled photons retain a memory of each other long after any such memory should have faded away," he said.

Adapted from materials provided by Massachusetts Institute Of Technology. Original article written by David Chandler.

http://www.sciencedaily.com/releases/2008/09/080912124754.htm

Scientists Point To Forests For Carbon Storage Solutions

Mill Creek Park, Youngstown, Ohio. (Credit: iStockphoto/Stan Rohrer)

ScienceDaily (Sep. 15, 2008) — Scientists who have determined how much carbon is stored annually in upper Midwest forests hope their findings will be used to accelerate global discussion about the strategy of managing forests to offset greenhouse gas emissions.

In an era of competing land use demands, the researchers argue that forests help stabilize the climate and are abundant sources of other ecological goods and services – such as cleansed air, fertile soil and filtered water. Quantifying the amount of carbon that forests can keep out of the atmosphere is one way of showing forests' value to energy policymakers, the researchers suggest.

"Demonstrating that forests have economic value because they offer carbon offsets might also help citizens have an appropriately broad appreciation for the things that forests do for them beyond providing recreation or wood used for construction or paper pulp," said Peter Curtis, professor and chair of evolution, ecology and organismal biology at Ohio State University.

Curtis is the senior author of a paper published in a recent issue of the journal BioScience that quantifies annual carbon storage capacity in forests in the upper Great Lakes region and details how historic land use, climate patterns and tree turnover influence forests' carbon storage trends.

The researchers' calculations suggest that carbon storage in Midwestern forests could offset the greenhouse gas emissions of almost two-thirds of nearby populations, and that proper management of forests could sustain or increase their storage capacity for future generations.

Based on measurements taken between 1999 and 2005 at a forest study site in northern Michigan, the scientists have determined that similar upper Midwest forests covering an estimated 40,000 square miles store an average of 1,300 pounds of carbon per acre per year.

Factoring in effects of climate, history and tree type, the researchers developed an equation suggesting that a heavily forested region in northern Michigan could store more than 350,000 tons of carbon per year. With the area population emitting about 573,000 tons of carbon annually, the forests would sequester approximately 62 percent of the region's human-caused carbon emissions – the equivalent of yearly emissions from about 225,000 cars.

Curtis said the concept of using forests to store carbon has steadily gained attention among policymakers, especially since the Kyoto Protocol was adopted in 1997 as a global program to reduce greenhouse gas emissions. Curtis is a believer in approaching carbon dioxide stabilization in the atmosphere through what he calls "small wedge" efforts.

"Biological carbon storage, mostly in forests, is one of those little wedges along with other ones you might think of, such as increased energy efficiency, using fluorescent light bulbs and the like. There is not one silver bullet," he said.

Effective use of forests for carbon storage requires knowing more than current storage statistics, he noted. Curtis and colleagues also have outlined historic factors that offer clues about what forests can be expected to store and release over future decades.

The research team conducted the measurements at the University of Michigan Biological Station (UMBS). The composition of this small forested region is representative of the forests stretching about 40,000 square miles – the equivalent of the land mass of Ohio – across the entire upper Midwest.

Most carbon in the UMBS forest is contained in the wood mass and soil organic matter – which, Curtis said, points to the importance of considering underground carbon reservoirs in carbon budgeting. Stem wood, leaves and debris contain about 42 percent of carbon in the forest.

The storage assessments for the past five years resulted from combining ecological and meteorological measurements at the Michigan forest site. Ecological estimates are based on the carbon content of wood, leaf litter, debris and roots as well as the release of carbon that occurs when soil and plants decompose. The meteorological measurements analyze the ongoing carbon exchange between the forest and atmosphere using instrumentation available at only a select few labs in the world.

In the case of the Michigan forest, carbon storage capacity is also affected by the repeated clear-cut harvesting and fire disturbance that occurred a century ago as well as climate variations that the scientists have documented and the species and age of trees the forest comprises. These conditions can be used to project future carbon storage trends in similar forests in the United States and around the world.

The scientists have recorded a rising average air temperature of almost 2 degrees Fahrenheit (1.1 degrees Celsius) and decreased solar radiation of 5 percent over the past 25 years at the Michigan study site. The current average temperature is about 45 degrees Fahrenheit.

Extending such changes to 2030, the researchers suggest the annual carbon storage affected by these climate changes will be reduced by between 1.3 percent and 28.5 percent, to a possible low of about 980 pounds of carbon per acre.

"We weren't surprised by the annual temperature increase, because that's happening everywhere, but the decline in solar radiation was very surprising," Curtis said. "It might seem like a small difference, but it's important from the standpoint of plants."

Plants use the energy from sunlight to manufacture carbohydrates and release oxygen through photosynthesis. Curtis said scientists believe the rising temperatures combined with the presence of water led to the increase in cloudy days.

The Michigan forest's storage capacity also is affected by its land use history. A period of deforestation between 1880 and 1920 was followed by abandonment of the land and a rash of wildfires. Forests with similar histories store significantly less carbon than stands without that kind of disturbance because of a resulting lower forest canopy and reduced soil fertility.

"Nothing this drastic would ever happen in the United States today. However, it's going on all the time in developing world, and a less damaging pattern of harvest and fire is increasing in the western United States. And there are lasting consequences of that," Curtis said. "The persistent legacies of poor management practices on forest carbon storage in northern Michigan should serve as a caution to contemporary forest managers."

Finally, the age and species of trees in forests also affect carbon storage capacity. Old growth forests store relatively little carbon. More carbon is stored in older wood, but the rate of accumulation decreases over time because a higher rate of decomposition in soil and dead wood lowers the net gain of carbon storage.

Curtis noted that some policymakers are concerned that aging Great Lakes forests will show a decline in carbon storage capacity.

"We contend the situation here is different because of the nature of the land use. We consider them 'old young' forests. Aspens are aging, but underneath the aspens, waiting for them to die, are lots of young pine, oak, beech and maple. Once they get their turn, they will rejuvenate these forests in terms of carbon storage," he said.

The scientists are accelerating this phenomenon – called succession – in a segment of the Michigan forest to test this hypothesis.

"If we're right, this will give people incentive to hold onto forests and not cut them down. Though a younger forest might be considered more productive, we contend cutting would set things back because it would cause a lot of disturbance," Curtis said.

He hopes the combined assessments can be used for global policy discussions about forests' ability to store carbon.

"We now know where carbon is in a forest – it's very important, if you're managing carbon, to know where it is. Now that we can document where carbon is, how it gets in there and how it leaves, what we have is an accounting problem," Curtis said. "Now we just have to do the bookkeeping."

Co-authors of the research are Christopher Gough, formerly of Ohio State's Department of Evolution, Ecology and Organismal Biology and now with Virginia Commonwealth University's Department of Biology; Christoph Vogel of the University of Michigan Biological Station in Pellston; and Hans Peter Schmid, head of the Institute of Meteorology and Climate Research-Atmospheric Environmental Research, Karlsruhe Institute of Technology, in Kreuzeckbahnstr, Germany.

The work was supported by the U.S. Department of Energy Office of Science; the Midwestern Regional Center of the National Institute for Climatic Change Research at Michigan Technological University; and the U.S. Department of Agriculture's Forest Service.

Adapted from materials provided by Ohio State University.

http://www.sciencedaily.com/releases/2008/09/080908185330.htm

Sexy Impulses: Treating Multiple Sclerosis with Hormones

Hormones increasingly are shown to affect brain functions, and now they may battle MS symptoms, too.

- By: Lisa Conti | September 09, 2008 | 10:18 AM (PDT

When it comes to the brain, hormonal influences are the butt of many tactless jokes and at the heart of Rhonda Voskuhl's seminal findings regarding neurodegenerative disease and protection.

Speeding down the length of the axon, nerve cell impulses, taking a fraction of a second to travel from head to toe, orchestrate choreographed muscle movements. This process is so in sync with our will that most of us can take our ability to walk, see and swallow for granted. But when it breaks down, as it does with the disease multiple sclerosis, unwieldy symptoms emerge.

Paralysis, tingling, uncoordinated movements, blindness and cognitive defects are all symptoms that can coincide with MS — a disease affecting 2.5 million people worldwide. Nerves, normally insulated in white myelin, become demyelinated — exposed —the impulses sputter, dissipate and may never reach their destination. While the immediate cause, scar tissue (sclerosis), will show up in brain scans, the underlying issue is thought to arise from an immune system malfunction (relating to inflammation).

But naturally, it's more complicated than that with environmental as well as hereditary factors as possible contributors to the disease. And, hormones have something to do with it, too.

Research involving hormonal influences on the brain is the rage right now. Yet, while one study suggests hormone therapy in postmenopausal women is detrimental to cognition, another shows memory-enhancing properties in patients with the neurodegenerative brain disorder, Alzheimer's disease. And with regard to MS, the effects of hormones are largely anecdotal. These confounding reports make untangling the specific roles of hormones, and how they relate to disease, challenging.

But Voskuhl's laboratory in the department of neurology at University of California, Los Angeles has taken on the task with vigor. She has received the attention of seven major universities around the country and acquired $5 million in grant money from the National Institute of Health and National Multiple Sclerosis Society to further her research and clinical trials on hormone-related therapy — specifically, therapy using sex hormones.

One of the lab's recent exploratory studies showed that testosterone treatment for men afflicted with MS enhanced cognitive abilities. The therapy also stabilized brain shrinkage commonly associated with the disease. The study investigated the effect of testosterone on 10 men with MS. At the outset, the men showed testosterone levels in the low/normal range. For men, diagnosis of MS tends to coincide with age (occurring between 30 and 40 — a time when available testosterone levels gradually drop). With treatment, the levels rose but not above high/normal quantities.

Analysis from blood showed that testosterone modulates the immune system and enhances production of brain derived protective factors. This supports the idea — central to Voskuhl's research — that hormones have a dual role , anti-inflammatory and neuroprotective, in influencing the disease.

The mechanism for the testosterone results may be due to testosterone's ability to bind brain receptors directly. Alternatively, the brain protection might arise from testosterone conversion to estrogen, a hormone that is routinely generated from testosterone by the enzyme aromatase. Either way, it seems that testosterone (as with estrogen) is neuroprotective. Since MS is a degenerative disease, the ability to target a molecular controller of brain protection would be ideal.

The specific physiological role estrogen plays in disease is also a focus of Voskuhl's investigations. That MS strikes twice as many women as men, along with the phenomenon that pregnant women have a striking 80 percent remission, prompted her to investigate the role of sex hormones in protecting the brain.

Using a mouse model system, Voskuhl and her research team have been able to tease out estrogen's mechanism of action and determine that the neuroprotective attributes can be independent of the inflammation-reducing abilities. This is a remarkable distinction that may guide future therapies. The experiments in mice showed promise for a compound that binds specifically to a distinct estrogen receptor. While the compound is currently not available for clinical use, strategically selecting an estrogen that works through the same receptor is a promising option.

"We've already done a pilot study with estriol," Voskuhl commented. Estriol, a naturally occurring estrogen produced during pregnancy, doesn't have the side effects associated with estrogens traditionally used for hormone therapy. Similar to the testosterone study in men, the pilot trial using estriol in women showed decreases in MS severity. In fact, "the lesions in the brain were reduced by 80 percent," Voskuhl reported.

A larger trial using estriol to treat women with MS is under way. Given as a pill, estriol will provide patients with hormone levels equivalent to six months of pregnancy, since the last trimester of pregnancy is often a time at which MS symptoms improve and relapse rates decrease. The study, currently recruiting participants, will be a two-year placebo-controlled study and will treat patients concurrently with a standard treatment.

Future studies to explore the possibility of using or designing specific compounds that function through the distinct neuroprotective receptor hold promise beyond the standard sex hormones. These designer estrogens may provide long-term protection and be used with standard therapies.

"It's important because anti-inflammatory medications now given reduce symptoms by one-third and have only modest affects on halting permanent disability," Voskuhl noted.

To date there is no cure for the disease. There are six FDA-approved treatment options; many of which act on the immune system. They can alter the disease course, treat specific symptoms and quell disease intensity, but they do not provide the brain with the protection needed to halt, repair or prevent the disease process. The prospect that hormones can decrease inflammation and increase factors associated with promoting brain cell survival is enticing. And the notion that designer estrogens may provide brain protection in MS as well as other neurodegenerative disorders is equally alluring.

As clinicians administer medications and researchers investigate receptors, our nerve cell impulses will continue their journey. And Voskuhl's laboratory will continue theirs. She said, "There are a lot of things that have to be done."

http://www.miller-mccune.com/article/672#

Reducing Carbon One Garbage Can at a Time

With a clear cash incentive to reduce garbage, the "one-can" concept gains ground.

- By: Joan Melcher | September 03, 2008 | 09:32 AM (PDT

It wasn't long ago that no one knew what a carbon footprint was. Now a person can't turn around without bumping into, uhhh, Bigfoot.

Most people and communities first look at energy efficiency as a quick means of reducing their carbon footprint, but pay-as-you-throw (or PAYT) garbage collection may be more efficient, according to consultant Lisa Skumatz, who works in both fields.

The PAYT concept is to pay for garbage to be picked up one bin or bag at a time so that, just like electricity, you are paying for what you use. Instead of being charged a flat rate by a hauler or an addition to home property taxes, the homeowner pays for each bag or bin of garbage set out for collection.

In many programs, recyclables are picked up at no charge. The result is a clear incentive not only to reduce waste through recycling but also to use other methods long touted by recycling advocates — composting, source reduction and reuse.

"Our research shows that if you look at the cost per greenhouse gas emissions reduction from some of the PAYT and recycling programs and compare that to what you get from energy efficiency programs, we find that the recycling and PAYT programs are cheaper per metric ton of carbon emission reduction and easier to implement," Skumatz said.

That ease comes from an all-out approach. According to Skumatz, "As soon as you implement the program, everyone is covered."

Skumatz, who has consulted in the solid waste field for 20 years and whose Skumatz Economic Research Associates conducts research and consults with communities on energy and waste management across the country, is not the only one touting these carbon savings.

The federal Environmental Protection Agency recently released a report that estimated that for each person participating in a PAYT program, greenhouse gas emissions are reduced by an average of 0.085 metric ton of carbon equivalent. (By comparison, the EPA estimates a passenger vehicle generates 1.5 metric tons of carbon equivalent a year.)

Communities with PAYT programs are reporting a doubling of recycling collection after implementing their programs, which saves in tipping fees to landfills and provides an increase in recycling revenues. Those benefits are likely to increase as landfill space dwindles and America's waste commodities are increasingly sought out as raw materials in a global market.

A lack of space for landfills and increasing tipping fees are definitely driving PAYT. New England states have some of the highest tipping fees in the country, but some of the states with the most PAYT programs in place are relatively land-rich. Minnesota, the first state to implement such a program, has gone 100 percent PAYT, as have Washington and Oregon.

Skumatz, along with Jan Canterbury of the EPA Office of Solid Waste, authored a 2006 report on PAYT programs in which they found that more than 7,100 programs are in place, serving about 25 percent of the U.S. population. Currently, PAYT programs are diverting about 17 percent of the residential waste stream, generally a higher rate than any other recycling approach has achieved to date.

The earliest PAYT programs began in the late 1980s, and the concept spread slowly but steadily through the 1990s. Today, Skumatz said, PAYT is taking off. For a growing number of people, the amount of refuse they set out every week has become a badge of honor, with neighbors vying for the lowest waste footprint. Becoming a "one-can" family is a trend in environmental consciousness.

Skumatz found that in Attleboro, Mass., which implemented a PAYT program in 2005, garbage fees decreased by $6 per year the second year the program was in operation, and the average household went from disposing three barrels of trash and one container of recycling to three containers of recycling and one barrel of trash.

In Vancouver, Wash., trash removal dropped enough to allow the city to offer every-other-week collection as an option. A recent *Wall Street Journal* article featured a family of six in New Jersey that has shrunk its weekly garbage to fit in a 30-pound container.

Many people like having a role in determining what they pay for trash removal, Skumatz said, adding that older people remember the scarcities and hardships of World War II and the PAYT concept is "tailor-made" for them.

But the picture isn't completely rosy.

Resistance to the idea usually results in illegal dumping at the inception of a program; most municipalities report that problems decrease after the programs have been running for a time. Haulers sometimes balk at the way programs are structured, and typically the phone rings off the hook for the first six months of operation of a PAYT program.

Costs of disposal for large low-income families, people on fixed incomes and those living in multi-unit housing can be a problem. Many programs attempt to address these issues in some way. For example, in Dubuque, Iowa, low-income families of five or more, low-income elderly persons and households meeting Section 8 federal assistance guidelines receive a 50 percent discount on their monthly fees.

PAYT programs work in tandem with curbside recycling pickup where it is available but also are being used in small towns where people recycle at drop-off centers and transfer stations. Lyme, N.H., a town of fewer than 2,000 people, implemented a program in 2005 and saw its recycling rate jump from 13.4 percent to 51.9 percent in one year.

Donald Maurer, a spokesperson for the New Hampshire Department of Environmental Services' Solid Waste Technical Assistance Section, said Lyme is one of the latest in a growing number of New Hampshire municipalities (46 total) using a PAYT program.

He works with cities and towns to set up PAYT programs and said there is usually resistance at first.

"It's a political issue more than anything else," he said.Skumatz concurred. "One of the things that we find is the politics of getting a program in place is most difficult," she said. "Once we get the program in place, every survey shows that 90 percent of the households like the system, like the equity and don't want to go back to the old program."

"A lot of people believe that trash is free," Maurer said. "You put it on the curb; it magically disappears and goes to someplace away."People say to me, 'You're going to charge me $1.50 a bag to get rid of my garbage?'" Maurer said. "They don't understand that it's costing us $70 to $80 a ton" in tipping fees at landfills.

There is a bit of a learning curve for both those instituting the program and those participating. Maurer attributed Lyme's success to a very basic educational effort. "They taught people what was recyclable. They worked with people when they came to the transfer station. Anybody who came in, they said, 'We'll help you to do it.'"

Skumatz agreed that education is key to making the programs work.For instance, many people don't understand how much of their trash can be recycled (compared to what was recycled even five years ago) and have never had an incentive to reduce packaging and yard and food waste.

A common PAYT approach is to let homeowners choose what size container they want for their weekly pickup (32 gallons, 64 gallons or 92 gallons, with costs increasing with size and/or weight of the bin); additional refuse can be put in specific bags bought and paid for by the homeowners.

In smaller towns like Lyme, residents buy garbage bags available at the town hall, transfer station or town supermarket that are priced according to size, commonly costing from $1.50 to $9 (programs and rates vary widely). The cost of the bag is what they pay for disposal.

The city of Boulder, Colo., has used a PAYT program since 2001 and currently boasts a rate of more than 50 percent diversion of in its residential waste stream. But when Boulder County recently instituted a PAYT program, the fur flew. Apparently, residents hadn't tuned into the carrot-and-stick approach.

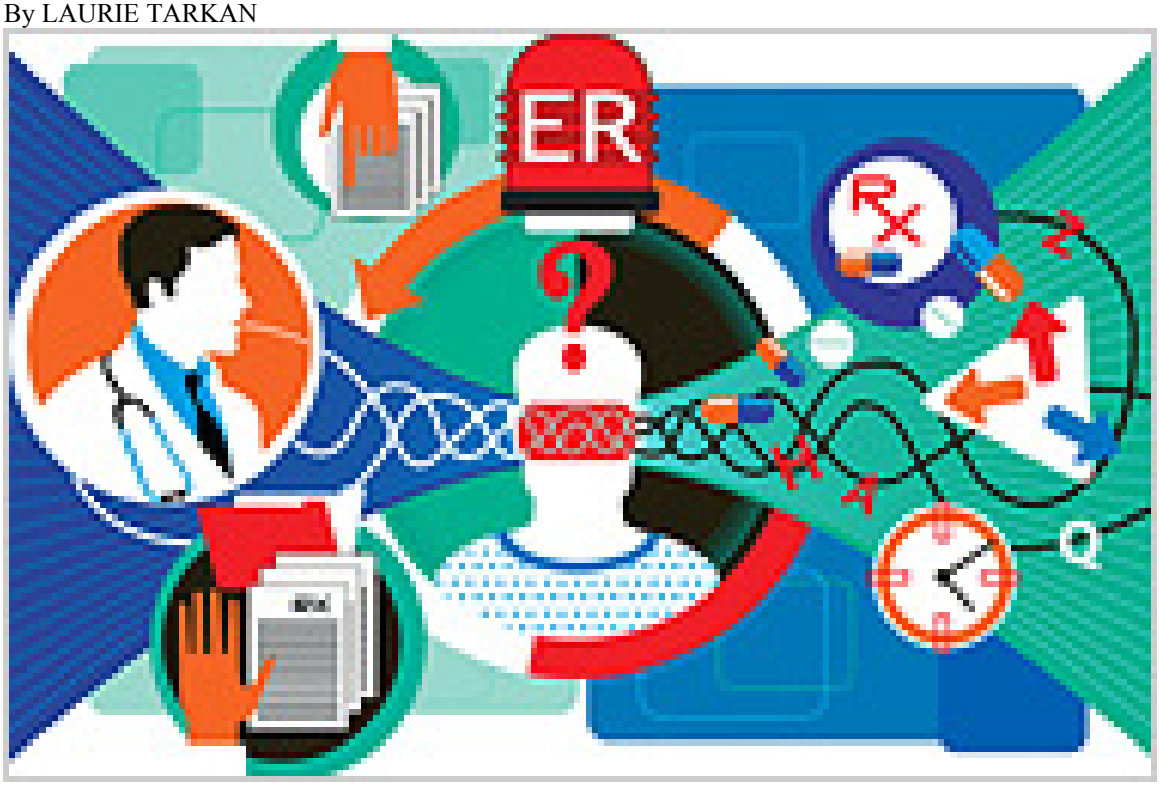
A three-tier system for containers was offered, and most people in the county chose to use a 96-gallon bin — the largest size offered. Had they opted for the 64-gallon container, their costs for pickup would have remained about the same as they had been, said Gary Horton, president of Western Disposal, the company contracted to remove the waste.

"It's not draconian," he said. "If you can get down to 64 gallons, you will be in the range of what it costs you now."Skumatz put it another way: "All-you-can-eat buffets do not happen in any real utility service."

http://www.miller-mccune.com/article/657

.R. Patients Often Left Confused After Visits

By LAURIE TARKAN



A vast majority of emergency room patients are discharged without understanding the treatment they received or how to care for themselves once they get home, researchers say. And that can lead to medication errors and serious complications that can send them right back to the hospital.

In a new study, researchers followed 140 English-speaking patients discharged from emergency departments in two Michigan hospitals and measured their understanding in four areas — their diagnosis, their E.R. treatment, instructions for their at-home care and warning signs of when to return to the hospital.

The study, published online in July by the Annals of Emergency Medicine, found that 78 percent of patients did not understand at least one area and about half did not understand two or more areas. The greatest confusion surrounded home care — instructions about things like medications, rest, wound care and when to have a follow-up visit with a doctor.

“We’re finding that people are just not prepared for self-care, and that’s what is bringing them back,” said Dr. Eric Coleman, director of the Care Transitions Program at the University of Colorado, who was not involved in the study.

The researchers described a woman in her 20s who went to the emergency room with abdominal pain. After extensive testing, doctors there diagnosed pelvic inflammatory disease, a sexually transmitted infection.

But when interviewed by a researcher, the woman said that she was not aware of any diagnosis, that she did not realize she had been sent home with an antibiotic (she took only the pain medication she was given), and that she did not know she should abstain from sex, tell her partner or have follow-up care.

"The risk is that she could become more seriously ill," said one of the authors, Dr. Kirsten G. Engel, a clinical instructor at Northwestern University. "It's a significant risk to her fertility, and she could pass it to her partner."

Dr. Paul M. Schyve, senior vice president of the Joint Commission, the main organization that accredits hospitals, said: "This study showed that this is much more common than you think. It's not the rare patient."

Similar results have been found for patients leaving hospitals, not just emergency rooms. And experts say they help explain why about 18 percent of Medicare patients discharged from a hospital are readmitted within 30 days.

Doctors and patients say that with hospitals pressed to see more patients faster, patients get less attention. "When I start my shift, I know what I'd like to accomplish, but by the end of the shift, my main concern is that nobody dies, and the other things become less important," said Dr. Michael S. Radeos, research director in the department of emergency medicine at New York Hospital Medical Center of Queens.

Jaleh Teymourian Brahms of Millburn, N.J., ended up in the emergency room after falling face down on a street in Manhattan. "I had pavement embedded in my face and two chipped front teeth," she said.

After being examined for broken bones (there were none), she waited four hours before she was discharged, with bits of pavement still embedded in her face. Ms. Teymourian Brahms said she received no instructions about how to care for her face. Her dentist had to pick the tar and gravel out with a dental tool, then instructed her on how to clean her face and to keep it moist with an antibacterial ointment.

"I risked a nasty infection had I not seen him," she said.

Everything is exaggerated in the emergency department. Doctors are harried, they have little time to go over complicated information and they do not know the patients. Most patients are anxious, upset and not likely to be thinking clearly.

"These factors do not make for the best environment for someone to absorb information," Dr. Engel said.

The problem is particularly acute when it comes to drugs. A patient-education program used in 130 health delivery systems across the country found that about 40 percent of patients 65 or older have a medication error after they leave the hospital. A 2006 report by the Institute of Medicine found that doctors and nurses were contributing to these errors by not providing information in an effective way.

"The physician's ability to predict whether a patient understands isn't as good as can be," said Dr. Rade B. Vukmir, an emergency physician at the University of Pittsburgh and spokesman for the American College of Emergency Physicians.

In the past, patients who did not follow discharge instructions were often labeled noncompliant. "Now, it's being called health illiteracy," Dr. Coleman said, adding that as many as half of all patients are considered to lack the ability to process and understand basic health information that they need to make decisions.

But the patient is only part of the equation, he continued; doctors are notoriously inept at communicating to patients.

The new study found that people were not aware of what they did not understand, suggesting that simply asking a patient if he understands is not enough.

"We're good at saying, 'Here's the information, any questions?,' " Dr. Coleman said, "and the person nods his head, but they don't get it."

Older patients are particularly vulnerable. "They have the kinds of communication barriers we might expect, with vision and hearing problems," said Dr. Susan N. Hastings, an instructor in geriatrics at Duke. The hectic environment of the emergency department can be particularly stressful for them.

Until recently, poor communication was largely ignored by hospitals. "Just a few years ago, there were subtle incentives for hospitals to not get involved in this area, because of financial gains when people come back," Dr. Coleman said.

But hospitals are now being forced to face their communication inadequacies. "We've raised the bar of what's expected of hospitals," said Dr. Schyve, of the Joint Commission. At the same time, the Medicare Payment Advisory Commission, a government agency that advises Congress on Medicare issues, has recommended a policy change that would reduce payments to hospital with excessive readmission rates. It has also asked Medicare to allow hospitals to reward physicians who help lower readmission rates.

Experts in doctor-patient communication recommend a "teach back" approach, in which the patient, preferably accompanied by a relative, friend or caregiver, has to repeat the instructions back to the doctor.

"No matter what you put in writing, what diagrams you have, you really can't be confident that patients understand what they should be doing unless you have them repeat it back to you," Dr. Schyve said.

Dr. Vukmir, of the emergency physicians' group, recommends a "dual discharge" approach: the physician talks to the patient about the results, treatment plan and follow-up care. Then a nurse follows up with computerized discharge instructions.

But Dr. Coleman believes this is not enough. "A third of people over 55 have impaired executive cognitive function," he said, adding that such patients might understand their medications and know when to take them, but fail to follow through.

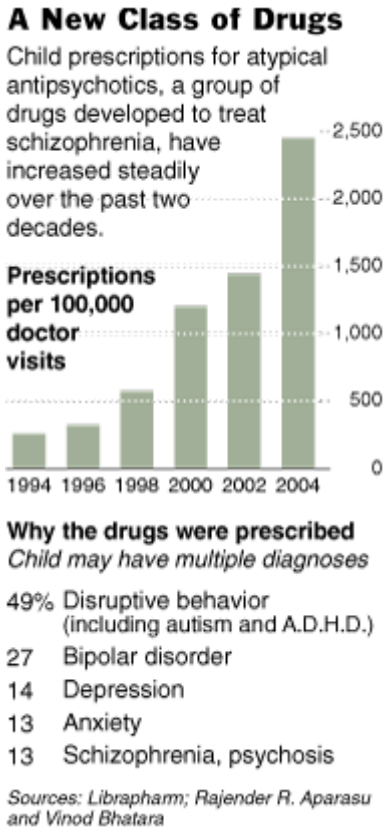
He recommends that hospitals coach patients on self-management skills before discharge. Patients need to ask questions, he said. Hospitals should make follow-up calls and visits to patients, a costly endeavor but potentially less expensive than getting reduced Medicare payments if readmission rates are high.

"Hospitals need to have some accountability for the no-care zone, the period between when you leave the emergency department or hospital and when you get into your primary care setting," Dr. Coleman said. "They should be available for 72 hours."

http://www.nytimes.com/2008/09/16/health/16emer.html?nl=8hlth&emc=hltha1

Risks Found for Youths in New Antipsychotics

By BENEDICT CAREY



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Health Guide: Schizophrenia »

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A new government study published Monday has found that the medicines most often prescribed for schizophrenia in children and adolescents are no more effective than older, less expensive drugs and are more likely to cause some harmful side effects. The standards for treating the disorder should be changed to include some older medications that have fallen out of use, the study's authors said.

The results, being published online by The American Journal of Psychiatry, are likely to alter treatment for an estimated one million children and teenagers with schizophrenia and to intensify a broader controversy in child psychiatry over the newer medications, experts said.

Prescription rates for the newer drugs, called atypical antipsychotics, have increased more than fivefold for children over the past decades and a half, and doctors now use them to settle outbursts and aggression in children with a wide variety of diagnoses, despite serious side effects.

A consortium of state Medicaid directors is currently evaluating the use of these drugs in children on state Medicaid rolls, to ensure they are being prescribed properly.

The study compared two of the newer antipsychotics, Zyprexa from Eli Lilly and Risperdal from Janssen, with an older medication and found that all three relieved symptoms of schizophrenia, like auditory hallucinations, in many young patients. Yet half of the children in the study stopped taking their drug within two months, either because it had no effect or was causing serious side effects, like rapid weight gain. The children receiving Zyprexa gained so much weight that a government oversight panel monitoring safety ordered that they be taken off the drug.

The long-anticipated study, financed by the National Institute of Mental Health, is the most rigorous, head-to-head trial of the drugs in children and adolescents with this disorder. About three million Americans suffer from schizophrenia, and perhaps 40 percent first show symptoms in their teens or earlier.

"This is really a landmark study, because these newer drugs have been around for 12 years or so now, and there were fundamental questions for which we really didn't have answers," said Dr. Sanjiv Kumra, director of the division of child and adolescent psychiatry at the University of Minnesota, who was not involved in the study.

Dr. Kumra said the results revealed significant differences in the drugs' side effects that should help doctors and patients choose among them.

"What this is saying is that all treatments work, at least for some people, and have serious risks for others," he said. "It's a trial-and-error process" to match people with the right medication.

Dr. Jon McClellan of the University of Washington, a co-author of the new study and of the current guidelines for treating childhood schizophrenia, said in a telephone interview that older schizophrenia drugs should now be considered as an alternative in some cases.

"Some of the children in this study gained 15 pounds or more in eight weeks," Dr. McClellan said. "That's as much as adults gain in a year on these medications. Children are especially susceptible to these side effects, and this has broad implications across the board, for the use of these agents to treat any disorder."

Studies have found that more than 80 percent of prescriptions for atypical antipsychotics for children are to treat something other than schizophrenia, like autism-related aggression, bipolar disorder or attention-deficit problems. Some of these are approved uses; others are not.

The researchers, led by Dr. Linmarie Sikich of the University of North Carolina, recruited 119 young people, ages 8 to 19, who suffer from psychotic symptoms. The children received either Zyprexa, Risperdal or molindone, an older drug used to blunt psychosis. Neither the young patients nor the doctors treating them knew which drug was being taken, but the researchers told the youngsters and their parents that, if the medication was not working out, the family could switch to another one.

After eight weeks, 34 percent of the children taking Zyprexa, 46 percent of those on Risperdal, and 50 percent of those receiving molindone showed significant improvement.

But by that time so many of the patients had stopped taking the drug they were on that it was not clear that those differences were significant. Many had gained a lot of weight: an average of about nine pounds for those in the Risperdal group, and 13 pounds in the Zyprexa group.

Both groups also showed changes in cholesterol and insulin levels that are risk factors for diabetes. Those taking molindone gained less than a pound, on average, and had little metabolic changes.

"I thought the extra weight was putting a lot of pressure on me," said Brandon Constantineau, 18, a study participant in Wilmington, N.C., who gained 35 pounds while taking Risperdal for several months. "Kids at school were making fun of me, all that. I knew I had to get rid of it. I exercised a lot, but it didn't happen until I changed drugs."

Mr. Constantineau said he was now doing well on a medication not offered in the study.

Dr. Sikich, the study's lead researcher, said, "One implication of this study is that the guidelines for treating schizophrenia need to be revised, so that some of the milder, traditional or older medications are considered first-line treatments in some cases." She added: "The other significant thing is that none of these medications were as well tolerated as we had hoped. We really need to find better alternatives."

Spokesmen for Eli Lilly and Janssen said that their drugs were not approved to treat schizophrenia in children and that, given the limited number of options for such patients, there was a need for new therapies.

Jamaison Schuler, a spokesman for Eli Lilly, pointed out that the new study, at eight weeks in length, had not lasted long enough to pick up the most worrisome side effect associated with the older drugs: Parkinson's-like movement problems, which are often irreversible. Patients in the study taking molindone also took another drug to reduce this risk.

Beginning in the early 1990s, psychiatrists turned to the newer drugs in large part to spare their patients those problems. Several large studies since then have shown that that shift — while perhaps sparing some patients movement problems — has had a cost.

A landmark comparison of older and newer drug in adults with schizophrenia, published in 2005, had findings similar to the new report. Most patients in the earlier study stopped taking the drug they were put on, and some of the medications were associated with rapid weight gain and other problems.

"I think the reason the use of these newer drugs has gone up so fast is that there was this widespread assumption that they were safer and more effective than what we had before," Dr. McClellan said. "Well, we're seeing now that that's not the whole story."

http://www.nytimes.com/2008/09/15/health/research/15drug.html?nl=8hlth&emc=hltha1

Nerves Tangle, and Back Pain Becomes a Toothache

By KATE MURPHY

When people have a heart attack, a classic symptom is shooting pain down the left arm. That symptom, it turns out, has something in common with a far more benign kind of pain: the headache one can get from eating ice cream too fast.

Both are examples of what doctors call referred pain, or pain in an area of the body other than where it originates. Such sensory red herrings include a toothache resulting from a strained upper back, foot soreness caused by a tumor in the uterus, and hip discomfort when the problem is really arthritis in the knee.

Referred pain can make diagnoses difficult and can lead to off-target or wholly unnecessary cortisone injections, tooth extractions and operations. Now, in trying to discover the patterns and causes of the phenomenon, researchers say they are gaining a greater understanding of how the nervous system works and how its signals can go awry.

"The body can really fool you in terms of determining pathology," said Karen J. Berkley, a professor of neuroscience at Florida State University. Her research has focused on referred pain caused by endometriosis — pain that can be felt as far away as the jaw.

One possible explanation has to do with the way the body's nerve fibers converge on and send signals up the spinal column. Each nerve input carries an astonishing amount of information about the body.

"What we think happens is that the information sometimes loses its specificity as it makes its way up the spinal column to the brain," Dr. Berkley said. In the constant dynamic of excitation and inhibition that occurs during the transport of innumerable nerve impulses, she went on, "we can't always discern where a sensory message is coming from."

Usually the mixed signals come from nerves that overlap as they enter the spinal column — from the heart and left arm, for example, or from the gallbladder and right shoulder. This so-called adjacency of neural inputs probably explains why some people report a sensation in their thighs when they need to have a bowel movement or feel a tingling in their toes during an orgasm.

Moreover, when the stimulus emanates from internal organs, the sensation is often perceived as coming from the chest, arms, legs, hands or feet. "The brain is more used to feeling something out there than in

the viscera," explained Gerald F. Gebhart, director of the Center for Pain Research at the University of Pittsburgh.

In a study published last year, researchers at Aalborg University in Denmark applied irritating substances like capsaicin (the stuff that makes chili peppers hot) to subjects' small and large intestines. They found increased blood flow and elevated temperatures in referred-pain sites in the trunk and extremities. (The study appeared in The European Journal of Pain.)

Pain can also be referred to areas that do not have overlapping nerves. This most often occurs after an injury, according to Dr. Jon Levine, a neuroscientist at the University of California, San Francisco. This, he said, might be because of "pain memory," which makes the brain more likely to "experience a new sensation as coming from where you were hurt before."

Several studies using functional magnetic resonance imaging have supported this hypothesis. Areas of the brain corresponding to once injured body parts often lit up when another part was poked or prodded.

Widespread and persistent inflammation in response to a current or past injury may cause what doctors call peripheral sensitization, or excitation of nerves elsewhere in the body. These somatic nerves are on high alert and ready to fire pain signals at the least provocation. Dr. Emeran A. Mayer, a gastroenterologist at the University of California, Los Angeles, who studies referred pain from the gut, said, "The more pain a person has experienced or is experiencing, the more likely we are to see atypical sites of referral."

Referred pain is also thought to emanate from trigger points — taut nodules that develop within muscle — which were first described in the 1960s by Dr. Janet G. Travell, who treated President John F. Kennedy's back pain. The matrix of trigger points and their predictable pain-referral patterns has "a remarkable correspondence with acupuncture meridians in Chinese medicine," said Dr. Jay P. Shah, a physiatrist in the rehabilitation medicine department at the National Institutes of Health.

Patients report that their referred pain is precipitated or worsened when the corresponding trigger point is pressed, and alleviated through massage or acupuncture at the trigger point. Though some doctors are skeptical about the trigger point hypothesis, Dr. Shah published a study last year in The Archives of Physical Medicine and Rehabilitation indicating that inflammatory chemicals exist at both the trigger points and the locations of referred pain.

Researchers say the varied explanations for referred pain may not be contradictory, but rather an indication that several mechanisms are at work. Dr. Lars Arendt-Nielsen, head of research at the Center for Sensory Motor Interaction at Aalborg, said the growing body of evidence supporting each notion "has changed the way we treat pain to a multifaceted approach."

Treatments might incorporate not just painkillers but drugs that calm the central nervous system, like anti-epileptics and serotonin reuptake inhibitors.Acupuncture and trigger-point therapy have also gained acceptance, along with psychological approaches that encourage patients to focus on where the pain is actually coming from rather than where it hurts. Research conducted in 2003 at the University of Bath in England and published in the British journal Rheumatology revealed that patients' referred pain diminished or disappeared if they saw where the pressure was actually being applied.

"Patients and doctors alike," said Dr. Berkley, of Florida State, "need to remind themselves that where pain is felt may not be where the problem lies."

http://www.nytimes.com/2008/09/16/health/research/16pain.html?nl=8hlth&emc=hltha2

Small Patients, Big Consequences in Medical Errors

By LAURIE TARKAN

WHEN 6-year-old Chance Pendleton came out of surgery for a wandering eye, it was obvious that something was not right. “He was crying hysterically, vomiting and kept saying, ‘I wish I was dead,’ ” his mother, Grace Alexander, of Paris, Tex., recalled.

The boy had been through surgery before and had never reacted this way. “The nurse was quite peeved and wanted me to calm him before he disturbed anyone,” said Ms. Alexander, who said Chance was denied more pain and anti-nausea medication. “She thought he was just throwing a tantrum.”

After about 20 minutes, another nurse walked by, and Ms. Alexander beckoned her for help. The nurse checked the intravenous line in Chance’s ankle and saw that it wasn’t inserted correctly. He wasn’t receiving any medication. She immediately fixed it, bringing relief to Chance in a matter of seconds.

Medical mistakes, though also common in adults, can have more serious consequences in children, doctors say. The actor Dennis Quaid’s newborn twins nearly died last year after receiving 1,000 times the prescribed dose of a blood thinner. Other infants have died from the same error. A study in the journal Pediatrics in April found that problems due to medications occurred in 11 percent of children who were in the hospital, and that 22 percent of them were preventable.

An Institute of Medicine report nearly a decade ago highlighted the prevalence of medical errors, and they are still a major problem. “There’s been slow progress in the decline of these errors,” said Dr. Peter B. Angood, chief patient safety officer of the Joint Commission, the independent hospital accreditation agency. The agency recently called on hospitals to further reduce medication errors in children.

Children are also the victims of diagnostic errors, incorrect procedures or tests, infections and injuries.

Medical errors pose a greater threat to children than to adults for a number of reasons. They are physically small, and their kidneys, liver and immune system are still developing. Even a tiny increase in the dose of medication can have serious effects — especially in babies born prematurely. And if children take a turn for the worse, they can deteriorate more rapidly than adults. Children also are less able to communicate what they are feeling, making it difficult to diagnose their problem or know when a symptom or complication develops.

Adult medications are prepackaged and have standardized doses, but pediatric medications vary, based on the child’s weight and sometimes height, requiring doctors to make calculations. It is easy to misplace a decimal point, a tenfold error.

Typically, an adult formulation is diluted for children, and sometimes “the amount of medication being diluted is smaller than an air bubble in a syringe,” said Dr. Rainu Kaushal, director of quality and patient safety at the Komansky Center for Children’s Health at NewYork-Presbyterian Hospital/Weill Cornell Medical Center.

“A pharmacist can get orders for 55 milligrams, 65 milligrams, 70 milligrams of the same medication,” said Michael R. Cohen, president of the Institute for Safe Medication Practices, a nonprofit health care education organization. And medications for children come in different formulations, from drops to liquids to chewables. These variables increase the chance of human error, Dr. Kaushal said.

The Joint Commission reported that about 32 percent of medication errors in children in the operating room involved the wrong dose, compared with 14 percent in adults.

But not all errors happen in hospitals. Karen Rhodes was giving her 2-year-old daughter, Lanie, the prescription medication Zyrtec for allergies three times a day, as the label indicated. But Lanie began to suffer tremors, her breathing grew shallow, and she became "zoned out," her mother said. It turned out she was getting three times the recommended dose; the drug should have been taken once a day. It was the pharmacist's error, said Mrs. Rhodes, of Spartanburg, S.C.

At the American Academy of Pediatrics annual meeting in 2006, Dr. Kaushal reported that potentially harmful medication errors affected 26 percent of children in outpatient care.

"There needs to be more medications specifically manufactured for the pediatric population, more standardized dosing regimens and very accurate and clear labeling and packaging of medications," said Dr. Angood of the Joint Commission. A labeling issue caused the mix-up that led to the overdose of the Quaid twins. The label for a 10-unit dose of the blood thinner heparin, which is used to flush intravenous lines, looked similar to the label of the 10,000-unit dose that the twins were given.

TECHNOLOGY has helped to reduce medication errors. Two methods are favored by experts: an electronic prescribing system known as computerized physician order entry, and a system in which a bar code assigned to a patient is swiped against the bar code of the drug he is about to receive.

But these technologies are expensive and require training. Only about 10 percent of hospitals in the United States use computerized prescribing, and 20 percent use bar coding, said Dr. Cohen. One technology, adopted by about half of the hospitals in the United States, is the smart pump, a programmable intravenous device that regulates the amount and timing of drug delivery. Infections, which are considered errors because they are preventable, are also common among children being treated in hospitals. Studies of neonatal and pediatric intensive care units found that infections topped the list of medical errors, followed by medication errors and injuries from catheters (many are left in too long), said Dr. Paul J. Sharek, chief clinical patient safety officer of the Lucile Packard Children's Hospital at Stanford in Palo Alto, Calif.

Misdiagnosis is also common and can lead to serious complications or death. A study of malpractice lawsuits involving children visiting emergency departments found that meningitis, appendicitis and broken arms were the most common misdiagnosed conditions.

Hospitals can take simple measures to reduce mistakes. For example, when members of a surgical team take a time-out a moment before operating to check that they have the right patient, the right procedure and the correct location, errors are reduced.

Parents need to be the eyes, ears and advocates for their children. "Parents have to pay attention and speak up," said Dr. Steve Selbst, professor of pediatrics at Jefferson Medical College in Philadelphia, who conducted the study on malpractice suits. "You know your child, and if you feel something's wrong, go up the chain of command."

Chance Pendleton's mother said she was not aggressive enough. "I wish I had been more confrontational sooner," she said. "That was the worst 20 minutes of my life."

Here are some tips from experts for parents to lower the chance their child will be harmed by his or her treatment.

ID BRACELETS If your child is in the hospital, make sure the identification bracelet is worn at all times.

HYGIENE Ask all health care providers to wash their hands before approaching your child.

INFORMATION Before a procedure, ask the surgery team's members if they know exactly what the procedure is.

KNOWLEDGE Schedule a time every day to review with the physician and nurses the medications your child is taking and any other information about his care.

AWARENESS Keep an eye on catheters and incisions, looking for redness and swelling.

ASK QUESTIONS If your child is very sick, make sure a pediatric specialist is involved, and ask whether your child should be moved to a children's hospital.

TALK ABOUT IT Express your concerns about a missed diagnosis.

BE PREPARED Carry a list of the medications your child is taking and remind doctors about any allergies your child has.

DOUBLE-CHECK Understand why medications are being ordered, and don't be afraid to ask the doctor to double-check that he used your child's correct weight and height in calculating the dose.

MEDICINES Familiarize yourself with the medications so that you can recognize if your child is given the wrong pill or liquid. Ask about potential complications and whom to contact if your child has a reaction.

VIGILANCE Be especially watchful if your child is taking multiple medications or is on high-risk medications like chemotherapy drugs, insulin or heparin, or if your child has a compromised immune or organ function.

http://www.nytimes.com/2008/09/15/health/healthspecial2/15mistakes.html?nl=8hlth&adxnnl=1&emc=hltha2&adxnnlx=1221584412-buYC6YLhNufYu/vMDkN6hQ

How Much Exercise Do Children Need?

By GINA KOLATA

YOU'RE a parent and you want to do your best to be sure your children are healthy. So you worry about physical activity. How much exercise is enough? Will being active protect them against diabetes, cancer or heart disease later in life? Will it prevent them from getting fat?

You search for information, for official guidelines on physical activity. And, you soon discover, there is plenty of advice — at least 27 sets of official guidelines, notes Harold W. Kohl, an epidemiologist at the University of Texas School of Public Health in Austin who formerly worked at the Centers for Disease Control and Prevention.

But the problem in making recommendations is a lack of good data.

We can't "clarify the dose of physical activity and exercise that's good for kids" as precisely as we think we can, Dr. Kohl said.

It's not that experts haven't tried.

For example, a few years ago the C.D.C. convened a panel of experts to review published papers and make the best recommendations. The panel's co-chairman, Robert M. Malina, a professor emeritus of kinesiology and health education at the University of Texas at Austin, noted that the group reviewed 850 published papers on the benefits of regular exercise for school-age children and adolescents.

In 2004, the panel concluded by recommending that children and adolescents get 60 minutes of moderate to vigorous physical activity every day. Why 60 minutes and not 30 or 45? It was, Dr. Malina said, "a gut reaction" to the body of evidence.

Now, the Department of Health and Human Services is preparing a new set of guidelines, but most of the same questions remain, Dr. Kohl said. And even though he, Dr. Malina and most other exercise researchers enthusiastically endorse physical activity for everyone, they caution that some of its reputed benefits may be oversold.

In reviewing published papers, the C.D.C. and Human Services panels asked: How good are the data? They learned that, with a few exceptions, for every purported benefit, the evidence was often marginal or

equivocal. And, Dr. Malina said, even in situations in which exercise has demonstrable effects, there are marked differences among individuals: some children will get more benefit than others and some will not get any at all.

The undisputed benefits of exercise, the panels said, are that it can lead to stronger muscles, greater endurance, and bones that are denser and have greater mineral content. In addition, when obese children exercise regularly, their body fat, blood lipids and blood pressure may fall. Exercise, though, has not been found to have those effects on healthy children of normal weight.

Even there, though, uncertainties remain, Dr. Kohl said. "Kids aren't little adults, and they don't do things for 30 minutes straight through," he said. "You can put kids on treadmills and train them and that can somewhat help obese kids reduce their adiposity levels, but when you get out in the real world it's not that easy."

The panels asked whether exercise alleviates symptoms of anxiety or depression or whether it improves self-image. The studies were not large enough to draw conclusions, they said.

Another issue is academics. Do physically active and physically fit children do better in school? Do they have qualities, like an improved ability to pay attention, that might predict better academic performance?

The answer, Dr. Kohl said, is not known. "The only good data we have indicate that participation in a better physical education program does not negatively affect test scores," he adds.

Parents sometimes are advised to get children involved in activities that they can do throughout a lifetime — walking, cycling or swimming. But, Dr. Malina said, there is no good evidence that the sport someone does as a child will affect activity as an adult.

"The evidence that tracks youngsters to adulthood is very relatively meager," Dr. Malina said. And, he added, it is not clear how and why people change activities during their lives.

"I played all sorts of sports growing up," he said. By the time he started college, he adds, "baseball was my sport." Now, said Dr. Malina, who is 71, "in my old age, my activity is walking."

Still, exercise researchers do have some advice for parents: Let the children decide what physical activity they want to do.

"The single best activity you can do is the one you will do," said Charles B. Corbin, a professor emeritus in the department of exercise and wellness at Arizona State University and the author of more than 80 books on fitness.

And the mistake parents often make, Dr. Malina said, is to decide in advance which sports their children should pursue.

"All too often, youngsters do not have a choice in the decision-making process," he explained. And, he said, no matter how much parents may want their children to be physically active, "if it is not fun, the child will not do it."

http://www.nytimes.com/2008/09/15/health/healthspecial2/15exercise.html?nl=8hlth&emc=hltha4

Defibrillators Are Lifesaver, but Risks Give Pause

By BARNABY J. FEDER

The implanted defibrillator, a device that can automatically shock an erratically beating heart back to a normal rhythm, has been proved to save lives. Hence its nickname: an emergency room in the chest. Major medical groups have recommended that more patients receive the devices.

But in the last two years the number of patients receiving defibrillators has actually declined, as more doctors and patients decide the risks and uncertainties the devices pose may outweigh their potential benefits.

This trend — the first decline since implanted defibrillators were introduced in 1985 — has spotlighted a shortcoming that health experts have struggled with for years. Simply put, there is no adequate tool or test to predict which of the heart patients who might seem good candidates to get the expensive devices are the ones most likely to ever need their life-saving shock.

Defibrillators have undoubtedly saved the lives of tens of thousands of Americans. That is why insurers still typically pay for the devices and the surgical procedure to implant them, which can top $50,000 for each patient.

What makes many doctors and patients increasingly wary, though, is a string of highly publicized recalls in recent years, along with mounting evidence suggesting that a vast majority of people who get a defibrillator never need it.

Industry estimates and medical studies indicate that defibrillators have saved the lives of 10 percent of the more than 600,000 people in this country who have received them, at most. While survivors would no doubt take those odds, 9 of 10 people who get defibrillators receive no medical benefit. One big long-term medical study indicated the odds of a defibrillator saving a patient's life might be even slimmer — about 1 in 14, over the five-year period studied.

The problem that defibrillators pose is in some ways singular among medical technologies. For devices like artificial knees, which improve lives but do not save them, few people would settle for only a 1 in 10 chance of success. For a potentially life-saving cancer drug, a patient might grasp at even much slimmer odds. Where defibrillators differ is that they are only a powerful standby — ready to intervene if necessary, but unlikely ever to be called into service.

If defibrillators were simply $50,000 life insurance policies, the relatively low rate of payoff might not matter much. But the long-shot statistics are significant to people who must weigh the risks of infection and malfunction after they have an electronic device anchored inside their hearts and its wires threaded through their arteries.

The slim odds also have large implications for the United States health care bill, adding billions of dollars annually to Medicare spending and to insurance payments. Dr. Larry A. Chinitz, director of the Heart Rhythm Center at New York University's Langone Medical Center, said, "The answer isn't just to keep implanting everybody" who fits the current guidelines.

More doctors are now thinking twice. From a peak of 160,000 new patients in 2005, the number has fallen to less than 140,000 last year, according to Lawrence H. Biegelsen, an analyst at Wachovia Capital Markets. He predicts this year's total will end up even lower.

For the manufacturers, the numbers translate to a decline in defibrillator sales to $3.94 billion in this country last year, down from $4.29 billion in 2005, Mr. Biegelsen said.

Only overseas, where defibrillators have been slower to catch on, has the number of new implants continued to rise, hitting a new sales high of $1.93 billion last year.

Many patients, of course, are grateful for their defibrillators. "It's saved me at least four times, including two when I passed out completely," Matthew M. Murray, a 55-year-old former engineer in Riverbank, Calif., said of his implant.

And some experts worry that the pendulum may have swung too far away from defibrillators — putting countless lives at risk among people with the heart abnormalities and ailments most likely to cause cardiac arrest. At least several hundred thousand people in this country have such conditions, and some estimates place the figure at more than a million.

Medtronic, the leading maker of defibrillators, contends that each day 500 deaths are caused by sudden cardiac arrests among people who meet the current medical guidelines for the devices but do not have them.

(The NBC journalist Tim Russert, who died earlier this year, reportedly suffered a heart attack after an artery was blocked. While Mr. Russert had a history of heart disease, his condition was not one for which a defibrillator would have been prescribed.)

Dr. Eric N. Prystowsky, a nationally renowned heart rhythm specialist in Indianapolis, said every doctor in his field was haunted by individual cases, like that of a Purdue University graduate student who was referred to Dr. Prystowsky for a defibrillator. The student had an abnormally thick heart muscle, a known risk for sudden cardiac arrest.

"He kept putting it off," Dr. Prystowsky said of the decision to get a defibrillator. "Six weeks later, his fiancée called to say he had been found dead in bed."

Cases like that may be inevitable as long as doctors cannot give patients more certainty about whether a defibrillator will actually help them.

Better clues could be submerged in the medical records of the people who have gotten defibrillators over the decades. Three years ago, Medicare ordered the creation of a nationwide registry, or database, for implanted defibrillators. Overseen by two leading professional groups, the American College of Cardiology and the Heart Rhythm Society, the registry has amassed about 270,000 records from 1,500 hospitals.

But the data mining has only recently begun, and results are not expected before 2010 at the earliest.

There is no guarantee that the information will lead to more effective use of defibrillators. Unlike drugs, many medical devices evolve so quickly that long-term data on their performance can be obsolete by the time it is available.

There are also efforts to find genetic markers and to develop new diagnostic tests that might more precisely identify patients who are predisposed to the type of sudden cardiac arrest a defibrillator could prevent. So far, though, the only federally approved screening test identifies some patients who are unlikely to need a defibrillator in the next year — not those most likely to require one.

The defibrillator decline began after highly publicized reports of a small number of deadly malfunctions. The biggest blow came in June 2005, when the Guidant Corporation — later acquired by Boston Scientific — recalled 29,000 implanted defibrillators because of flaws that might have caused them to short-circuit instead of delivering critical shocks. At the time, at least two deaths had been linked to the failure.

Medtronic, the market leader, and St. Jude Medical, the third major player, subsequently announced product recalls, although neither was prompted by known deaths.

Heading into 2007, as those headlines faded, many analysts predicted a rebound in defibrillator sales. But last fall Medtronic recalled its newest version of the main wire that connects a defibrillator to the heart. A small percentage of the more than 200,000 Fidelis-brand leads that had been implanted were developing fractures suspected of either preventing some defibrillators from delivering shocks when needed or causing them to deliver unnecessary shocks.

Even with properly functioning devices, patients risk unnecessary shocks — jolts recipients often describe as a painful and frightening kick in the chest. "Almost as many get shocked unnecessarily as benefit," Dr. Paul J. Hauptman, a professor of medicine at St. Louis University, said.

And even problem-free patients need surgery to replace their unit's batteries when they run low. Most of today's batteries are expected to last five to seven years. Manufacturers say patients generally get better software and longer battery life with each replacement. But the repeat procedures also raise costs and risks.

Meanwhile, there are signs that improved treatment of cardiac disease with drugs, diet and behavioral changes could be reducing the need for defibrillators. At a meeting of heart rhythm specialists in May in San Francisco, Dr. Douglas P. Zipes, an Indiana University medical professor, cited data suggesting a decline in the percentage of heart patients who suffered the kinds of heart stoppages that defibrillators were intended to address.

Hoping to stay relevant, the makers of defibrillators have been developing higher-priced devices with new features, including software to limit unnecessary shocks. Most are built to communicate wirelessly, allowing doctors to remotely monitor their performance. Many can perform other rhythm-regulating functions, like synchronizing contractions in different chambers of the heart.

"Adding additional therapy will get at more of the market," said Daniel J. Starks, chief executive of St. Jude Medical, citing plans to add sensors that could warn of impending heart failure. But adding complexity could also make it even more difficult to calculate the costs and benefits of implanting the devices in the first place.

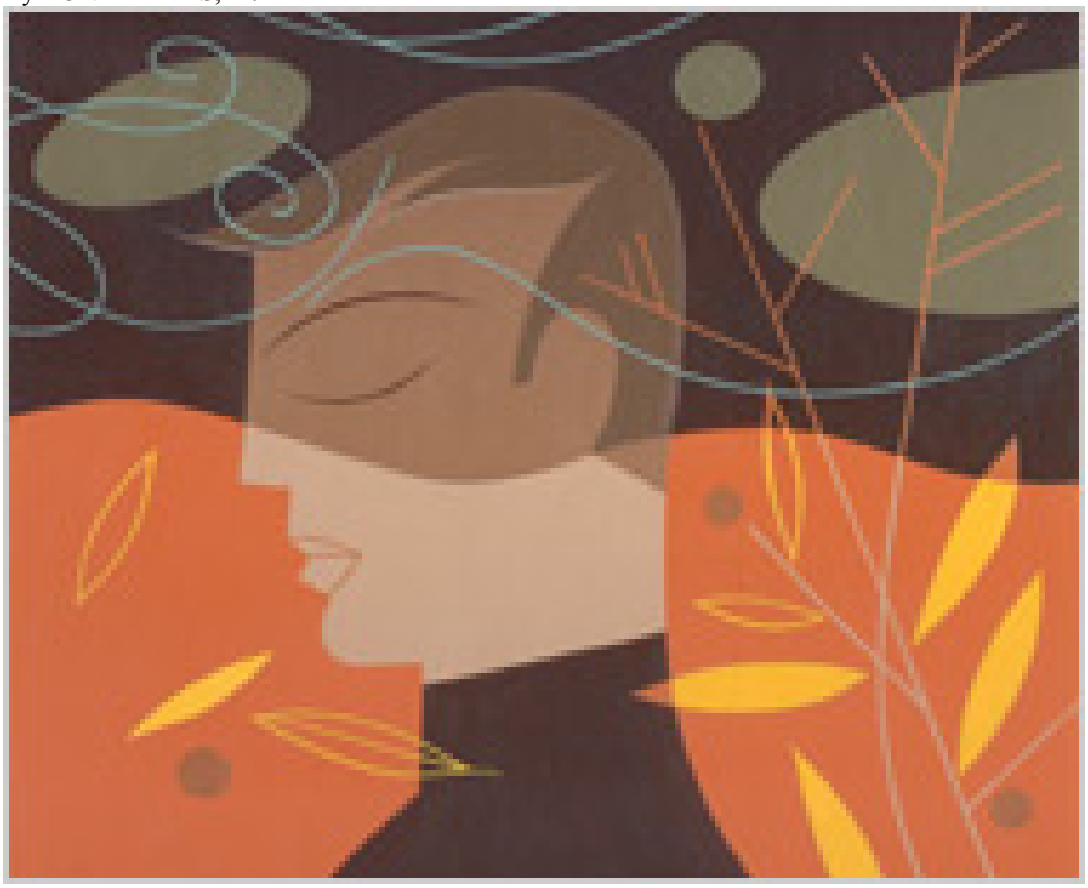
That bothers patients like one 50-year-old business consultant in the San Francisco Bay Area. The man, who declined to be identified for fear of alarming his clients, ignored recommendations from three doctors to get a defibrillator. Online research suggested his risk of sudden cardiac arrest would be 3 percent a year without a defibrillator — and about 1 percent with one.

Doctors thinking about thousands of patients might see that as a significant difference, he said. But for him, he said, it did not seem a fair tradeoff for becoming "part of the medical-industrial complex for the rest of your life."

http://www.nytimes.com/2008/09/13/business/13defib.html?nl=8hlth&emc=hltha6

Redefining Depression as Mere Sadness

By RONALD PIES, M.D



Let's say a patient walks into my office and says he's been feeling down for the past three weeks. A month ago, his fiancée left him for another man, and he feels there's no point in going on. He has not been sleeping well, his appetite is poor and he has lost interest in nearly all of his usual activities.

Should I give him a diagnosis of clinical depression? Or is my patient merely experiencing what the 14th-century monk Thomas à Kempis called "the proper sorrows of the soul"? The answer is more complicated than some critics of psychiatric diagnosis think.

To these critics, psychiatry has medicalized normal sadness by failing to consider the social and emotional context in which people develop low mood — for example, after losing a job or experiencing the breakup of an important relationship. This diagnostic failure, the argument goes, has created a bogus epidemic of increasing depression.

In their recent book "The Loss of Sadness" (Oxford, 2007), Allan V. Horwitz and Jerome C. Wakefield assert that for thousands of years, symptoms of sadness that were "with cause" were separated from those that were "without cause." Only the latter were viewed as mental disorders.

With the advent of modern diagnostic criteria, these authors argue, doctors were directed to ignore the context of the patient's complaints and focus only on symptoms — poor appetite, insomnia, low energy, hopelessness and so on. The current criteria for major depression, they say, largely fail to distinguish between "abnormal" reactions caused by "internal dysfunction" and "normal sadness" brought on by

external circumstances. And they blame vested interests — doctors, researchers, pharmaceutical companies — for fostering this bloated concept of depression.

But while this increasingly popular thesis contains a kernel of truth, it conceals a bushel basket of conceptual and scientific problems.

For one thing, if modern diagnostic criteria were converting mere sadness into clinical depression, we would expect the number of new cases of depression to be skyrocketing compared with rates in a period like the 1950s to the 1970s. But several new studies in the United States and Canada find that the incidence of serious depression has held relatively steady in recent decades.

Second, it may seem easy to determine that someone with depressive complaints is reacting to a loss that touched off the depression. Experienced clinicians know this is rarely the case.

Most of us can point to recent losses and disappointments in our lives, but it is not always clear that they are causally related to our becoming depressed. For example, a patient who had a stroke a month ago may appear tearful, lethargic and depressed. To critics, the so-called depression is just "normal sadness" in reaction to a terrible psychological blow. But strokes are also known to disrupt chemical pathways in the brain that directly affect mood.

What is the "real" trigger for this patient's depression? Perhaps it is a combination of psychological and neurological factors. In short, the notion of "reacting" to adverse life events is complex and problematic.

Third, and perhaps most troubling, is the implication that a recent major loss makes it more likely that the person's depressive symptoms will follow a benign and limited course, and therefore do not need medical treatment. This has never been demonstrated, to my knowledge, in any well-designed studies. And what *has* been demonstrated, in a study by Dr. Sidney Zisook, is that antidepressants may help patients with major depressive symptoms occurring just after the death of a loved one.

Yes, most psychiatrists would concede that in the space of a brief "managed care" appointment, it's very hard to understand much about the context of the patient's depressive complaints. And yes, under such conditions, some doctors are tempted to write that prescription for Prozac or Zoloft and move on to the next patient.

But the vexing issue of when bereavement or sadness becomes a disorder, and how it should be treated, requires much more study. Most psychiatrists believe that undertreatment of severe depression is a more pressing problem than overtreatment of "normal sadness." Until solid research persuades me otherwise, I will most likely see people like my jilted patient as clinically depressed, not just "normally sad" — and I will provide him with whatever psychiatric treatment he needs to feel better.

Ronald Pies is a professor of psychiatry at Tufts and SUNY Upstate Medical Center in Syracuse.

http://www.nytimes.com/2008/09/16/health/views/16mind.html?nl=8hlth&emc=hltha8

Healing the Doctor-Patient Divide

By PAULINE W. CHEN

"I don't rely on the doctor anymore. These days, you have to look out for yourself."

Those words, and the smell of grilled meats, wafted by me at a recent potluck dinner party.

My husband and I had tagged along for a summer reunion, where my sister-in-law and her husband joined a group of 40-, 50- and 60-somethings who were visiting their hometown, eager to catch up on their childhood buddies' lives.

The chatter started as one would expect -- five-minute recaps of work, children, parents and summer plans. But as the evening progressed, the gossamer conversations of this boomer crowd seemed to spin into one thread: the state of one's health. Or our parents' health. Or our children's health.

And no matter the specifics of each story, they all seemed to revolve around one theme: that as a patient or the family of a patient, you would feel at odds with the very people who were supposed to care: the doctors.

Looking back on that night, I realize that the conversations in this polite crowd might have taken a different bent if the guests had known that one among them happened to be a surgeon. I also realize that because I am a doctor it might have only seemed like everyone was talking about health.

But I don't believe that the stories I heard that night are the exception. In fact, I think they may be the norm.

More and more Americans feel disconnected from their doctors, especially compared to a generation ago. And they certainly have less confidence in the profession as a whole. In 1966, a Harris Poll found that almost three-quarters of Americans had "a great deal" of confidence in their health care leaders. That number has steadily dropped over the last four decades, so that today only slightly more than a third feel the same way, the same poll shows.

I can't blame people for losing their confidence in medicine. My mother-in-law has been in and out of hospitals for the past couple of years. While a few of her doctors have been extraordinary, there have also been enough mishaps and misinformation to make me cringe every time the threat of another hospitalization looms.

Moreover, when her kids ask her which of her doctors is in charge, my mother-in-law can rarely provide a name. At first my husband speculated that his mother was suffering from memory loss. But he and his sister have since learned that in-house doctors turn over so frequently that even the most intact intellect can lose track.

I know there's a problem with the way medicine works these days, but as a surgeon, I've also stood on the other side. I have felt my heart drop when a patient whose new liver I struggled to sew into place decides without telling me to stop taking immunosuppressive medications. I have felt a pang in my chest when, still paying back student loans 15 years after my last graduation ceremony, I can hear a patient questioning not my therapeutic recommendation but my financial motivation.

And I feel a great sadness for my profession and my patients when I hear conversations like the ones I heard at that summer potluck.

When I started medical school 22 years ago, I believed that I could have the kind of relationship with patients that I had had growing up with my pediatrician. "Dr. Kirkland" unflinchingly jabbed immunization needles into my arms, regularly tapped my hyper-reflexive knees with a rubber hammer and pulled no punches when I, the moody adolescent, sulked in his waiting room or stormed out of his office.

But despite those difficult moments, I knew that ultimately we stood together. These days I'm not sure many of us -- patient or doctor -- can say the same.

There is a tragic irony in the growing divide between us. We all want the same thing: the best care possible. But we have lost the ability to converse thoughtfully with one another. And because of that loss, we can no longer discuss the meaning of illness, care, health and policy in a way that is relevant to all of us.

My hope is that we can revive that conversation. Not in a clinic or hospital room, but here on the Web. Many of the topics I discuss will emerge from my experiences in and out of the operating room, or reflect an ongoing policy debate or fascinating research finding. Others, I hope, will spring from your comments and unique perspectives.

It will be the shared insights from this online community, I believe, that will begin to bridge the gap between patients and doctors and remedy the disconnect.

It *is* difficult for any one of us to change today's health care system, but there is one thing every one of us can do.

We can begin the conversation.

To join the discussion: click here to post your comments on the Well blog, "Patients and Doctors Start Talking."

Pauline W. Chen, a liver transplant and liver cancer surgeon, is the author of "Final Exam: A Surgeon's Reflections on Mortality" (Knopf, 2007; Vintage, 2008). This is the first of a regular online column, "Doctor and Patient," that will be appearing on Thursdays at nytimes.com/health

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