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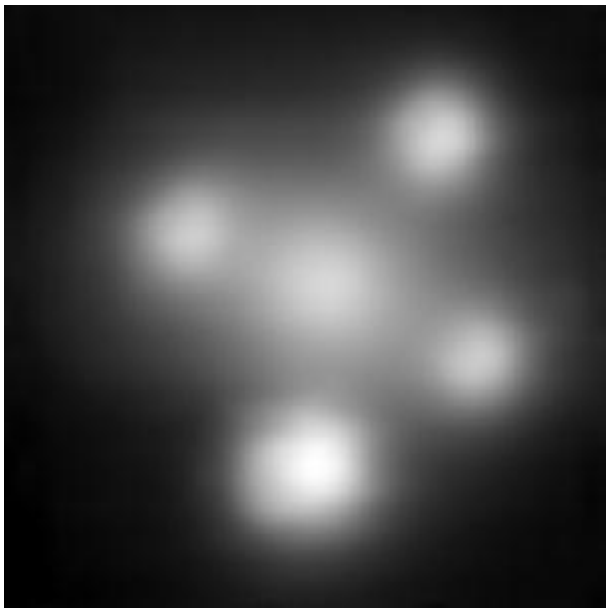
Supermassive Black Hole Dissected With Natural Magnifying Glasses: 1,000 Times Clearer Than Best Telescopes Can Do



Close-up of the Einstein Cross, as observed with the SINFONI instrument on ESO's Very Large Telescope. SINFONI makes use of the adaptive optics technique and so, allows astronomers to overcome the blurring effect of the atmosphere, thereby providing very sharp images. The central blob is the nucleus of the lensing galaxy, surrounded by the four mirage images of the distant quasar. (Credit: ESO/F. Courbin et al)

ScienceDaily (Dec. 13, 2008) — Combining a double natural "magnifying glass" with the power of ESO's Very Large Telescope, astronomers have scrutinised the inner parts of the disc around a supermassive black hole 10 billion light-years away. They were able to study the disc with a level of detail a thousand times better than that of the best telescopes in the world, providing the first observational confirmation of the prevalent theoretical models of such discs.

The team of astronomers from Europe and the US studied the "Einstein Cross", a famous cosmic mirage. This cross-shaped configuration consists of four images of a single very distant source. The multiple images are a result of gravitational lensing by a foreground galaxy, an effect that was predicted by Albert Einstein as a consequence of his theory of general relativity. The light source in the Einstein Cross is a quasar approximately ten billion light-years away, whereas the foreground lensing galaxy is ten times closer. The light from the quasar is bent in its path and magnified by the gravitational field of the lensing galaxy.

This magnification effect, known as "macrolensing", in which a galaxy plays the role of a cosmic magnifying glass or a natural telescope, proves very useful in astronomy as it allows us to observe distant objects that would otherwise be too faint to explore using currently available telescopes. "The combination of this natural magnification with the use of a big telescope provides us with the sharpest details ever obtained," explains Frédéric Courbin, leader of the programme studying the Einstein Cross with ESO's Very Large Telescope.

In addition to macrolensing by the galaxy, stars in the lensing galaxy act as secondary lenses to produce an additional magnification. This secondary magnification is based on the same principle as macrolensing, but on a smaller scale, and since stars are much smaller than galaxies, is known as "microlensing". As the stars are moving in the lensing galaxy, the microlensing magnification also changes with time. From Earth, the brightness of the quasar images (four in the case of the Einstein

Cross) flickers around a mean value, due to microlensing. The size of the area magnified by the moving stars is a few light-days, i.e., comparable in size to the quasar accretion disc.

The microlensing affects various emission regions of the disc in different ways, with smaller regions being more magnified. Because differently sized regions have different colours (or temperatures), the net effect of the microlensing is to produce colour variations in the quasar images, in addition to the brightness variations. By observing these variations in detail for several years, astronomers can measure how matter and energy are distributed about the supermassive black hole that lurks inside the quasar. Astronomers observed the Einstein Cross three times a month over a period of three years using ESO's Very Large Telescope (VLT), monitoring all the brightness and colour changes of the four images.

"Thanks to this unique dataset, we could show that the most energetic radiation is emitted in the central light-day away from the supermassive black hole and, more importantly, that the energy decreases with distance to the black hole almost exactly in the way predicted by theory," says Alexander Eigenbrod, who completed the analysis of the data.

The use of the macro- and microlensing, coupled with the giant eye of the VLT, enabled astronomers to probe regions on scales as small as a millionth of an arcsecond. This corresponds to the size of a one euro coin seen at a distance of five million kilometres, i.e., about 13 times the distance to the Moon! "This is 1000 times better than can be achieved using normal techniques with any existing telescope," adds Courbin.

Measuring the way the temperature is distributed around the central black hole is a unique achievement. Various theories exist for the formation and fuelling of quasars, each of which predicts a different profile. So far, no direct and model-independent observation has allowed scientists to validate or invalidate any of these existing theories, particularly for the central regions of the quasar. "

This is the first accurate and direct measurement of the size of a quasar accretion disc with wavelength (colour), independent of any model," concludes team member Georges Meylan.

Adapted from materials provided by ESO.

http://www.sciencedaily.com/releases/2008/12/081212122941.htm

Ecological Impact Of African Cities

A typical street view in downtown Nairobi, capital of Kenya. (Credit: iStockphoto/Peter Miller)

ScienceDaily (Dec. 13, 2008) — African cities are growing faster than anywhere else in the world. This is having a major impact, but few ecologists are studying the urban environment and effect of cities on rural areas. One of the most important ecological changes in Africa's history is being over-looked.

Joy Clancy from the University of Twente has reviewed the problem in the current issue of the African Journal of Ecology. She says "A hundred years ago 95% of the African population was rural, today 38% live in cities with about half the population expected to be urban by 2010." This rapid growth is resulting in huge changes in natural resource use, but the effects are highly controversial.

"Some environmentalists say that demand for fuel wood and charcoal from cities are causing deforestation, but in fact it is change in land use that is the main driver" continues Joy. "The real change is around cities – the 'peri-urban' areas – where woodlands are cleared for agriculture to feed the new centres of population." She points out "When this is added to the effect on water demand and waste disposal on aquatic ecosystems, then African cities can have an ecological footprint much larger than their actual extent."

But there is little research on the ecology of cities "Africa is famous for its wildlife and the ecology of places such as the Serengeti are familiar to people all over the world, but remarkably few ecologists are studying urban environments" says Jon Lovett, associate editor of the African Journal of Ecology. "Although we know a lot about lions and wildebeest, the real ecological challenges are in the cities and these are being ignored" he continues. "We need a massive shift in focus to tackle the most urgent environmental issues".

Joy S. Clancy (2008). Urban ecological footprints in Africa. African Journal of Ecology Vol. 46 Iss 4. DOI: 10.1111/j.1365-2028.2008.01041.x

Jon C. Lovett 2008. Urbanisation and over-population. African Journal of Ecology Vol 46 Iss 4. DOI: 10.1111/j.1365-2028.2008.01040.x

Journal references:

1. Clancy et al. **Urban ecological footprints in Africa**. *African Journal of Ecology*, 2008; 46 (4): 463 DOI: 10.1111/j.1365-2028.2008.01041.x
2. Jon C. Lovett et al. **Urbanisation and over-population**. *African Journal of Ecology*, Vol 46 Issue 4 DOI: 10.1111/j.1365-2028.2008.01040.x

Adapted from materials provided by Wiley - Blackwell, via AlphaGalileo.

http://www.sciencedaily.com/releases/2008/12/081202081457.htm

Computer Quantifies Carbon Sequestration Of Urban Trees

ScienceDaily (Dec. 13, 2008) — U.S. Forest Service scientists at the Center for Urban Forest Research are providing online software that can show users how much carbon dioxide an urban tree in California has sequestered in its lifetime and the past year.

The Tree Carbon Calculator is free and programmed in a Microsoft Excel spreadsheet that provides carbon-related information for a single tree in one of six California climate zones. It is the only tool approved by the California Climate Action Registry's Urban Forest Project Reporting Protocol for quantifying carbon dioxide sequestration from tree planting projects.

It can be found at the U.S. Forest Service Climate Change Resource Center Web site, http://www.fs.fed.us/ccrc/topics/urban-forests/

Users enter information such as a tree's climate zone, species name, size or age. The program then estimates how much carbon dioxide the tree has sequestered in the past year and its lifetime. It also calculates the dry weight of the biomass that would be obtained if it were removed.

Trees planted near buildings to cut heating and cooling costs require additional inputs because they also reduce the greenhouse gases power plants emit while generating electricity. The Tree Carbon Calculator automatically calculates power plant reductions using emission factors for local utilities.

"The Tree Carbon Calculator is easy to use and provides quantifiable incentives for tree planting and stewardship projects," said Greg McPherson, director of the Center for Urban Forest Research. "Anyone from homeowners to certified arborists can use it."

McPherson and his colleagues measured the size and growth of 5,000 trees in the six climate zones to determine how much carbon dioxide the trees sequestered and stored.

The scientists determined tree shade effects on building energy performance by conducting more than 12,000 simulations that examined combinations of tree sizes, building locations and architectural styles for each zone.

"Microclimates, building characteristics and other factors can vary greatly within the six climate zones," McPherson said. "But, this software demonstrates the feasibility of a tool that quantifies the effect of urban trees on building energy performance."

In 2009, the Center for Urban Forest Research will add data for tree species in climate zones across the nation, McPherson said.

Adapted from materials provided by US Forest Service, Pacific Southwest Research Station, via EurekAlert!, a service of AAAS.
http://www.sciencedaily.com/releases/2008/12/081209221748.htm

Secret Ingredient For The Health Of Tropical Rainforests Discovered

Dense tropical rainforest in Costa Rica. Scientists have found that most of the nitrogen that supports the rapid, lush growth of rainforests comes from tiny bacteria that can turn nitrogen in the air into fertilizer in the soil. (Credit: iStockphoto/Matt Tilghman)

ScienceDaily (Dec. 10, 2008) — A team of researchers led by Princeton University scientists has found for the first time that tropical rainforests, a vital part of the Earth's ecosystem, rely on the rare trace element molybdenum to capture the nitrogen fertilizer needed to support their wildly productive growth. Most of the nitrogen that supports the rapid, lush growth of rainforests comes from tiny bacteria that can turn nitrogen in the air into fertilizer in the soil.

Until now, scientists had thought that phosphorus was the key element supporting the prodigious expansion of rainforests, according to Lars Hedin, a professor of ecology and evolutionary biology at Princeton University who led the research. But an experiment testing the effects of various elements on test plots in lowland rainforests on the Gigante Peninsula in the Barro Colorado Nature Monument in Panama showed that areas treated with molybdenum withdrew more nitrogen from the atmosphere than other elements.

"We were surprised," said Hedin, who is also a professor in the Princeton Environmental Institute. "It's not what we were expecting."

The report is detailed in the Dec. 7 online edition of Nature Geoscience.

Molybdenum, the team found, is essential for controlling the biological conversion of nitrogen in the atmosphere into natural soil nitrogen fertilizer, which in turn spurs plant growth. "Just like trace amounts of vitamins are essential for human health, this exceedingly rare trace metal is indispensable for the vital function of tropical rainforests in the larger Earth system," Hedin said. Molybdenum is 10,000 times less abundant than phosphorus and other major nutrients in these ecosystems.

The discovery has implications for global climate change policy, the scientists said. Previously, researchers knew little about rainforests' capacity to absorb the greenhouse gas carbon dioxide. If molybdenum is central to the biochemical processes involved in the uptake of carbon dioxide, then there may be limits to how much carbon that tropical rainforests can absorb.

The biological enzyme, nitrogenase, which converts atmospheric nitrogen into soil fertilizer, feeds on molybdenum, the researchers found. "Nitrogenase without molybdenum is like a car engine without spark plugs," said Alexander Barron, the lead author on the paper, who was a graduate student in Hedin's laboratory and earned his Ph.D. in ecology and evolutionary biology from Princeton in 2007 and who now is working on climate legislation in Congress.

Other authors on the paper from Princeton include: Anne Kraepiel, an associate research scholar in the Department of Chemistry; Nina Wurzburger, a research associate in the Department of Ecology and Evolutionary Biology; and Jean Philippe Bellenger, an associate research scholar in the Princeton Environmental Institute. S. Joseph Wright, who earned his bachelor's degree in biology from Princeton in 1974 and now is a staff scientist at the Smithsonian Tropical Institute in Panama, is also a contributing author.

Molybdenum, a lustrous, silvery metal, is found in soil, rock and sea water and in a range of enzymes vital to human health. Traces of the element have been found in Japanese swords dating back to the 14th century. In modern times, its high strength, good electrical conductivity and anticorrosive properties have made molybdenum desirable as an element of rocket engines, radiation shields, light bulb filaments and circuit boards.

The research was conducted with support from the National Science Foundation, the Andrew W. Mellon Foundation, the Smithsonian Scholarly Studies program, the Smithsonian Tropical Research Institute student fellowship program and the Environmental Protection Agency student fellowship program.

Adapted from materials provided by Princeton University.

http://www.sciencedaily.com/releases/2008/12/081209125830.htm

Vitamin D Found To Fight Placental Infection

ScienceDaily (Dec. 10, 2008) — A team of UCLA researchers reports for the first time that vitamin D induces immune responses in placental tissues by stimulating production of the antimicrobial protein cathelicidin.

The study involved exposing cultured human trophoblast cells to the active form of vitamin D, leading to production of cathelicidin and an increased antibacterial response in the trophoblast cells.

The team, headed by Dr. Martin Hewison, suspects that the ability of the placenta to synthesize cathelicidin varies widely among women. Their discovery suggests that placental innate immunity can be enhanced if pregnant women supplement their diets with vitamin D.

Induction of cathelicidin production by vitamin D may help the placenta stave off infection by a variety of pathogenic organisms, including staphylococcus, streptococcus, and E. coli bacteria. Vitamin D may also enhance and sustain this bacterial killing by protecting placental trophoblast cells from infection-associated cell death.

The significance of vitamin D in human reproduction has been recognized for the past 20 years, although its exact role has not been completely understood. This study presents a new mechanism for activation of innate immune responses in the placenta to protect it from infectious bacteria and sheds new light on the possible role of vitamin D in pregnancy and pregnancy-associated infection.

This research was recently published in the journal Biology of Reproduction.

Adapted from materials provided by Society for the Study of Reproduction, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2008/12/081201162125.htm

Semantic Desktop Paves Way For Semantic Web

ScienceDaily (Dec. 10, 2008) — European researchers have developed innovative software to make finding information on your computer and sharing it with others considerably easier. In the process, they may have solved the chicken and egg problem that has held back development of the semantic web.

Annotating information with semantic data so that its meaning is understood by machines as well as humans has been heralded as the next evolution of the internet – giving more meaningful structure to the jumbled and disjointed results of web searches. However, the vision of the semantic web has largely failed to materialise because there is little incentive to create semantic content when there are few services that use it. And there are few services that use it because there is so little semantic content.

Rather than getting stuck in this vicious circle, the researchers behind the Nepomuk project sought to bring semantic information closer to the user, focusing not on how it could be used on the web but on how it can help people find and structure information on their personal computers and share it with others in a network. The result is what the Nepomuk team calls a 'social semantic desktop' and it could be the key stepping stone to realising the vision of the semantic web.

"In making data and connections between data easy to find and identify, the semantic desktop gives people a very personal motivation to start annotating their information. The next logical step is for that information to be shared, and you therefore have a starting point for the semantic web," explains Ansgar Bernardi, the coordinator of the EU-funded Nepomuk.

Giving meaning to information

Nepomuk's desktop solution offers plenty of incentives for people to get to grips with semantic information. By giving meaning to documents, contact details, pictures, videos and all manner of other data stored on a user's computer, regardless of file format, application or language, the semantic desktop makes it easier and faster to retrieve information and to identify connections between different information items.

"For example, I was taking notes at a summer school we recently held in Malta and I was writing the information into a wiki application on my computer. With Nepomuk installed, each time I mentioned a speaker's name I was given the opportunity to link to contact details and other data about that person I already had stored on the computer," Bernardi, a researcher at the German Research Centre for Artificial Intelligence (DFKI), explains.

The need to identify connections between a person and information and between different people was one of the key inspirations of the project.

"The idea of building a semantic desktop arose from the fact that one of our colleagues could not keep track of the girlfriends of his friends because they kept changing," Bernardi says. "Social networking sites such as Facebook only go half way towards solving the problem because they do not provide an actual assessment of relations between people based on all the information available to you and your interpretation of it… Much of that information is hidden on your computer in files, emails, contact books, pictures, in the names and structures of your folders. Nepomuk provides a more efficient way of managing that information."

When information is added, the Nepomuk software, which consists of independent applications and plug-ins for third-party programs, prompts users to annotate it so that it can be correctly situated in what Bernardi describes as their "personal information view of the world."

What's more, when the Nepomuk software is installed it crawls the user's computer in search of information and then begins to establish connections between different information items.

Users can decide what information to share with others by setting access permissions for individual information elements. Using a peer-to-peer architecture or a direct connection, the Nepomuk software then establishes semantic connections between data stored on different users' computers, creating a semantic network that is only one step away from the vision of the semantic web.

The benefits of the technology are being highlighted in four case studies.

At the Institut Pasteur in Paris, the software is being used to create an electronic lab book to help researchers document experiments in the bio-science laboratory and link references to the original sources.

At software developer SAP, it is being used as a task management solution, allowing developers to collectively organise their time.

At TMI group, it is being used to network the organisation's consultancies in different European countries, helping one consultant use the experiences of others to provide solutions for clients.

And at Mandriva, a project partner and distributor of the Linux open source operating system, the software is being used to power its knowledge base.

Open source interest and commercial applications

The Nepomuk project, which is due to end in December, has already elicited widespread interest from the open source development community. New applications and software plug-ins are being worked on by developers outside of the project consortium. These allow Nepomuk to function with third-party programs, such as the Firefox open source web browser and email readers, such as Thunderbird and Microsoft Outlook.

Nepomuk's semantic annotating and tagging system has been incorporated into the K Desktop Environment 4 (KDE) that is distributed with some versions of Linux, while a pure Java implementation, based on the Eclipse platform, is also published by the consortium.

One spin-off company from coordinating partner DFKI is in the process of being established, and Bernardi says others may follow.

In the meantime, the consortium plans to establish the Open Semantic Collaboration Architecture Foundation to support the Nepomuk results after the project ends. They are actively seeking industrial and academic partners to help in that goal, offering them, in exchange, the chance to participate in what could be the key software breakthrough that turns the semantic web from a vision into reality.

Nepomuk received funding from the ICT strand of the EU's Sixth Framework Programme for research.

Adapted from materials provided by ICT Results.

http://www.sciencedaily.com/releases/2008/12/081202081546.htm

Higher Rates Of Mental Illness Among The Homeless In Western Countries

ScienceDaily (Dec. 10, 2008) — Homeless people in Western countries have substantially higher rates of mental health problems than the general population, according to results from a systematic review and meta-analysis published in PLoS Medicine.

Searching for studies over the past four decades containing data on the prevalence of mental disorders in homeless people, Seena Fazel and colleagues of the University of Oxford identified 29 studies involving 5,684 homeless individuals based in the US, UK, mainland Europe, and Australia. Combining the data from the surveys, the researchers found that the prevalence of serious mental disorders was raised compared with expected rates in the general population.

The most common mental disorders appeared to be alcohol and drug abuse, with pooled prevalence estimates of 37.9% (95% CI 27.8%–48.0%) and 24.4% (95% CI 13.2%–35.6%), respectively. Furthermore, the rate of alcohol abuse has increased in recent decades. The prevalence estimates for psychosis were found to be as high as those for depression which contrasts with community estimates and other "at risk" populations such as prisoners and refugees, where depression is more common.

In an accompanying Perspective, Helen Herrman of the University of Melbourne, who was uninvolved with the research, discusses the implications of the findings for policy and planning. She notes that "The rate of mental disorders among homeless people is useful information for advocacy and for monitoring policy and practice change in a community."

Journal reference:

1. Fazel et al. **The Prevalence of Mental Disorders among the Homeless in Western Countries: Systematic Review and Meta-Regression Analysis**. *PLoS Medicine*, 2008; 5 (12): e225 DOI: 10.1371/journal.pmed.0050225

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

http://www.sciencedaily.com/releases/2008/12/081201233443.htm

Progression Of Retinal Disease Linked To Cell Starvation

ScienceDaily (Dec. 9, 2008) — Rods and cones coexist peacefully in healthy retinas. Both types of cells occupy the same layer of tissue and send signals when they detect light, which is the first step in vision. The incurable eye disease Retinitis Pigmentosa, however, reveals a codependent relationship between the two that can be destructive. When flawed rods begin to die, otherwise normal cones follow them to the grave, leading to blindness. A new study might explain why.Data published online in Nature Neuroscience Dec. 7 suggest the cones are starving to death. As rods disappear, the structure of the retina breaks down. This might disrupt the connections between the cones and their source of nutrients.

"This is the first study linking cone death in Retinitis Pigmentosa to a metabolic problem that suggests starvation," says senior author Constance Cepko, an HMS professor and investigator with Howard Hughes Medical Institute. "If we can find a way to supply nutrients to the cones, we might be able to preserve daylight vision in patients."Active in bright light, cones allow us to perceive color and fine details. Conversely, rods allow us to see in dim light. The untrained eye cannot distinguish between the two types of cells, which grow side-by-side. Both rods and cones have a protrusion that has many membranous discs, resembling a stack of cookies. A cone stack is half the height of a rod stack. Stacks emanating from both types of cells get clustered together, like Oreos on a plate. The entire plate gets covered in "plastic," with the flexible plastic reaching down to touch each stack. In the eye, this plastic consists of a giant retinal pigment (RPE) cell, which supplies nutrients to the rods and cones on its plate.

With this structure in mind, researchers have proposed a variety of hypotheses to explain the loss of cones in patients with mutations in rod-specific genes. For example, some teams have suggested that rods produce a chemical cones need to survive. But the data didn't quite fit the proposed models.Cekpo's team took a fresh approach to the problem. Postdoctoral researcher Claudio Punzo gathered four strains of mice, each with a different rod-specific mutation and a different rate of disease progression. He discovered an interesting pattern. Cone death always began after the major phase of rod death.

Punzo analyzed gene expression before and after this point in each strain. During the cone death phase, 230 genes were always expressed at higher levels. Sleuthing revealed that 34.9 percent of those play a role in cellular metabolism, including 12 genes in the insulin/mTOR pathway.

mTOR serves as a signaling hub, gathering information about the environment and helping the cell to decide whether it has enough nutrients to make new proteins. Punzo now had a lead. Further experiments suggested the cones weren't getting enough glucose. Not only did they express high levels of a protein that allows the cell to take up more glucose, but the cones survived longer when Punzo tricked them into thinking they had enough glucose by injecting the mice with insulin.

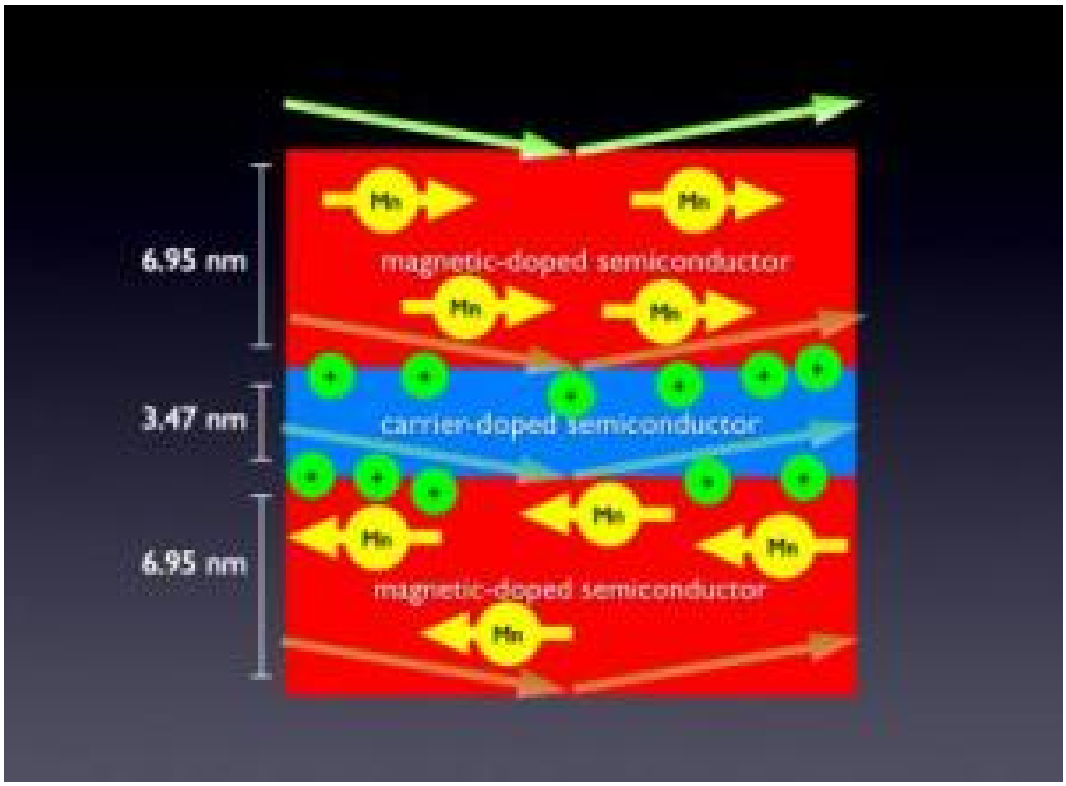
"Apparently, the cones caught onto our trick," says Punzo. "After surviving longer than usual, they started to die in droves."Cepko and Punzo say the new hypothesis makes sense. Rods outnumber cones by more than 20 to 1. The RPE cells sag when too many rods disappear, as the plastic over that plate of Oreo cookies droops when too many stacks are missing. The structural change likely disturbs the contacts between RPE cells and cones, impeding the flow of nutrients to the cones.

"This points us in a new direction," says Cepko. "We're currently exploring ways to boost nutrient levels in the cones. Perhaps someday we can help Retinitis Pigmentosa patients maintain their daylight vision for at least a bit longer than they otherwise would."This research is supported by the National Institutes of Health, the Macular Research Foundation, The Foundation for Retinal Research, Merck and the European Molecular Biology Organization.

Adapted from materials provided by Harvard Medical School, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2008/12/081207133721.htm

Neutron Researchers Discover Widely Sought Property In Magnetic Semiconductor



Researchers working at NIST have confirmed that thin magnetic layers (red) of a semiconductor separated by a nonmagnetic layer (blue) can exhibit a coveted phenomenon known as "antiferromagnetic coupling," in which manganese (Mn) atoms in successive magnetic layers spontaneously orient their magnetization in opposite directions. This discovery, made by scattering neutrons (arrows) from the material, raises the prospects of "spintronic logic circuits" that could both store and process data. (Credit: Brian Kirby, NIST)

ScienceDaily (Dec. 9, 2008) — Researchers working at the National Institute of Standards and Technology (NIST) have demonstrated for the first time the existence of a key magnetic—as opposed to electronic—property of specially built semiconductor devices. This discovery raises hopes for even smaller and faster gadgets that could result from magnetic data storage in a semiconductor material, which could then quickly process the data through built-in logic circuits controlled by electric fields.

Magnetic data storage is currently utilized with great success in consumer products such as computer hard drives and MP3 players. But these storage devices are based on metallic materials. These conventional hard drives can only hold data; they have to send the data to a semiconductor-based device to process the data, slowing down performance.

In a new paper,* researchers from NIST, Korea University and the University of Notre Dame have confirmed theorists' hopes that thin magnetic layers of semiconductor material could exhibit a prized property known as antiferromagnetic coupling—in which one layer spontaneously aligns its magnetic pole in the opposite direction as the next magnetic layer. The discovery of antiferromagnetic coupling in metals was the basis of the 2007 Nobel Prize in Physics, but it is only recently that it has become conceivable for semiconductor materials. Semiconductors with magnetic properties would not only be able to process data, but also store it.

The most widely studied magnetic semiconductor is gallium arsenide (GaAs) with magnetic atoms (manganese) taking the place of some of the gallium atoms. Theorists had predicted that by creating thin

films of this material separated by a nonmagnetic material of just the right thickness and electrical properties, one could engineer antiferromagnetic (AF) coupling. With magnetic fields, one could then switch the magnetization of one of the layers back and forth to create "spintronic" logic circuits, ones that operate not only under the usual control of electric fields but also the influence of magnetic fields (manipulating a property known as spin, which could be imagined as tiny internal bar magnets in particles such as electrons).

The team, working at the NIST Center for Neutron Research, studied these multilayer stacks using a technique known as polarized neutron reflectometry. In this technique, a beam of neutrons is bounced off the stacks. Since neutrons are magnetic, and are able to easily penetrate through the entire stack, the reflected neutrons provide information about the magnetic properties of the individual layers. At low temperatures and small magnetic fields, the polarized neutron data unambiguously confirm the existence of an antiparallel magnetic alignment of neighboring layers. When the magnetic field was increased, the neutron data indicated a parallel alignment of all layers.

These results demonstrate that AF coupling is achievable in GaMnAs-based multilayers, a seminal property that now opens up a multitude of device possibilities for this novel material. While the phenomenon only occurs at very cold temperatures in the material (about 30 K), the researchers believe these results will help inform theorists who could then better understand how to create room-temperature devices with the same magnetic properties.

Journal reference:

1. J.-H. Chung, S.J. Chung, S. Lee, B.J. Kirby, J.A. Borchers, Y.J. Cho, X.Liu and J.K. Furdyna. **Carrier-mediated antiferromagnetic interlayer exchange coupling in diluted magnetic semiconductor multilayers Ga1-xMnxAs/GaAs:Be**. *Physical Review Letters*, (in press)

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

http://www.sciencedaily.com/releases/2008/11/081125181041.htm

Why Do People Make 'A Mountain Out of a Molehill?' Aggression, Status And Sex

ScienceDaily (Dec. 9, 2008) — Have you ever wondered why it seems like the littlest things make people angry? Why a glance at the wrong person or a spilled glass of water can lead to a fist fight or worse? University of Minnesota researcher Vladas Griskevicius has three words to explain why people may be evolutionarily inclined to make a mountain out of molehill: aggression, status and sex.

Although hostility or belligerent acts might not immediately appear to be linked to reproduction, new research shows that mating goals may underlie behaviors such as aggression. Griskevicius, a marketing professor at the U of M's Carlson School of Management, and his co-authors, have found conclusive evidence that merely activating a desire for status can trigger aggression. Aggressive displays, which may result in enhanced status, indirectly boost an individual's ability to attract a mate and, thereby, reproduce.

"It all boils down to the fact that status for men typically equals sex. Across different cultures and time, the higher status men have, the more sex or better-quality partners they may have," said Griskevicius. "At the gene-level, nobody wants to go down in an evolutionary blaze of glory--no one wants their genes to become extinct. Additionally, unlike low-status women, low-status men are in serious danger of not reproducing, since they make especially undesirable mates."

"Think of it this way," said Griskevicius, "For men, fighting for status is akin to fighting for the survival of their genes. Not caring about status, which can be implied by backing away from a fight, can be evolutionary suicide. Aggression can lead to status. A higher status leads to sex, and that leads to more or higher-quality offspring."

The evolved pull of aggression was shown in a series of three studies. Results showed that if men have status or sex on their minds (e.g., they are thinking about a promotion at work or an attractive opposite-sex individual), they will more quickly respond aggressively to a trivial insult. The slight seems much more substantial when a man has sex or status on his mind. Men are especially likely to respond aggressively when there are other men around to watch the situation, suggesting that much of aggression is about display, rather than self-defense.

Statistics reinforce this idea; police reports show that "trivial altercations" is the leading reason for homicide. But Griskevicius warns that his work should not suggest that people are attracted to aggression. Rather, "it is all about status--the one who wins the game--he's the one that gets the girl. And at the end of the day, if those genes are passed on, the aggressor is the ultimate winner."

Journal reference:

1. . **Aggress to Impress: Hostility as an Evolved Context-Dependent Strategy**. *Journal of Personality and Social Psychology*, (in press)

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

http://www.sciencedaily.com/releases/2008/12/081208140156.htm

Key To 'Curing' Obesity May Lie In Worms That Destroy Their Own Fat

(Credit: NASA)

ScienceDaily (Dec. 9, 2008) — A previously unknown mutation discovered in a common roundworm holds the promise of new treatments for obesity in humans, McGill University researchers say. Their study was published Dec. 3 in the journal Nature.

In lean times, a normal Caenorhabditis elegans worm goes into a form of suspended animation called "dauer" that slows its metabolism and allows it to survive for extended periods without food.

"When they go into dauer, these worms radically alter their metabolism," said Dr. Richard Roy, a cancer researcher at McGill's Department of Biology specializing in the control of cell division. "They shut down everything energy-consuming, which includes foraging, cell division and reproduction."

Unlike other "hibernating" organisms, C. elegans maintains a degree of mobility during dauer by stocking up on energy in the form of fats – or lipids – which they store in special cells or reserves.

"This allows them to live up to six months without eating, instead of the two weeks they would otherwise have," Roy explained. A worm with the newly discovered mutation, however, will usually die within a week of going into dauer.

"These mutants somehow cannot shut down the process of cell division, which is why we noticed them in the first place," Roy said. "However, that's not what kills them. They cannot adjust their metabolism correctly. They store up their six-month lipid reserves, but as soon as they shift into dauer they use them up within a few days. This is because they lack an enzyme that blocks the activity of a very important triglyceride lipase. Without this regulation the lipase burns up all the fat it encounters and destroys the worm's energy reserves."

This discovery was a near-accidental by-product of Roy's regular line of research, searching for cells that abnormally disobey cellular signals in a cancer context, and he gives graduate student and study first author Patrick Narbonne much of the credit.

"Patrick was absolutely brilliant. He was so observant that he noticed these animals were dying way too early, and he also realized that they were not dying because of the cell-division issue."

Roy and Narbonne believe this discovery, which will require considerable additional research, may have significant long-term implications for human health.

"I think we should start looking at the enzymes involved in this cascade, particularly in obese individuals. They are likewise accumulating lipids, but in a reverse situation to C. elegans, this enzyme isn't recognizing it, or something is blocking its function. We're making the case that we can uncouple this enzyme from its normal regulation. If we could develop drugs to do that selectively in fatty tissue, we'd be able to chew up all the fat."

"This study fascinates me," said Dr. Robert Sladek, one of Canada's most prominent diabetes researchers, affiliated to the McGill Department of Human Genetics and the McGill and Genome Quebec Innovation Centre. "It will be exciting to see whether this pathway that controls energy storage and lifespan in worms plays a similar role in humans. The implications for patients with obesity and diabetes might be quite far-reaching."

This research was funded by the Canadian Cancer Society and the Canadian Institutes of Health Research.

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

http://www.sciencedaily.com/releases/2008/12/081208114335.htm

Key Event That Breaks Continents Apart Discovered

Purdue University graduate student Sarah D. Stamps and Tanzanian scientist Elifuraha Saria install a Global Positioning System instrument in the Natron area of Tanzania. The Ol Doinyo Lenga volcano is visible in the background. Global Positioning Systems were used by a Purdue-led team to capture the first dyking event ever recorded within the Earth's continental crust. (Credit: Photo courtesy of Eric Calais)

ScienceDaily (Dec. 11, 2008) — Researchers have captured for the first time a geological event considered key in shaping the Earth's landscape. An international research team led by Eric Calais, a Purdue University professor of geophysics, was able to measure ground displacements as two tectonic plates in Africa moved apart and molten rock pushed its way toward the surface during the first so-called "dyking event" ever recorded within the planet's continental crust.

The event left a wall of magma 6 miles long and 5 feet wide wedged between the two plates. A paper detailing the event will be published Dec. 11 in Nature.

Dyking events have been reported in the thin oceanic crust but had never been directly observed and quantified in the thicker areas of the planet's shell, Calais said.

"Such dyking events had been included in theories, but researchers had never before been in the right place at the right time with the right equipment to record them," Calais said. "The event was preceded by a slow slipping of the tectonic plates along a fault line. This also had not been seen before. Faults usually slip suddenly, which produces earthquakes, but this was a very seismically quiet course of events that lasted about one week."

The existence of these events provides a key element of how the Earth's rigid outer shell - the lithosphere - breaks apart and moves. The known forces pushing and pulling on continents are not powerful enough

to break them apart. However, repeated dyking events could weaken the lithosphere severalfold, allowing it to shift and break under far less force, Calais said.

"To break a continent apart, one needs to overcome the strength of the Earth's lithosphere," he said. "But when we calculate the forces available from plate tectonics, we find that they are not large enough to do the job. We know that continents break apart and have done so repeatedly in the geological past. So, how can it happen? One way is to add a little push to the system, and this is exactly what dyke intrusions do."

During a dyke intrusion, magma held in deep reservoirs breaks through surrounding rock and rises toward the surface, forcing the two plates apart, and, over time, weakening the lithosphere by transferring heat to the surrounding rocks. The magma fills and widens cracks and fractures as it rises. The end result is a vertical wall, or dyke, of magma that has pushed the Earth's crust apart, he said.

"Eventually, if these events occur over and over again for millions of years, an ocean will form between the two plates," he said. "So, today in Tanzania, we are really witnessing the earliest stages of ocean formation."

Calais and his collaborators captured this event in Tanzania's Lake Natron basin during the summer of 2007. The basin lies near the southern tip of the eastern branch of the East African Rift, the area where the Somalia and Nubia tectonic plates are moving apart.

Reports of a series of moderate earthquakes from northern Tanzania felt all the way to Nairobi in Kenya caught the team's attention. French collaborators had installed seismographs in the vicinity of the Natron basin a few months before the event and recorded more than 600 small earthquakes in two weeks, pinpointing the center of the tectonic activity. Tanzanian researchers were able to collect Global Positioning System (GPS) measurements in the Natron area. Calais compared these measurements with those taken earlier to determine the amount of displacement of the Earth's surface. But these displacements did not match what was expected from the earthquakes.

"The displacement was much too large given the small size of the earthquakes, which was the first lead that something unusual was happening," Calais said. "Soon after these earthquakes, one of the volcanoes in the area entered an explosive eruptive stage, which indicated that magma was involved. So we had an idea this might be a dyking event."

He then worked with colleagues in Luxembourg to obtain radar interferometry (InSAR) data, which provided a detailed picture of ground movements. A team of led by Belgium scientists went to the area for a field check and mapped 13 miles of open fissures that corresponded well with the observations from InSAR data.

"Once we had all of the measurements, in particular the InSAR data, we knew that the combined dataset could only be explained by the injection of a dyke," Calais said. "If we had only the GPS data and/or seismic activity data, this would have been difficult to prove. We needed all of these methods to really understand what was happening."

A dyking event is mostly an aseismic process, meaning it does not create large earthquakes or release a lot of ground-shaking energy. It would be easy to miss such an occurrence without some of the advanced geodetic measurement technology available today, he said.

"When you look at events like this with only one measurement tool, you are half blind," Calais said. "You are missing a lot of what the planet is telling us. Sometimes it whispers instead of shouting."

It is possible that there have been several dyking events on the East African Rift within the past few decades, he said.

"If there is evidence that these events have been happening within recent time, there is no reason not to believe that they have been happening for several million years," Calais said. "This could then be a very important contribution to the dynamics of the East African Rift system."

Co-authors of the paper include Nicolas d'Oreye and Anneleen Oyen from the National Museum of Natural History in Luxembourg; Julie Albaric, Jacques Déverchère and Julie Perrot from the University of Brest in France; Anne Deschamps from the National Center for Scientific Research in France; Damien Delvaux, Francois Kervyn, Benoit Smets and Christelle Wauthier from the Royal Museum for Central Africa in Belgium; Cynthia Ebinger from the University of Rochester; Richard W. Ferdinand from the University of Dar es Salaam in Tanzania; Athanas S. Macheyeki from the Renard Centre of Marine Geology in Belgium; Elifuraha Saria from Ardhi University in Tanzania; and D. Sarah Stamps from Purdue.

Calais and his collaborators next will watch the surrounding area for the aftermath of this dyking event.

"When a large event like this occurs, the state of stress on the Earth's upper layers are changed, and we expect several additional events to follow," Calais said. "Other magma reservoirs may be touched and trigger another dyking event. It will take a while for the system to relax again and get back to its quiet, steady-state, behavior."

His team also plans to examine the area in more detail to try to discover evidence of past dyking events. This information could illustrate any historical patterns in the incidences of these events and how regularly they occur.

"At stake is a better understanding of geohazards in East African countries, whose fragile economy may easily be disrupted even by seismic or volcanic events of moderate magnitude," Calais said.

The National Science Foundation funded this research.

Adapted from materials provided by Purdue University.

http://www.sciencedaily.com/releases/2008/12/081210090817.htm

Maintaining Brain's Wiring In Aging And Disease

ScienceDaily (Dec. 11, 2008) — Researchers at the Babraham Institute near Cambridge, supported by the Alzheimer's Research Trust and the Biotechnology and Biological Sciences Research Council (BBSRC), have discovered that the brain's circuitry survives longer than previously thought in diseases of ageing such as Alzheimer's disease.

Alzheimer's disease causes nerve cells in the brain to die, resulting in problems with memory, speech and understanding. Little is known about how the nerve cells die, but this new research has revealed how they first lose the ability to communicate with each other, before deteriorating further.

"We've all experienced how useless a computer is without broadband. The same is true for a nerve cell (neuron) in the brain whose wiring (axons and dendrites) has been lost or damaged," explained Dr Michael Coleman the project's lead researcher. "Once the routes of communication are permanently down, the neuron will never again contribute to learning and memory, because these 'wires' do not re-grow in the human brain."

But axons and dendrites are much more than inert fibre-optic wires. They are homes to the world's smallest transport tracks. Every one of our hundred billion nerve cells continuously shuttles hundreds of proteins and intracellular packages out along its axons and dendrites, and back again, during every minute of every day. Without this process, the wires cannot be maintained and the nervous system will cease to function within a few hours.

During healthy ageing this miniature transport system undergoes a steady decline, but the challenges are immense. Axons up a metre long have to survive and function for at least eight or nine decades. Over this period, our homes will need rewiring several times, but in our brains the wires are all original, surviving from childhood. In Alzheimer's disease, axons swell dramatically, ballooning to 10 or 20 times their normal diameter. These swellings disrupt transport but not, it seems, completely. Enough material gets through the swellings to keep more distant parts of the axon alive for at least several months, and probably for a year or more. This is important because it suggests a successful therapy applied during this early period may not only halt the symptoms, but allow a degree of functional recovery.

"We've been able to look at whole nerve cells affected by Alzheimer's", said Dr Michael Coleman. "For the first time we have shown that supporting parts of nerve cells are alive, and we can now learn how to intervene to recover connections. This is very important for treatment because in normal adult life, nerve cell connections constantly disappear and reform, but can only do so if the supporting parts of the cell remain. Our results suggest a time window in which damaged connections between brain cells could recover under the right conditions."

This basic research gives hope over the longer term to the 700,000 people in the UK who live with dementia. Understanding how the brain responds to disease also tells us a lot about how it functions in all of us.

Journal reference:

1. . **Severely dystrophic axons at amyloid plaques remain continuous and connected to viable cell bodies**. *Brain*, Dec 5, 2008

Adapted from materials provided by Biotechnology and Biological Sciences Research Council, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2008/12/081205113942.htm

Brand-name Drugs Do Not Appear Superior To Generic Drugs For Treating Cardiovascular Diseases

ScienceDaily (Dec. 11, 2008) — Contrary to the perception of some patients and physicians, there is no evidence that brand-name drugs are clinically superior to their generic counterparts, according to a new article, which examined studies comparing the effectiveness of generic vs. brand-name drugs for treating cardiovascular diseases.

"The problem of rising prescription drug costs has emerged as a critical policy issue, straining the budgets of patients and public/private insurers and directly contributing to adverse health outcomes by reducing adherence to important medications. The primary drivers of elevated drug costs are brand-name drugs, which are sold at high prices during a period of patent protection and market exclusivity after approval by the Food and Drug Administration (FDA)," the authors write. To control spending, many payers and clinicians have encouraged substitution of inexpensive bioequivalent generic versions of these drugs after the brand-name manufacturer's market exclusivity period ends.

Some patients and physicians have expressed concern that generic drugs may not be equivalent in their effectiveness. "Brand-name manufacturers have suggested that generic drugs may be less effective and safe than their brand-name counterparts. Anecdotes have appeared in the lay press raising doubts about the efficacy and safety of certain generic drugs," the authors note.

Aaron S. Kesselheim, M.D., J.D., M.P.H., of Brigham and Women's Hospital and Harvard Medical School, Boston, and colleagues assessed the clinical differences resulting from the use of generic medications or brand-name drugs used primarily to treat cardiovascular disease, which as a group make up the largest portion of outpatient prescription drug spending. The researchers conducted a meta-analysis on studies on this subject published from 1984 to August 2008, and to determine the expert opinion on the subject of generic substitution, also reviewed the content of editorials published during this time.

The researchers identified 47 articles for detailed analysis, covering nine different subclasses of cardiovascular drugs, of which 38 (81 percent) were randomized controlled trials (RCTs). Clinical equivalence was noted in 7 of 7 RCTs (100 percent) of beta-blockers, 10 of 11 RCTs (91 percent) of diuretics, 5 of 7 RCTs (71 percent) of calcium-channel blockers, 3 of 3 RCTs (100 percent) of antiplatelet agents, 2 of 2 RCTs (100 percent) of statins, 1 of 1 RCT (100 percent) of angiotensin-converting enzyme (ACE) inhibitors, and 1 of 1 RCT (100 percent) of alpha-blockers.

Among narrow therapeutic index drugs (NTI; drugs whose effective doses and toxic doses are separated by a small difference in plasma concentration), clinical equivalence was reported in 1 of 1 RCT (100 percent) of class 1 anti-arrhythmic agents and 5 of 5 RCTs (100 percent) of warfarin.

Forty-three editorials and commentaries were identified as meeting study criteria. Of these editorials, 23 (53 percent) expressed a negative view of the interchangeability of generic drugs compared with 12 (28 percent) that encouraged substitution of generic drugs (the remaining 8 did not reach a conclusion on interchangeability). Among editorials addressing NTI drugs specifically, 12 (67 percent) expressed a negative view while only 4 (22 percent) supported generic drug substitution.

"One explanation for this discordance between the data and editorial opinion is that commentaries may be more likely to highlight physicians' concerns based on anecdotal experience or other nonclinical trial settings. Another possible explanation is that the conclusions may be skewed by financial relationships of editorialists with brand-name pharmaceutical companies, which are not always disclosed. Approximately half of the trials in our sample (23/47, 49 percent), and nearly all of the editorials and commentaries, did not identify sources of funding," the researchers write.

The researchers also reported, "… we identified numerous studies that evaluated differences in clinical outcomes with generic and brand-name medications. Our results suggest that it is reasonable for

physicians and patients to rely on FDA bioequivalence rating as a proxy for clinical equivalence among a number of important cardiovascular drugs, even in higher-risk contexts such as the NTI drug warfarin. These findings also support the use of formulary designs aimed at stimulating appropriate generic drug use. To limit unfounded distrust of generic medications, popular media and scientific journals could choose to be more selective about publishing perspective pieces based on anecdotal evidence of diminished clinical efficacy or greater risk of adverse effects with generic medications. Such publications may enhance barriers to appropriate generic drug use that increase unnecessary spending without improving clinical outcomes."

Journal reference:

1. Aaron S. Kesselheim; Alexander S. Misono; Joy L. Lee; Margaret R. Stedman; M. Alan Brookhart; Niteesh K. Choudhry; William H. Shrank. **Clinical Equivalence of Generic and Brand-Name Drugs Used in Cardiovascular Disease: A Systematic Review and Meta-analysis**. *JAMA*, 2008;300(21):2514-2526 [link]

Adapted from materials provided by JAMA and Archives Journals.

http://www.sciencedaily.com/releases/2008/12/081202170811.htm

Sugar Can Be Addictive: Animal Studies Show Sugar Dependence

Sugar. Rats drank more alcohol than normal after their sugar supply was cut off, showing that the bingeing behavior had forged changes in brain function. (Credit: iStockphoto/Tobias Helbig)

ScienceDaily (Dec. 11, 2008) — A Princeton University scientist will present new evidence today demonstrating that sugar can be an addictive substance, wielding its power over the brains of lab animals in a manner similar to many drugs of abuse.

Professor Bart Hoebel and his team in the Department of Psychology and the Princeton Neuroscience Institute have been studying signs of sugar addiction in rats for years. Until now, the rats under study have met two of the three elements of addiction. They have demonstrated a behavioral pattern of increased intake and then showed signs of withdrawal. His current experiments captured craving and relapse to complete the picture.

"If bingeing on sugar is really a form of addiction, there should be long-lasting effects in the brains of sugar addicts," Hoebel said. "Craving and relapse are critical components of addiction, and we have been able to demonstrate these behaviors in sugar-bingeing rats in a number of ways."

At the annual meeting of the American College of Neuropsychopharmacology in Scottsdale, Ariz., Hoebel will report on profound behavioral changes in rats that, through experimental conditions, have been trained to become dependent on high doses of sugar.

"We have the first set of comprehensive studies showing the strong suggestion of sugar addiction in rats and a mechanism that might underlie it," Hoebel said. The findings eventually could have implications for the treatment of humans with eating disorders, he said.

Lab animals, in Hoebel's experiments, that were denied sugar for a prolonged period after learning to binge worked harder to get it when it was reintroduced to them. They consumed more sugar than they ever had before, suggesting craving and relapse behavior. Their motivation for sugar had grown. "In this case, abstinence makes the heart grow fonder," Hoebel said.

The rats drank more alcohol than normal after their sugar supply was cut off, showing that the bingeing behavior had forged changes in brain function. These functions served as "gateways" to other paths of destructive behavior, such as increased alcohol intake. And, after receiving a dose of amphetamine normally so minimal it has no effect, they became significantly hyperactive. The increased sensitivity to the psychostimulant is a long-lasting brain effect that can be a component of addiction, Hoebel said.

The data to be presented by Hoebel is contained in a research paper that has been submitted to The Journal of Nutrition. Visiting researchers Nicole Avena, who earned her Ph.D. from Princeton in 2006, and Pedro Rada from the University of Los Andes in Venezuela wrote the paper with Hoebel.

Hoebel has been interested in the brain mechanisms that control appetite and body weight since he was an undergraduate at Harvard University studying with the renowned behaviorist B.F. Skinner. On the Princeton faculty since 1963, he has pioneered studies into the mental rewards of eating. Over the past decade, Hoebel has led work that has now completed an animal model of sugar addiction.

Hoebel has shown that rats eating large amounts of sugar when hungry, a phenomenon he describes as sugar-bingeing, undergo neurochemical changes in the brain that appear to mimic those produced by substances of abuse, including cocaine, morphine and nicotine. Sugar induces behavioral changes, too. "In certain models, sugar-bingeing causes long-lasting effects in the brain and increases the inclination to take other drugs of abuse, such as alcohol," Hoebel said.

Hoebel and his team also have found that a chemical known as dopamine is released in a region of the brain known as the nucleus accumbens when hungry rats drink a sugar solution. This chemical signal is thought to trigger motivation and, eventually with repetition, addiction.

The researchers conducted the studies by restricting rats of their food while the rats slept and for four hours after waking. "It's a little bit like missing breakfast," Hoebel said. "As a result, they quickly eat some chow and drink a lot of sugar water." And, he added, "That's what is called binge eating -- when you eat a lot all at once -- in this case they are bingeing on a 10 percent sucrose solution, which is like a soft drink."Hungry rats that binge on sugar provoke a surge of dopamine in their brains. After a month, the structure of the brains of these rats adapts to increased dopamine levels, showing fewer of a certain type of dopamine receptor than they used to have and more opioid receptors. These dopamine and opioid systems are involved in motivation and reward, systems that control wanting and liking something. Similar changes also are seen in the brains of rats on cocaine and heroin.

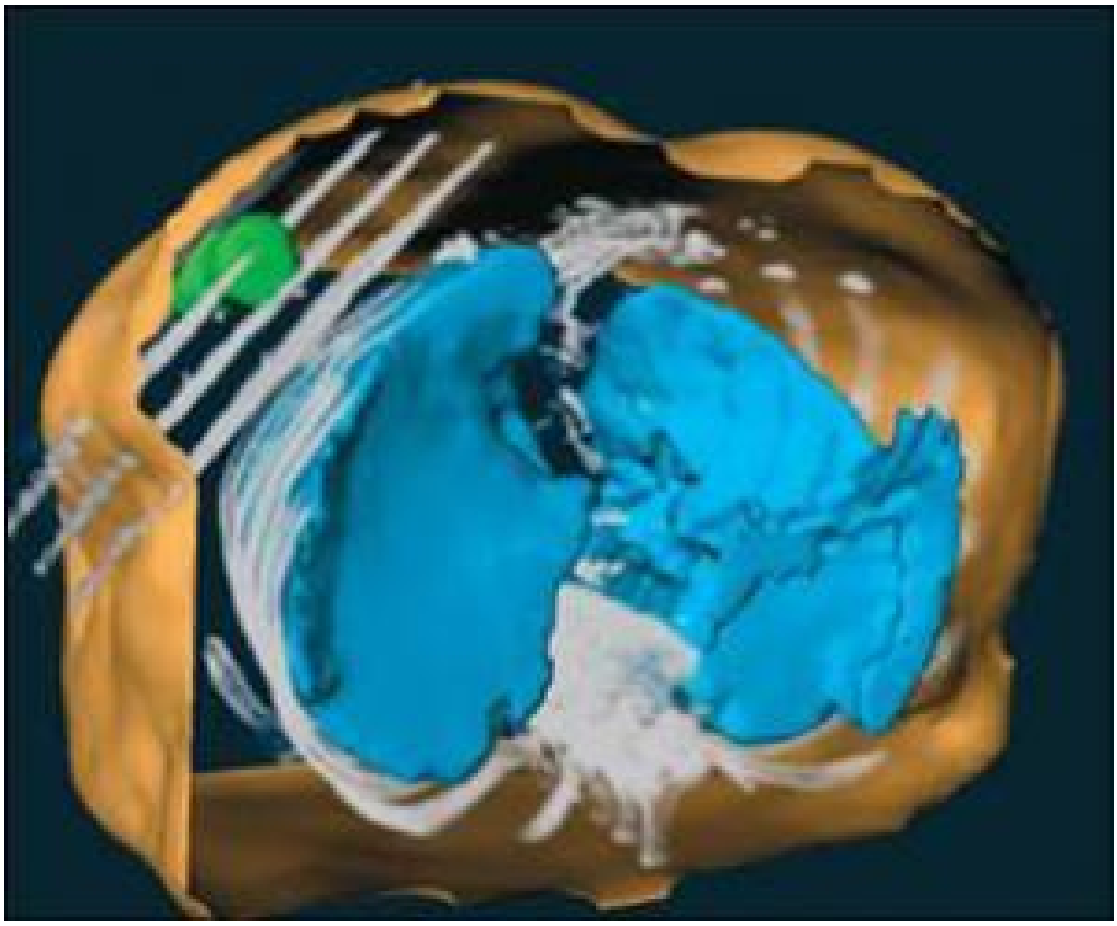
In experiments, the researchers have been able to induce signs of withdrawal in the lab animals by taking away their sugar supply. The rats' brain levels of dopamine dropped and, as a result, they exhibited anxiety as a sign of withdrawal. The rats' teeth chattered, and the creatures were unwilling to venture forth into the open arm of their maze, preferring to stay in a tunnel area. Normally rats like to explore their environment, but the rats in sugar withdrawal were too anxious to explore.The findings are exciting, Hoebel said, but more research is needed to understand the implications for people. The most obvious application for humans would be in the field of eating disorders.

"It seems possible that the brain adaptations and behavioral signs seen in rats may occur in some individuals with binge-eating disorder or bulimia," Hoebel said. "Our work provides links between the traditionally defined substance-use disorders, such as drug addiction, and the development of abnormal desires for natural substances. This knowledge might help us to devise new ways of diagnosing and treating addictions in people."

Adapted from materials provided by Princeton University.

http://www.sciencedaily.com/releases/2008/12/081210090819.htm

Breast Cancer Treatment Offers Better Outcome To Women With Implants



A CT image of an interstitial High Dose Rate (HDR) breast brachytherapy implant. (Credit: Image courtesy of Radiological Society of North America)

ScienceDaily (Dec. 11, 2008) — Women with early-stage breast cancer who have undergone breast augmentation may be treated successfully with a partial-breast radiation treatment called brachytherapy, according to a study presented today at the annual meeting of the Radiological Society of North America (RSNA). Patients treated with brachytherapy have better cosmetic outcomes and avoid the risk of the implant hardening, compared to patients who undergo whole-breast radiation therapy.

"We are seeing an increasing number of breast cancer patients with augmentation," said Robert R. Kuske Jr., M.D., clinical professor at the University of Arizona Health Sciences Center and radiation oncologist at Arizona Oncology Services in Scottsdale, Ariz. "By nature, these women are concerned about their appearance and we need to have options for them."

According to the American Society of Plastic Surgeons, breast augmentation is the most popular cosmetic surgery in the U.S. with 347,500 procedures performed in 2007. This represents an increase of 64 percent since 2000.

Approximately one in eight women who undergo breast augmentation will develop breast cancer at some point in their lives.

The most common breast cancer treatment for patients with breast implants is skin-sparing mastectomy and implant exchange. Whole-breast radiation therapy after lumpectomy is an option, but carries a

substantial risk during the healing process of scar tissue wrapping around the implant, causing it to become rock-hard and extremely painful. This condition, known as capsular contracture, also distorts the appearance of the breast.

Dr. Kuske set out to determine if partial-breast radiation with brachytherapy might offer a better outcome for women with implants wishing to avoid mastectomy.

Breast brachytherapy is a radiation treatment that can be given in higher doses to a small, targeted area of the breast after lumpectomy. Radioactive "seeds" are guided into place through small plastic tubes, or catheters, with the aid of imaging and a computer. The seeds emit high doses of radiation in short bursts.

Scar tissue is minimal, the implant remains unaffected and treatment time is shortened from 6 ½ weeks with whole-breast radiation therapy to five days with brachytherapy.

For the study, 65 women who were diagnosed with small, early stage malignant tumors were treated with brachytherapy after a lumpectomy. The women received two doses per day, separated by six hours, over a five-day period. Follow-up was six months to five years. None of the patients experienced tumor recurrence during the follow-up period. Cosmetic outcome was determined to be good to excellent in 100 percent of patients with 95 percent judged excellent. Implant hardening was not observed in any of the patients.

"Compared to traditional treatments, brachytherapy offers an excellent alternative for these women," Dr. Kuske said. "It offers very high rates of tumor control with fewer side effects and is easier on their lifestyle."

Adapted from materials provided by Radiological Society of North America.

http://www.sciencedaily.com/releases/2008/12/081201081911.htm

Asian Students Top Latest Global Math, Science Study

ScienceDaily (Dec. 11, 2008) — Students from Asian countries were top performers in math and science at both the fourth and eighth grade levels, according to the most recent reports of the Trends in International Mathematics and Science Study (TIMSS), released by the study's directors Michael O. Martin and Ina V.S. Mullis of Boston College.

In mathematics, at the fourth grade level, Hong Kong SAR and Singapore were the top performing countries, followed by Chinese Taipei and Japan. Kazakhstan, the Russian Federation, England, Latvia, and the Netherlands also performed very well. In mathematics achievement at the eighth grade, Chinese Taipei, Korea, and Singapore were followed by Hong Kong SAR and Japan. There was a substantial gap in average mathematics achievement between the five Asian countries and the next group of four similarly performing countries, including Hungary, England, the Russian Federation, and the United States.

In science, students from Singapore and Chinese Taipei were top performers at both grade levels. In science achievement at the fourth grade, Singapore was the top performing country, followed by Chinese Taipei and Hong Kong SAR. Japan, the Russian Federation, Latvia, England, the United States, Hungary, Italy, and Kazakhstan also performed very well. At the eighth grade in science, Singapore and Chinese Taipei again had the highest average achievement, followed by Japan and Korea. England, Hungary, the Czech Republic, Slovenia, Hong Kong SAR, and the Russian Federation also performed well. Countries and scores are listed below.

TIMSS is one of the world's most influential global assessments of student achievement in math and science. With more than 60 participants and 425,000 students assessed, TIMSS 2007 also is the largest study of student math and science achievement in the world. Each country sampled approximately 4,000 students in 150 schools.

The TIMSS 2007 report also provides data at the fourth and eighth grades for those countries that also participated in TIMSS 1995, 1999 and 2003.

"One of the great strengths of TIMSS is the ability to monitor progress in educational improvement over time," said TIMSS Directors Michael O. Martin and Ina V.S. Mullis of Boston College. "Such trend information is crucial in helping policy makers understand the impact of decisions about investment in education, curricular reform, and initiatives to improve instruction."

As with previous TIMSS reports, TIMSS 2007 data provide invaluable international benchmarks that can be used to help define world-class performance in mathematics and science at the middle or lower-secondary school level. Beyond comparisons in mathematics and science test scores, they said, the reports provide a wealth of information on educational policies and practices around the world, as well as on gender performance, home environment, curriculum and instructional approaches and teacher preparation in math and science.

About TIMSS

TIMSS, the Trends in International Mathematics and Science Study, is the largest assessment of international student achievement in the world and was the first to provide data about trends in math and science achievement over time.

TIMSS is a project of the International Association for the Evaluation of Educational Achievement (IEA) headquartered in Amsterdam, and is directed by the TIMSS & PIRLS International Study Center at Boston College in collaboration with a worldwide network of organizations and representatives from the participating countries.

TIMSS 2007 is the fourth in a continuing cycle of international mathematics and science assessments conducted every four years. TIMSS assesses achievement in countries around the world and collects a rich array of information about the educational contexts for learning mathematics and science.

The TIMSS 2007 report involved more than 60 participants: it contains science results for 37 countries and 7 benchmarking participants at the fourth grade and for 50 countries and 7 benchmarking participants at the eighth grade. Each country sampled approximately 4,000 students in 150 schools. Trend data are provided at the fourth and eighth grades for those countries that also participated in 1995, 1999, and 2003.

To inform educational policy in the participating countries, TIMSS also routinely collects extensive background information that addresses concerns about the quantity, quality and content of instruction. TIMSS 2007 offers detailed information about mathematics and science curriculum coverage and implementation, as well as teacher preparation, resource availability and the use of technology.

TIMSS 2007 Participants

Participating countries: Algeria, Armenia, Australia, Austria, Bahrain, Bosnia and Herzegovina, Botswana, Bulgaria, Chinese Taipei, Colombia, Cyprus, Czech Republic, Denmark, Egypt, El Salvador, England, Georgia, Germany, Ghana, Hong Kong, Hungary, Indonesia, Iran, Israel, Italy, Japan, Jordan, Kazakhstan, Korea, Republic of Kuwait, Latvia, Lebanon, Lithuania, Malaysia, Malta, Mongolia, Morocco, Netherlands, New Zealand, Norway, Oman, Palestinian National Authority, Qatar, Romania, Russian Federation, Saudi Arabia, Scotland, Serbia, Singapore, Slovak Republic, Slovenia, Sweden, Syrian Arab Republic, Thailand, Tunisia, Turkey, Ukraine, United States, Yemen. Benchmarking entities include the provinces of Alberta, British Columbia, Ontario and Quebec in Canada; Dubai (United Arab Emirates); Basque Country in Spain, and Massachusetts and Minnesota in the United States.

The full TIMSS 2007 reports are available on-line at timss.bc.edu TIMSS 2007 Data Exhibits Summarizing Principal Achievement Results (Trends in International Mathematics and Science Study)

Mathematics Achievement at the 4th Grade

Country Average Scale Score (TIMSS Scale Average 500)

1. Hong Kong SAR 607
2. Singapore 599
3. Chinese Taipei 576
4. Japan 568
5. Kazakhstan 549
6. Russian Federation 544
7. England 541
8. Latvia 537
9. Netherlands 535
10. Lithuania 530
11. United States 529
12. Germany 525
13. Denmark 523
14. Australia 516
15. Hungary 510
16. Italy 507
17. Austria 505
18. Sweden 503
19. Slovenia 502
20. Armenia 500
21. Slovak Republic 496

22. Scotland 494
23. New Zealand 492
24. Czech Republic 486
25. Norway 473
26. Ukraine 469
27. Georgia 438
28. Iran, Islamic Rep. of 402
29. Algeria 378
30. Colombia 355
31. Morocco 341
32. El Salvador 330
33. Tunisia 327
34. Kuwait 316
35. Qatar 296
36. Yemen 224
37. Benchmarking Participants
38. Massachusetts, US 572
39. Minnesota, US 554
40. Quebec, Canada 519
41. Ontario, Canada 512
42. Alberta, Canada 505
43. British Columbia, Canada 505
44. Dubai, UAE 444

Science Achievement at the 4th Grade

Country Average Scale Score (TIMSS Scale Average 500)

1. Singapore 587
2. Chinese Taipei 557
3. Hong Kong SAR 554
4. Japan 548
5. Russian Federation 546
6. Latvia 542
7. England 542
8. United States 539
9. Hungary 536
10. Italy 535
11. Kazakhstan 533
12. Germany 528
13. Australia 527
14. Slovak Republic 526
15. Austria 526
16. Sweden 525
17. Netherlands 523
18. Slovenia 518
19. Denmark 517
20. Czech Republic 515
21. Lithuania 514
22. New Zealand 504
23. Scotland 500
24. Armenia 484
25. Norway 477
26. Ukraine 474
27. Iran, Islamic Rep. of 436
28. Georgia 418

29. Colombia 400
30. El Salvador 390
31. Algeria 354
32. Kuwait 348
33. Tunisia 318
34. Morocco 297
35. Qatar 294
36. Yemen 197

Benchmarking Participants

1. Massachusetts, US 571
2. Minnesota, US 551
3. Alberta, Canada 543
4. British Columbia, Canada 537
5. Ontario, Canada 536
6. Quebec, Canada 517
7. Dubai, UAE 460

Mathematics Achievement at the 8th Grade

Country Average Scale Score (TIMSS Scale Average 500)

1. Chinese Taipei 598
2. Korea, Rep. of 597
3. Singapore 593
4. Hong Kong SAR 572
5. Japan 570
6. Hungary 517
7. England 513
8. Russian Federation 512
9. United States 508
10. Lithuania 506
11. Czech Republic 504
12. Slovenia 501
13. Armenia 499
14. Australia 496
15. Sweden 491
16. Malta 488
17. Scotland 487
18. Serbia 486
19. Italy 480
20. Malaysia 474
21. Norway 469
22. Cyprus 465
23. Bulgaria 464
24. Israel 463
25. Ukraine 462
26. Romania 461
27. Bosnia and Herzegovina 456
28. Lebanon 449
29. Thailand 441
30. Turkey 432
31. Jordan 427
32. Tunisia 420

33. Georgia 410
34. Iran, Islamic Rep. of 403
35. Bahrain 398
36. Indonesia 397
37. Syrian Arab Republic 395
38. Egypt 391
39. Algeria 387
40. Colombia 380
41. Oman 372
42. Palestinian Nat'l Auth. 367
43. Botswana 364
44. Kuwait 354
45. El Salvador 340
46. Saudi Arabia 329
47. Ghana 309
48. Qatar 307
49. Morocco 381

Benchmarking Participants

1. Massachusetts, US 547
2. Minnesota, US 532
3. Quebec, Canada 528
4. Ontario, Canada 517
5. British Columbia, Canada 509
6. Basque Country, Spain 499
7. Dubai, UAE 461

Science Achievement at the 8th Grade

Country Average Scale Score (TIMSS Scale Average 500)

1. Singapore 567
2. Chinese Taipei 561
3. Japan 554
4. Korea, Rep. of 553
5. England 542
6. Hungary 539
7. Czech Republic 539
8. Slovenia 538
9. Hong Kong SAR 530
10. Russian Federation 530
11. United States 520
12. Lithuania 519
13. Australia 515
14. Sweden 511
15. Scotland 496
16. Italy 495
17. Armenia 488
18. Norway 487
19. Ukraine 485
20. Jordan 482
21. Malaysia 471
22. Thailand 471
23. Serbia 470

24. Bulgaria 470
25. Israel 468
26. Bahrain 467
27. Bosnia and Herzegovina 466
28. Romania 462
29. Iran, Islamic Rep. of 459
30. Malta 457
31. Turkey 454
32. Syrian Arab Republic 452
33. Cyprus 452
34. Tunisia 445
35. Indonesia 427
36. Oman 423
37. Georgia 421
38. Kuwait 418
39. Colombia 417
40. Lebanon 414
41. Egypt 408
42. Algeria 408
43. Palestinian Nat'l Auth. 404
44. Saudi Arabia 403
45. El Salvador 387
46. Botswana 355
47. Qatar 319
48. Ghana 303
49. Morocco 402

Benchmarking Participants

1. Massachusetts, US 556
2. Minnesota, US 539
3. Ontario, Canada 526
4. British Columbia, Canada 526
5. Quebec, Canada 507
6. Basque Country, Spain 498
7. Dubai, UAE 489

Adapted from materials provided by Boston College.

http://www.sciencedaily.com/releases/2008/12/081210171906.htm

Breaking The Silence After A Study Ends

ScienceDaily (Dec. 11, 2008) — While an estimated 2.3 million people in the United States take part in clinical trials every year, there currently exists no formal requirement to inform them of study results, an oversight that leaves participants confused, frustrated, and, in some cases, lacking information that may be important to their health. Researchers at the University of Rochester Medical Center have proposed a novel and effective approach to disseminate the results of clinical trials to study volunteers.

Industry, government, and academic researchers are dependent upon the willing participation of millions of individuals to fill the estimated 50,000 clinical trials conducted every year that evaluate the safety and efficacy of experimental drugs and medical devices.

Researchers are only required to inform participants in instances when new information arises that may affect their willingness to continue participation. However, neither federal guidelines nor institutional review boards generally require disclosure of results at the conclusion of a study – even if the study is halted. Consequently, many research participants never learn the outcome of studies in which they volunteer.

"Individuals who volunteer to participate in clinical research frequently expose themselves to risks, both known and unknown," said neurologist Ray Dorsey, M.D., the report's author. "Because of their participation, they should be informed of the results of these studies in a timely and personalized manner."

In recent years, there have been several high-profile examples in which information has been either withheld from participants (and the public), participants were not directly informed of study results, or they learned about negative study results indirectly from other sources such as the media. Despite recent federal efforts to mandate communications in instances when the product is approved, researchers are still not required to disclose results in instances when the drug or device has been tested in patients but – because of unfavorable results – abandoned before it is submitted for regulatory approval.

The paper details efforts of researchers to communicate the results of a clinical trial for an experimental drug (ethyl-EPA) for Huntington's disease. The results of the study – which showed no significant difference between the group of patients who received the drug and those who received the placebo – were also published today in the Archives of Neurology. The research was sponsored by the drug's manufacturer, Amarin Neuroscience, and conducted by the Huntington Study Group, an international network of researchers based in Rochester. The 12-month study included 316 adults with Huntington's disease and was conducted at 41 sites in the U.S. and Canada.

Over the course of the trial, the scientists and the sponsor developed a communication plan to inform participants of the study results. The goal was to directly inform participants within 48 hours of the official release of study results; federal securities law requires companies to publicly disclose study results if they have a material financial impact.

The plan included a mix of electronic communication and personal outreach. Information on the results was posted to the study's website and emailed to members of the Huntington's disease community. Additionally, study coordinators called each of the participants directly. Rochester neurologist Ira Shoulson, M.D., the study's principal investigator, and the CEO of Amarin Neuroscience also held a conference call which was open to all study participants and investigators during which they summarized the study results and then fielded questions.

The researchers surveyed participants after the communication efforts and found that more than half (56%) learned of the results of the study within 48 hours of the initial public release in 2007 by the company – the vast majority (73%) via a telephone call from the study staff. Participants reported a high

level of satisfaction with the way results were communicated and had developed a strong understanding of the drugs benefits and risks.

"It is critical that we treat participants as partners in research," said Shoulson. "It is our hope that the commitment that the investigators and sponsor made to communicate the results of the clinical trial in a timely and personalized manner to research participants will set the standard for future clinical trials."

Journal reference:

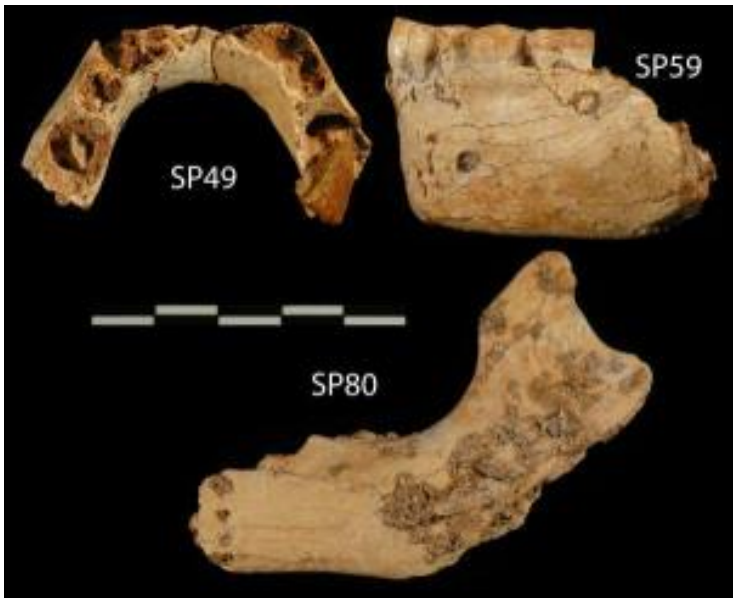
1. Dorsey et al. **Communicating Clinical Trial Results to Research Participants**. *Archives of Neurology*, 2008; 65 (12): 1590 DOI: 10.1001/archneurol.2008.503

Adapted from materials provided by University of Rochester Medical Center.

http://www.sciencedaily.com/releases/2008/12/081208180236.htm

The Last Neandertals? Late Neandertals And Modern Human Contact In Southeastern Iberia

Lower jaw of a Palomas fossil. (Credit: Erik Trinkaus)



ScienceDaily (Dec. 11, 2008) — It is widely accepted that Upper Paleolithic early modern humans spread westward across Europe about 42,000 years ago, variably displacing and absorbing Neandertal populations in the process. However, Middle Paleolithic assemblages persisted for another 8,000 years in Iberia, presumably made by Neandertals. It has been unclear whether these late Middle Paleolithic Iberian assemblages were made by Neandertals, and what the nature of those humans might have been.

New research, published Dec. 8 in the Proceedings of the National Academy of Sciences, is now shedding some light on what were probably the last Neandertals.

The research is based on a study of human fossils found during the past decade at the Sima de la Palomas, Murcia, Spain by Michael Walker, professor at Universidad de Murcia, and colleagues, and published by Michael Walker, Erik Trinkaus, professor of Anthropology at Washington University in St. Louis, and colleagues.

The human fossils from the upper levels of the Sima de las Palomas are anatomically clearly Neandertals, and they are now securely dated to 40,000 years ago. They therefore establish the late persistence of Neandertals in this southwestern cul-de-sac of Europe. This reinforces the conclusion that the Neandertals were not merely swept away by advancing modern humans. The behavioral differences between these human groups must have been more subtle than the Middle-to-Upper Paleolithic technological contrasts might imply.

In addition, the Palomas Neandertals variably exhibit a series of modern human features rare or absent in earlier Neandertals. Either they were evolving on their own towards the modern human pattern, or more likely, they had contact with early modern humans around the Pyrenees. If the latter, it implies that the persistence of the Middle Paleolithic in Iberia was a matter of choice, and not cultural retardation.

From the Sima de las Palomas, other late Neandertal sites, and recent discoveries of the earliest modern humans across Europe, a complex picture is emerging of shifting contact between behaviorally similar, if culturally and biologically different, human populations. Researchers are coming to see them all more as people, flexibly making a living through the changing human and natural landscapes of the Late Pleistocene.

Adapted from materials provided by Washington University in St. Louis, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2008/12/081209221750.htm

Lack Of Vitamin D Causes Weight Gain And Stunts Growth In Girls

ScienceDaily (Dec. 11, 2008) — Insufficient vitamin D can stunt growth and foster weight gain during puberty, according to a new study published in the Journal of Clinical Endocrinology & Metabolism. Even in sun-drenched California, where scientists from the McGill University Health Centre (MUHC) and the University of Southern California conducted their study, vitamin D deficiency was found to cause higher body mass and shorter stature in girls at the peak of their growing spurt.

While lack of vitamin D is common in adults and has been linked to diseases such as osteoporosis, cancer and obesity, until this study, little was known about the consequences of insufficient vitamin D in young people. The research team measured vitamin D in girls aged 16 to 22 using a simple blood test (25-hydroxy vitamin D). They also assessed body fat and height to determine how vitamin D deficiency could affect young women's health.

"The high prevalence of vitamin D insufficiency in young people living in a sun-rich area was surprising," says study lead author, Richard Kremer, co-director of the Musculoskeletal Axis of the MUHC. "We found young women with vitamin D insufficiency were significantly heavier, with a higher body mass index and increased abdominal fat, than young women with normal levels."

Vitamin D fosters growth, healthier weight

The researchers examined 90 Caucasian and Hispanic girls and discovered that young women with normal vitamin D levels were on average taller than peers deficient in vitamin D. Yet in contrast to what's been previously reported in older women, their investigation found no association between lack of vitamin D and bone strength.

"Although vitamin D is now frequently measured in older adults, due to a higher level of awareness in this population, it is rarely measured in young people – especially healthy adolescents," says Dr. Kremer.

"Clinicians need to identify vitamin D levels in younger adults who are at risk by using a simple and useful blood test," says the co-author, Dr. Vicente Gilsanz, head of musculoskeletal imaging at the Children's Hospital Los Angeles of the University of Southern California.

"Because lack of vitamin D can cause fat accumulation and increased risk for chronic disorders later in life, further investigation is needed to determine whether vitamin D supplements could have potential benefits in the healthy development of young people," added Dr. Gilsanz.

Journal reference:

1. Kremer et al. **Vitamin D Status and its Relationship to Body Fat, Final Height, and Peak Bone Mass in Young Women**. *Journal of Clinical Endocrinology & Metabolism*, 2008; DOI: 10.1210/jc.2008-1575

Adapted from materials provided by McGill University Health Centre.

http://www.sciencedaily.com/releases/2008/12/081210122238.htm

Fructose Metabolism More Complicated Than Was Thought

Chances are you consume quite a bit of fructose. Most Americans do --- in refined sugars such as sucrose or table sugar and in high-fructose corn syrup, used in products as diverse as soft drinks, protein bars, and fruit juice. (Credit: iStockphoto)

ScienceDaily (Dec. 11, 2008) — A new University of Illinois study suggests that we may pay a price for ingesting too much fructose. According to lead author Manabu Nakamura, dietary fructose affects a wide range of genes in the liver that had not previously been identified.

Chances are you consume quite a bit of fructose. Most Americans do—in refined sugars such as sucrose or table sugar (which is half fructose) and in high-fructose corn syrup, used in products as diverse as soft drinks, protein bars, and fruit juice.

But many scientists believe that high dietary fructose contributes to the development of metabolic syndrome, a group of risk factors that predict heart disease and Type 2 diabetes.

"For this reason, it's important for scientists to understand exactly how consuming high amounts of fructose affects human health," said Nakamura, a U of I associate professor of food science and human nutrition.

Nakamura's lab is continuing to study the metabolism of fructose with an eye to making recommendations about its dietary use.

His study shows that the metabolism of fructose is more complex than the data had indicated. "Our gene-expression analysis showed that both insulin-responsive and insulin-repressive genes are induced during this process. Our bodies can do this, but it's complicated, and we may pay a price for it," he said.

According to the scientist, most carbohydrates are handled fairly simply by our bodies. They are converted quickly to glucose and used for energy or stored as fat. "When we are eating, blood sugar--and insulin production--goes up. When we sleep or fast, it goes down," he said.

The process is not so simple with fructose, he noted. "In order for fructose to be metabolized, the body has to create both fasted and fed conditions. The liver is really busy when you eat a lot of fructose."

Because, unlike glucose, fructose metabolism occurs mainly in the liver, Nakamura wanted to gain a complete picture of gene expression in the liver during fructose metabolism.

In Nakamura's study, 24 rats were fed either a 63 percent glucose or fructose diet four hours a day for two weeks; at the end of this period, half the animals fasted for 24 hours before the scientists performed a gene expression analysis; the other half were examined at the end of a four-hour feeding.

Fructose feeding not only induced a broader range of genes than had previously been identified, there were simultaneous increases in glycogen (stored glucose) and triglycerides in the liver.

"To our surprise, a key regulatory enzyme involved in the breakdown of glucose was about two times higher in the fructose-fed group than in the glucose-fed group," Nakamura said.

The study also suggests that a protein called carbohydrate response element binding protein is responsible for the fructose effect on certain genes that trigger the production of fat, he said.

"We're continuing to assess the risk of fructose insulin resistance and the consequent risk for development of diabetes," he said.

Co-authors of the study, published in a recent issue of Biochimica et Biophysica Acta, are Hyun-Young Koo, Matthew A. Wallig, Takayuki Y. Nara, and B. H. Simon Cho of the University of Illinois and Byung Hong Chung of the University of Alabama at Birmingham.

Adapted from materials provided by University of Illinois at Urbana-Champaign.

http://www.sciencedaily.com/releases/2008/12/081209221742.htm

Transplanted Fat Cells Restore Function After Spinal Cord Injury

ScienceDaily (Dec. 11, 2008) — A new study suggests that mature adipocytes - fat cells - could become a source for cell replacement therapy to treat central nervous system disorders.

According to the study's lead researcher, Dr. Yuki Ohta of the Institute of Medical Science, St. Mariana University School of Medicine, Kawasaki, Japan, adipose-derived stem/stromal cells have in the past been shown to differentiate into neuronal cells in an in vitro setting. In their study, for the first time fat cells have been shown to successfully differentiate into neuronal cells in in vivo tests. The fat cells are grown under culture conditions that result in them becoming de-differentiated fat (DFAT) cells.

"These cells, called DFAT cells, are plentiful and can be easily obtained from adipose tissue without discomfort and represent autologous (same patient) tissue," said Ohta. "DFAT cells, with none of the features of adipocytes, do have the potential to differentiate into endothelial, neuronal or glial lineages."

The research team reported that DFAT cells expressed neurotrophic factors, such as BDNF and GDNF, prior to and after transplantation and which likely contributed to the promotion of functional recovery.

According to Ohta and colleagues, tests in animal models confirmed that the injected cells survived without the aid of immunosuppression drugs and that the DFAT-grafted animals showed significantly better motor function than controls.

"We concluded that DFAT-derived neurotrophic factors contributed to promotion of functional recovery after spinal cord injury (SCI)," said Ohta. "Transplanting DFAT cells into SCI rats significantly promoted the recovery of their hind limb function."

"These studies demonstrate the ability to obtain stem cells from a patient's own fat that can help repair injury to the spinal cord," said Paul R. Sanberg, PhD, DSc, at the University of South Florida Health, and Coeditor-in-chief of Cell Transplantation.

This study was published Cell Transplantation (Vol.17, No. 8.)

Adapted from materials provided by Cell Transplantation, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2008/12/081210122254.htm

Building World's Largest Neutrino Telescope At South Pole

Close-up of the two digital optical detectors in each IceTop tank as a tank is filled with water. The ice must be frozen perfectly with no bubbles or cracks. Such imperfections could obstruct the tiny flash that occurs when neutrino particles pass through the ice. (Credit: Image courtesy of University of Delaware)

ScienceDaily (Dec. 11, 2008) — It's 40 degrees F below zero (with the wind chill) at the South Pole today. Yet a research team from the University of Delaware is taking it all in stride.

The physicists, engineers and technicians from the University of Delaware's Bartol Research Institute are part of an international team working to build the world's largest neutrino telescope in the Antarctic ice, far beneath the continent's snow-covered surface.

Dubbed “IceCube,” the telescope will occupy a cubic kilometer of Antarctica when it is completed in 2011, opening super-sensitive new eyes into the heavens.

“IceCube will provide new information about some of the most violent and far-away astrophysical events in the cosmos,” says Thomas Gaisser, the Martin A. Pomerantz Chaired Professor of Physics and Astronomy at the University of Delaware, and one of the project's lead scientists.

The University of Delaware is among 33 institutions worldwide that are contributing to the National Science Foundation project, which is coordinated by the University of Wisconsin.

Besides taking a turn as “on-ice lead” for this year's IceCube construction effort at the South Pole (or simply “Pole,” as the locals call it), Gaisser is managing the University of Delaware's continued deployment of the telescope's surface array of detectors, known as "IceTop."

A huge telescope in the ice

Rather than a giant lens aimed at the heavens, the IceCube telescope consists of kilometer-long strings of 60 optical detectors frozen more than a mile deep in the Antarctic ice like beads on a necklace. Atop each string of deep detectors sits a pair of 600-gallon IceTop tanks, each containing two optical detectors.

Ironically, it takes about seven weeks for the water in the IceTop tanks to freeze perfectly, without bubbles or cracks, which could obstruct the tiny flash that occurs when particles pass through the ice.

Neutrinos are among the most fundamental constituents of matter. Because they have no electrical charge and interact only weakly, these particles can travel millions of miles through space.

Neutrinos can pass right through planets, and they can emerge from deep inside regions of intense radiation such as the accretion disk around a massive black hole.The surface IceTop detectors measure cascades of particles generated by high-energy cosmic rays showered down from above, while the detectors deep in the ice monitor neutrinos passing up through the planet from below.

When a flash of light is detected, the information is relayed to the nearby IceCube Lab, where the path of the particle can be reconstructed and scientists can trace where it came from, perhaps an exploding star or a black hole.For Gaisser, this great quest to capture neutrinos is a cosmic journey in more ways than one.

“All of my career at Bartol Research Institute at the University of Delaware has been to study high-energy particles from space,” Gaisser says. “This experiment we're building fulfills all of my dreams. Besides, it's fun to work here,” he notes.

Working in the deep freeze

A drill camp supports each season of the IceCube project in the 24-hour daylight of the Antarctic summer. Drilling is a 24/7 operation with three shifts of drillers.

In the subfreezing temperatures and howling winds, fuel tanks supply generators that make electricity, which is used to heat the water that pulses through the high-pressure hoses that melt the mile-and-a-half-long deep holes into which strings of optical detectors are submerged.

The IceTop team works six days a week from 8 a.m. to 6 p.m., retreating to the warmth of the new Amundsen-Scott South Pole Station, to sleep, eat, and spend what little free time they have reading, watching movies, exercising, or chatting with fellow “Polies.”Among the new facility's amenities are constant e-mail communication, a recreation room with enough musical instruments for a band, and a greenhouse where lettuce, cucumbers and tomatoes are grown.

Gaisser and senior electronics instrument specialist James Roth, electronics engineer Leonard Shulman, and physicist Paul Evenson will all work on location at the South Pole over the next several weeks, assisted by Hermann Kolanoski, a colleague who is a professor of physics at the Humboldt University in Berlin.

Ten other scientists and graduate students from the University of Delaware Department of Physics and Astronomy also are involved in the effort, from deployment to data analysis. They include David Seckel, John Clem, Chris Elliott, Shahid Hussain, Takao Kuwabara, Bakhtiyar Ruzybayev, Todor Stanev, Serap Tilav and Chen Xu.

Adapted from materials provided by University of Delaware.

http://www.sciencedaily.com/releases/2008/12/081209221746.htm

How The Brain Thinks About Crime And Punishment

Image of a brain from the Vanderbilt University fMRI scanner. (Credit: Image courtesy of Vanderbilt University)

ScienceDaily (Dec. 11, 2008) — In a pioneering, interdisciplinary study combining law and neuroscience, researchers at Vanderbilt University peered inside people's minds to watch how the brain thinks about crime and punishment.

When someone is accused of committing a crime, it is the responsibility of impartial third parties, generally jurors and judges, to determine if that person is guilty and, if so, how much he or she should be punished. But how does one's brain actually make these decisions? The researchers found that two distinct areas of the brain assess guilt and decide penalty.

This work is the joint effort of Owen Jones, professor of law and of biology, and René Marois, a neuroscientist and associate professor of psychology. Together with neuroscience graduate student Joshua Buckholtz, they scanned the brains of subjects with a highly sensitive technique called functional magnetic resonance imaging or fMRI. Their goal was to see how the brain was activated when a person judged whether or not someone should be punished for a harmful act and how severely the individual should be punished.

During the study, the participant inside the fMRI scanner read scenarios on a computer screen, each describing a person committing an arguably criminal act that varied in harmfulness. With every scenario that appeared, the participant determined how severely to punish the scenario's protagonist on a scale of 0 (no punishment) to nine (extreme punishment). Sometimes there were extenuating circumstances or background information about why the person acted as he did. Was he coerced? Did he feel threatened? Was he mentally ill?

"We were looking for brain activity reflecting how people reason about the differences in the scenarios," said Jones.

The researchers found that activity in an analytic part of the brain, known as the right dorsolateral prefrontal cortex, tracked the decision of whether or not a person deserved to be punished but, intriguingly, appeared relatively insensitive to deciding how much to punish. By contrast, the activity in brain regions involved in processing emotions, such as the amygdala, tracked how much subjects decided to punish.

"These results raise the possibility that emotional responses to criminal acts may represent a gauge for assessing deserved punishment," said Marois.

"There are long-running debates about the proper roles in law of 'cold' analysis and 'hot' emotion," said Jones. "Our results suggest that, in normal punishment decisions, the distinct neural circuitries of both processes may be jointly involved, but separately deployed."

Another intriguing result of the study was that the part of the brain that third-party subjects used to determine guilt in this study was the same brain area that has previously been found to be involved in punishing unfair economic behavior in two-party interactions.

"The convergence of findings between second-party and third-party punishment studies suggests that impartial legal decision-making may not be fundamentally different from the reasoning used in deciding to punish those who have harmed us personally," said Marois.

Journal reference:

1. . **The Neural Correlates of Third-Party Punishment**. *Neuron*, Dec. 11, 2008

Adapted from materials provided by Vanderbilt University.

http://www.sciencedaily.com/releases/2008/12/081210121912.htm

Are Men Hardwired To Overspend?

ScienceDaily (Dec. 11, 2008) — Bling, foreclosures, rising credit card debt, bank and auto bailouts, upside down mortgages and perhaps a mid-life crisis new Corvette—all symptoms of compulsive overspending.

University of Michigan researcher Daniel Kruger looks to evolution and mating for an explanation. He theorizes that men overspend to attract mates. It all boils down, as it has for hundreds of thousands of years, to making babies.

Kruger, an assistant research scientist in the School of Public Health, tested his hypothesis in a community sample of adults aged 18-45 and found that the degree of financial consumption was directly related to future mating intentions and past mating success for men but not for women.

Financial consumption was the only factor that predicted how many partners men wanted in the next five years and also predicted the number of partners they had in the previous five years, Kruger said. Being married made a difference in the frequency of one-time sexual partners in the last year, but not in the number of partners in the past or desired in the future.

The 25 percent of men with the most conservative financial strategies had an average of three partners in the past five years and desired an average of just one in the next five years. The 2 percent of men with the riskiest financial strategies had double those numbers.

"Men in the ancestral environment were valued if they were good providers. Now we have this new consumer culture, so basically we show our potential through the consumer goods that we purchase, rather than being a good hunter or providing protection," Kruger said.

"It gives an ultimate explanation for why we feel we have to keep up with the Joneses. Especially for guys, our position in the social hierarchy is based on our resources. Economic success has traditionally been good for men's reproductive success, so men have an incentive to show that they are doing well economically."

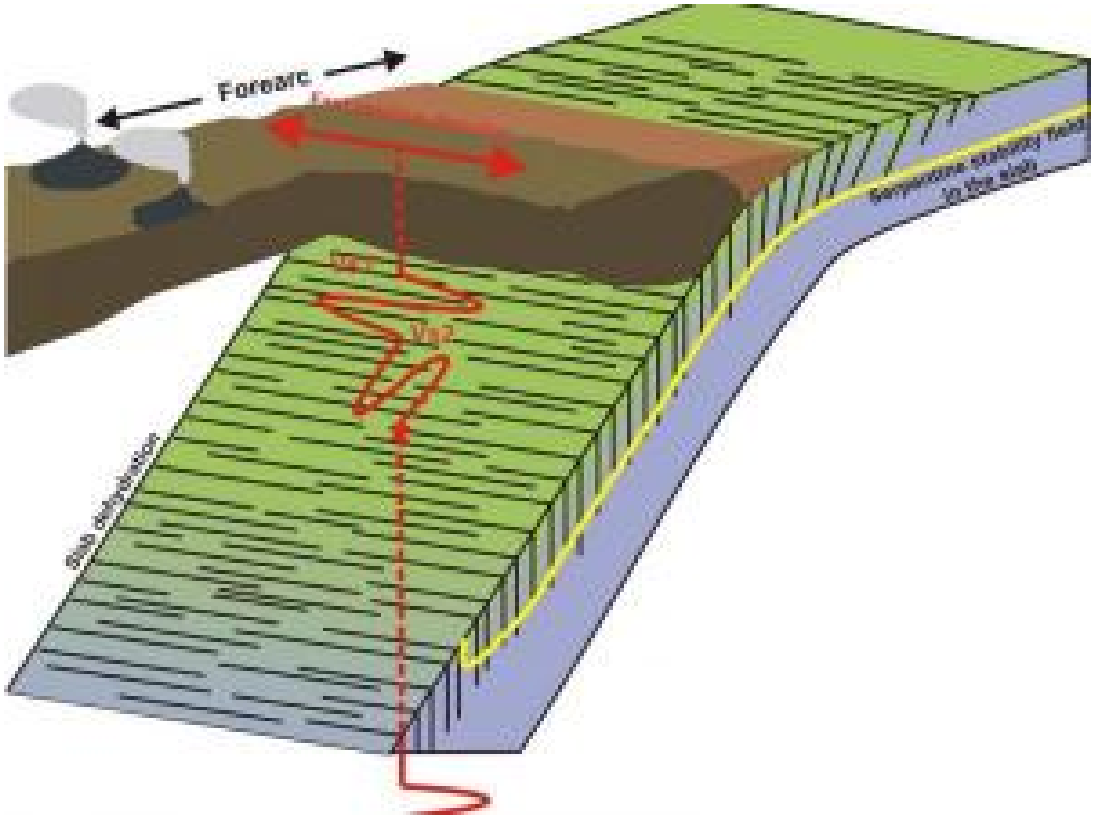
So where does the current economic downturn come into play?

"It is partially a result of our economic system and recent financial policies, but I really do think that our evolved mating strategies have an influence. Our competition for economic displays drives our consumer economy and culture of affluence," he said. "In terms of the current mortgage crisis, the findings suggest that one of the reasons why we overextend ourselves is that we're basically in a status race. We have expectations that spiral upward as people make more money and everyone wants to show that they are better than average."

http://www.sciencedaily.com/releases/2008/12/081208180514.htm#

Tracking Down Strange Seismic Waves

ScienceDaily (Dec. 11, 2008) — Seismic waves generated by earthquakes pass through the earth. Changes in their direction or velocity indicate variations in the materials through which they pass. ETH Zurich geophysicists have now been able to show in a model exactly what happens at zones where crustal plates subduct below one another.



As a rule, oceanic crust is subducted under the adjoining continent or under other oceanic crust at the major fault zones bordering and traversing the Pacific. Seismic waves generated by earthquakes and passing through the earth's interior provide information about the underground structure of such regions, and with few exceptions they run according to specific patterns. Accordingly, the waves pass through an anisotropic region by splitting up and propagating at right angles to one another in two different directions and at two different velocities. In subduction zones, the fast component of shear waves alignes normally parallel to the trench. This is usually interpreted as due to flow of the mantle parallel to the trench in the region below the slab. However, numerical models show that the flow is perpendicular to the slab.

Cause identified

In his doctoral dissertation, Manuele Faccenda from the Institute for Geophysics at ETH Zurich has now studied the reason why the faster of the two seismic waves propagates in the known directions. Together with Luigi Burlini and Taras Gerya, Senior Lecturers at ETH Zurich, and David Mainprice of the University of Montpellier, he has now published the results of the study today in the scientific journal "Nature".

Until now it was assumed that the cause of the splitting of the waves – the anisotropy – is situated in the earth's mantle, but satisfactory replication of this in models was unsuccessful. Therefore the scientists

have now included new aspects in their model. The study was based on seismic wave data already recorded. To this were added various parameters representing the conditions in the fault zone, e.g. the subduction angle and the age of the plates, their thickness and the orientation of the minerals to be expected in this crustal region. The expected water content of the minerals was also taken into account.

Hydrated plates as the decisive factor

In their model the researchers were now able to show that the source of the anisotropy lies in the subducting plate and not in the mantle. The computer simulation they developed reveals exactly what happens when an oceanic crustal plate subducts below a neighbouring plate. It is apparent that cracks form in it, depending on its age, depth, subduction angle and pressure. The minerals of the oceanic plate can be hydrated along these cracks by water penetrating down to a depth of 40 kilometres. This forms highly anisotropic platelet-shaped minerals aligned parallel to the cracks.

The seismic waves attain their highest velocity when they penetrate through these platelets longitudinally. In this case the fast seismic waves propagate parallel to the fault. The overall results of the study show that the orientation patterns of the seismic waves relative to the faults match the patterns observed around the Pacific well. The only case in which the researchers were unable to simulate the known pathway of the seismic waves by their model was for a quite young subduction zone in which the plate is still very flexible and subducts at only a gentle slope, and in which consequently scarcely any fractures and hydrated minerals occur. Faccenda explains that in this case probably the cause of the anisotropy really is to be found in the mantle.

Journal reference:

1. Faccenda M, Burlini L, Gerya & Mainprice D. **Fault-induced seismic anisotropy by hydration in subducting oceanic plates**. *Nature*, 2008; 455 (7216): 1097 DOI: 10.1038/nature07376

Adapted from materials provided by ETH Zurich. Original article written by Simone Ulmer.

http://www.sciencedaily.com/releases/2008/11/081129173952.htm#

More Than 2,000 Children Die Every Day From Unintentional Injury; At Least Half Could Be Saved

ScienceDaily (Dec. 11, 2008) — More than 2000 children die every day as a result of an unintentional, or accidental injury, and every year tens of millions more worldwide are taken to hospitals with injuries that often leave them with lifelong disabilities, according to a new report by the World Health Organization (WHO) and UNICEF.

The World Report on Child Injury Prevention provides the first comprehensive global assessment of childhood unintentional injuries and prescribes measures to prevent them. It concludes that if proven prevention measures were adopted everywhere at least 1000 children's lives could be saved every day.

"Child injuries are an important public health and development issue. In addition to the 830 000 deaths every year, millions of children suffer non-fatal injuries that often require long-term hospitalization and rehabilitation," said WHO Director-General Dr Margaret Chan. "The costs of such treatment can throw an entire family into poverty. Children in poorer families and communities are at increased risk of injury because they are less likely to benefit from prevention programmes and high quality health services."

"This report is the result of a collaboration of more than 180 experts from all regions of the world," said UNICEF Executive Director Ann M. Veneman. "It shows that unintentional injuries are the leading cause of childhood death after the age of nine years and that 95% of these child injuries occur in developing countries. More must be done to prevent such harm to children."

Africa has the highest rate overall for unintentional injury deaths. The report finds the rate is 10 times higher in Africa than in high-income countries in Europe and the Western Pacific such as Australia, the Netherlands, New Zealand, Sweden and the United Kingdom, which have the lowest rates of child injury.

However, the report finds that although many high-income countries have been able to reduce their child injury deaths by up to 50% over the past 30 years, the issue remains a problem for them, with unintentional injuries accounting for 40% of all child deaths in such countries.

The report finds that the top five causes of injury deaths are:

1. Road crashes: They kill 260 000 children a year and injure about 10 million. They are the leading cause of death among 10-19 year olds and a leading cause of child disability.
2. Drowning: It kills more than 175 000 children a year. Every year, up to 3 million children survive a drowning incident. Due to brain damage in some survivors, non-fatal drowning has the highest average lifetime health and economic impact of any injury type.
3. Burns: Fire-related burns kill nearly 96 000 children a year and the death rate is eleven times higher in low- and middle-income countries than in high-income countries.
4. Falls: Nearly 47 000 children fall to their deaths every year, but hundreds of thousands more sustain less serious injuries from a fall.
5. Poisoning: More than 45 000 children die each year from unintended poisoning.

"Improvements can be made in all countries," said Dr Etienne Krug, Director of WHO's Department of Violence and Injury Prevention and Disability. "When a child is left disfigured by a burn, paralysed by a fall, brain damaged by a near drowning or emotionally traumatized by any such serious incident, the effects can reverberate through the child's life. Each such tragedy is unnecessary. We have enough evidence about what works. A known set of prevention programmes should be implemented in all countries."

The report outlines the impact that proven prevention measures can have. These measures include laws on child-appropriate seatbelts and helmets; hot tap water temperature regulations; child-resistant closures on medicine bottles, lighters and household product containers; separate traffic lanes for motorcycles or

bicycles; draining unnecessary water from baths and buckets; redesigning nursery furniture, toys and playground equipment; and strengthening emergency medical care and rehabilitation services.

It also identifies approaches that either should be avoided or are not backed by sufficient evidence to recommend them. For example, it concludes that blister packaging for tablets may not be child resistant; that airbags in the front seat of a car could be harmful to children under 13 years; that butter, sugar, oil and other traditional remedies should not be used on burns and that public education campaigns on their own don't reduce rates of drowning.

Adapted from materials provided by World Health Organization.

http://www.sciencedaily.com/releases/2008/12/081210090825.htm

Panel Presses to Bolster Security in Cyberspace

By JOHN MARKOFF

SAN FRANCISCO — License plates may be coming to cyberspace.

A government and technology industry panel on cyber-security is recommending that the federal government end its reliance on passwords and enforce what the industry describes as "strong authentication."

Such an approach would probably mean that all government computer users would have to hold a device to gain access to a network computer or online service. The commission is also encouraging all nongovernmental commercial services use such a device.

"We need to move away from passwords," said Tom Kellermann, vice president for security awareness at Core Security Technologies and a member of the commission that created the report.

The report, which offers guidance to the Obama administration, is a strong indictment of government and private industry efforts to secure cyberspace to date. "The laissez-faire approach to cyber-security has failed," Mr. Kellermann said.

Restricting Internet access is one of a series of recommendations that a group of more than 60 government and business computer security specialists will make in a public presentation, "Securing Cyberspace in the 44th Presidency," on Monday.

The report has been prepared during the last 18 months under the auspices of the Center for Strategic and International Studies, a Washington policy group, after a number of break-ins into government computer systems.

"The damage from cyber attack is real," the report states. "Last year, the Departments of Defense, State, Homeland Security, and Commerce, NASA and the National Defense University all suffered major intrusions by unknown foreign entities."

The report describes a laundry list of serious break-ins ranging from the hacking of the secretary of Defense's unclassified e-mail to the loss of "terabytes" of data at the State Department.

The group recommends the creation of a White House cyber-security czar reporting to the president and the consolidation of the powers that have largely been held by the Homeland Security Department under the Bush administration. The report argues that cyber-security is one of the most significant national security threats and that it can no longer be relegated to information technology offices and chief information officers.

The commission included the top Democrat and Republican members of the House Homeland Security subcommittee that oversees cyber-security. The chairmen of the commission included Jim Langevin, a Democratic congressman from Rhode Island; and Michael McCaul, a Republican congressman from Texas.

Scott Charney, corporate vice president for trustworthy computing at Microsoft; and Harry D. Raduege Jr., a retired Air Force lieutenant general who is chairman of the Center for Network Innovation at Deloitte & Touche, were also on the commission.

The report calls for new laws and regulations governing cyberspace.

"We believe that cyberspace cannot be secured without regulation," the report said. The proposed regulations included new standards for critical infrastructure providers like the finance and energy industries, as well as new federal product acquisition rules to force more secure products.

The report does not entirely reject the work of the Bush administration. It cites the creation of the Comprehensive National Cybersecurity Initiative, adopted by the government as part of a presidential memorandum issued last January as a good starting point for remaking the nation's cyber-security strategy.

That effort has led to a commitment by the federal government to spend more than $30 billion in the next seven years to enhance computing security.

http://www.nytimes.com/2008/12/09/technology/09security.html?th&emc=th

The Lion of the Screen, and What Made Him Roar

By MICHIKO KAKUTANI

Turner Networks

SOMEBODY

The Reckless Life and Remarkable Career of Marlon Brando

By Stefan Kanfer

Illustrated. 350 pages. Alfred A. Knopf. $26.95.

He was famous for wearing a T-shirt and jeans decades before it became the default uniform of every Hollywood and Silicon Valley worker bee.

He mumbled a lot and was often silent when you expected him to talk, but there was a drama to those pauses and a raw, animal physicality to his every move. When he was young, his beauty was a magnet to women and men alike, but it was his willingness to expose his own tortured conflicts in his work — his vulnerability and anger, his naïveté and brooding melancholy — that made millions of strangers enshrine him as a symbol of a new, rebellious generation, sick of the correct poses and posturings of the past and committed to an unvarnished authenticity and emotional truth.

He was hailed as the "Byron from Brooklyn" (though he was from Nebraska, not New York), a "genius hunk," "the Valentino of the bop generation" and the essence of "the primitive modern male." John Huston said he was "like a furnace door opening" — so powerful was the heat he gave off. Eva Marie Saint said he had the ability "to see through you" and make you feel "like glass." Jack Nicholson said he had a gift that "was enormous and flawless, like Picasso": he "was the beginning and end of his own revolution." Of course, Marlon Brando was not the end of the revolution he brought to acting. Mr. Nicholson, along with James Dean, Paul Newman, Robert De Niro, Al Pacino, Sean Penn, Johnny Depp and Leonardo DiCaprio are all his heirs, and to watch the movies made before and after such iconic

Brando films as "A Streetcar Named Desire" and "On the Waterfront" is to see a paradigm shift from the heightened, stylized theatricality of old-time Hollywood to the immediate, intimate and gut-churning world of the Method.

After those totemic early movies, Brando would lose his way, making a series of poor career choices and increasingly giving in to his own demons of denial, self-indulgence and laziness. He reminded audiences of his galvanic power as an actor in "The Godfather" and "Last Tango in Paris," but he also made many bad movies, and he would fall prey to catty tabloid reporters and gossip mongers, who wanted to dwell on his weight, his emotional outbursts, his multiple marriages and troubled children instead of his achievements on the screen.

Stefan Kanfer's new biography of Brando, "Somebody," is an antidote of sorts to the unsavory and voyeuristic 1994 biography written by Peter Manso, who focused on the actor's personal difficulties — his eccentricities, his many affairs and his often capricious behavior — in voluminous and unseemly detail. Mr. Kanfer, who wrote an estimable biography of Groucho Marx in 2000, focuses here on Brando's work, and while the reader may wish that he'd devoted more space to pivotal films like "Streetcar," "Waterfront," "The Wild One" and "The Godfather" and less space to such forgettable ones as "Sayonara" and "The Ugly American," he does a solid job of describing Brando's preparation for various roles and evoking the often tortuous route such projects took on their way to the screen.

To prepare for the role of a paralyzed war veteran in "The Men," Mr. Kanfer tells us, Brando checked into the Birmingham Veterans Hospital near Los Angeles, "learned how to live in a wheelchair, wear heavy leg braces, rely only on his arms for movement," and he picked up from the patients there "a tough, ironic humor drained of lament and self pity."

To prepare for the title role in "Viva Zapata!" he traveled down to Sonora, Mexico, in the company of his pet raccoon, Russell, to observe peasant life for himself, talking with people who still remembered meeting that revolutionary.

And to prepare for the role of Vito Corleone in "The Godfather," he "got himself invited to the home of a well-placed Mafioso in New Jersey," where at a dinner for some 40 people, he took mental notes on the "exaggerated politesse" they showed to a stranger, the "manner in which powerful dons spoke in quiet voices; the way the men went out of their way to be gracious to their women, but also how they kept them in secondary roles."

Mr. Kanfer describes the tensions on "Guys and Dolls" that developed between Brando and Frank Sinatra, who played Nathan Detroit in that musical instead of the romantic lead, Sky Masterson, which he reportedly wanted and which went to Brando instead. Sinatra also seems to have resented the younger actor for nabbing the role of Terry Malloy in "Waterfront" away from him.

In another chapter Mr. Kanfer describes the antipathy between Brando and Sophia Loren on the set of "A Countess From Hong Kong," which got so bad that the movie's director, Charlie Chaplin, had to keep reminding them that it was a love story when they "each clasped the other as if embracing a werewolf."

Unlike Richard Schickel and Patricia Bosworth, who each wrote slim, illuminating books about Brando, Mr. Kanfer doesn't serve up any particularly new or original takes on the actor. His biography remains indebted to those earlier works, and even more heavily reliant on Brando's quirky but vivid 1994 memoir, "Songs My Mother Taught Me."

As Brando did in that volume, Mr. Kanfer emphasizes the debilitating fallout that the actor's childhood had on his emotional constitution and his difficulty in transcending that early damage. He suggests that the sense of abandonment the actor felt as a boy — his mother retreated into drink, his beloved nanny left him to get married — resulted in a fear of rejection, which frequently led him to pursue simultaneous affairs with multiple women.

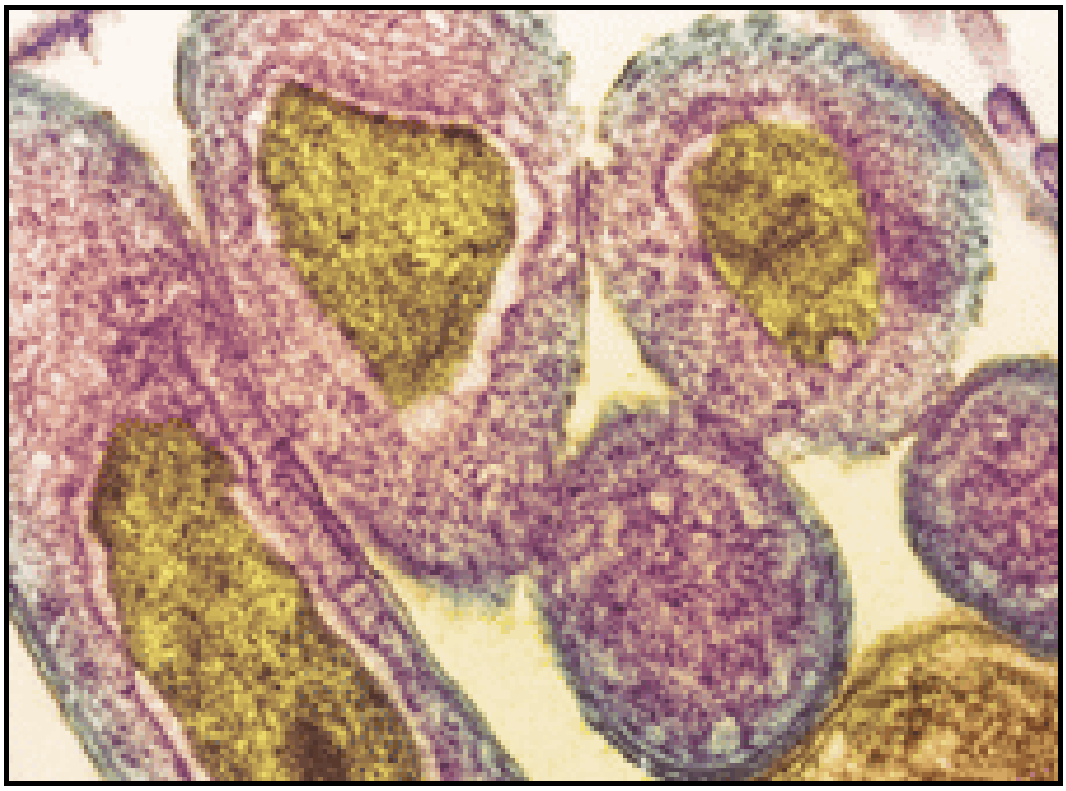
As for his father's continual put-downs, they left Brando with a defiant attitude toward authority figures (like directors) and a self-loathing that inhibited his ability to enjoy his early success and fostered a deep ambivalence about the vocation he would help transform.

In "Songs" Brando recalled how his emotional insecurity as a child gave him a reservoir of intense emotions to draw upon as an actor. "It also gave me a capacity to mimic," he wrote, "because when you are a child who is unwanted or unwelcome, and the essence of what you are seems to be unacceptable, you look for an identity that will be acceptable. Usually this identity is found in faces you are talking to. You make a habit of studying people, finding out the way they talk, the answers that they give and their points of view; then, in a form of self-defense, you reflect what's on their faces and how they act because most people like to see reflections of themselves."

If "you want something from an audience," he said on another occasion, "you give blood to their fantasies. It's the ultimate hustle."

http://www.nytimes.com/2008/12/09/books/09kaku.html?th&emc=th

Religious 'shun nanotechnology'



Nanotech particles can be small enough to get inside body tissues

Attitudes to nanotechnology may be determined by religious and cultural beliefs, suggest researchers writing in the journal Nature Nanotechnology.

They say religious people tend to view nanotechnology in a negative light.

The researchers compared attitudes in Europe and the US and looked at religious and cultural backgrounds.

They say the findings have implications for scientists and politicians making policy decisions to regulate the use of nanotechnology.

'Religiosity'

The researchers compared attitudes to nanotechnology in 12 European countries and the US.

They then rated each country on a scale of what they called "religiosity" - a measure of how religious each country was.

They found that countries where religious belief was strong, such as Ireland and Italy, tended to be the least accepting of nanotechnology, whereas those where religion was less significant such as Belgium or the Netherlands were more accepting of the technology.

Professor Dietram Scheufele from the Department of Life Sciences Communication at the University of Wisconsin, who led the research, said religious belief exerted a strong influence on how people viewed nanotechnology.

"Religion provides a perceptual filter, highly religious people look at information differently, it follows from the way religion provides guidance in people's everyday lives," he said.

The US was found to be the most religious country in the survey, and also the least accepting of nanotechnology.

Cultural beliefs

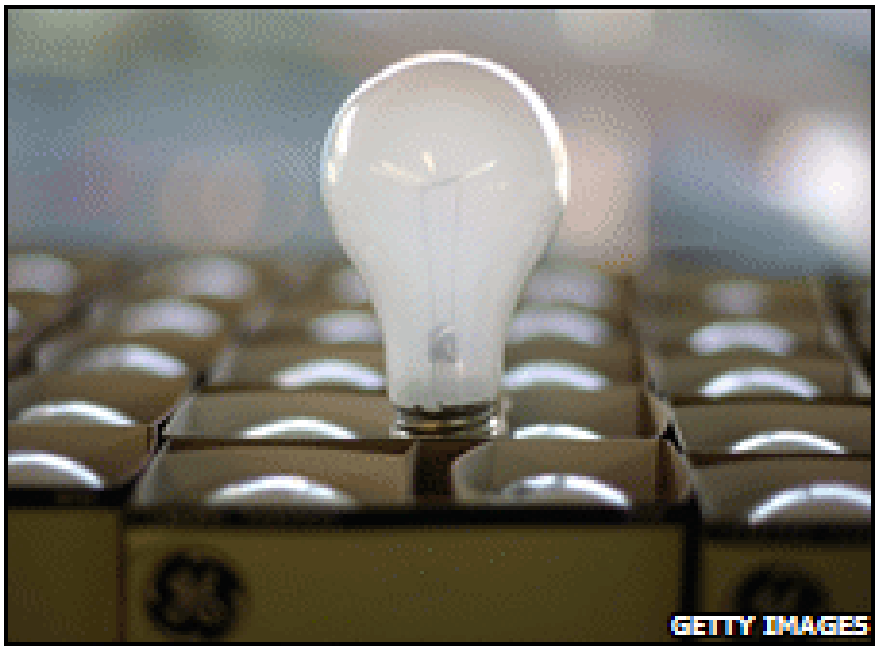
The researchers say it is understandable that there would be a conflict between religious belief and nanotechnology, especially when looking at what they call "nano-bio-info-cogno" (NBIC) technologies, the potential to create life at a nano scale without divine intervention.

"It's not that they're concerned about not understanding the science, more that talking openly about constructing life raises a whole host of moral issues," said Professor Scheufele.

"It is not a study about what religions or believers think about nanotechnology, but about the influence of religiosity on views of nanotechnology. Indeed what it measures as the national 'religiosity' of different countries seems odd compared with my experience of working with several of the countries on issues of religious belief and technology," said Dr Donald Bruce, a technology consultant.
"A second major concern is what is meant by the term 'nanotechnology'. It has been apparent for several years in public engagement with nanotechnologies that to ask the someone if 'nanotechnology is morally acceptable' is largely meaningless, because 'nano' can be as varied as the technology to which its innovations are applied."
A similar study in the US looked at attitudes to nanotechnology and wider cultural and political beliefs. People were asked about their views on a range of subjects, including risk from the internet, genetically modified food, nuclear power and mad cow disease.
Broadly, if they thought these were risky, they thought nanotechnology was too.
The researchers say their finding support the idea that underlying cultural beliefs have a stronger influence on opinions formed about nanotechnology than science based information about its potential and pitfalls.
Professor Scheufele says the findings have implications for policymakers trying to regulate nanotechnology.
"How do we regulate something where we have different moral ideas from the public?
"We need to get to grips with the idea that the exact same piece of information can have a different meaning to different people, its the age-old dilemma for science about what could be done versus what should be done."

http://news.bbc.co.uk/2/hi/science/nature/7767192.stm

EU wants end to old-style bulbs



Improvements to conventional bulbs reached a limit 50 years ago

A European Union report has recommended banning conventional incandescent light bulbs by 2012 to save energy and cut down on greenhouse gas emissions.

Most light bulbs sold in the EU are of the type developed by Thomas Edison in 1879.

But the report says the EU could save up to $12bn (£8bn) a year in energy bills by switching to low-energy bulbs.

The report needs the backing of the European parliament and all 27 member states to become law.

"It's very clear that this is a measure that will change the way that we consume energy," EU Energy Commissioner Andris Piebalgs told journalists.

Phase out

Once approved, the EU would phase out conventional bulbs between September 2009 and September 2012.

> **"European homes will keep the same quality of lighting, while saving energy, CO2 and money"**
>
> Andris Piebalgs
>
> EU Energy Commissioner

Consumers will choose between long-life fluorescent bulbs or halogen lamps.

The EU says the measure will save households up to 50 euros ($64, £43) a year and pump up to 10bn euros ($13bn) into the economy.

The new-style lamps carry energy savings of 25% to 75% compared to traditional incandescent bulbs, which are little changed since they were invented almost 130 years ago.

The report also says the switch will reduce carbon dioxide emissions by 12 million tonnes a year, and save energy equivalent to the consumption of 11 million European households.

Mr Piebalgs said that the phasing out had to be gradual so that "production facilities could adapt to the new lighting" and the quality of illumination could be ensured.

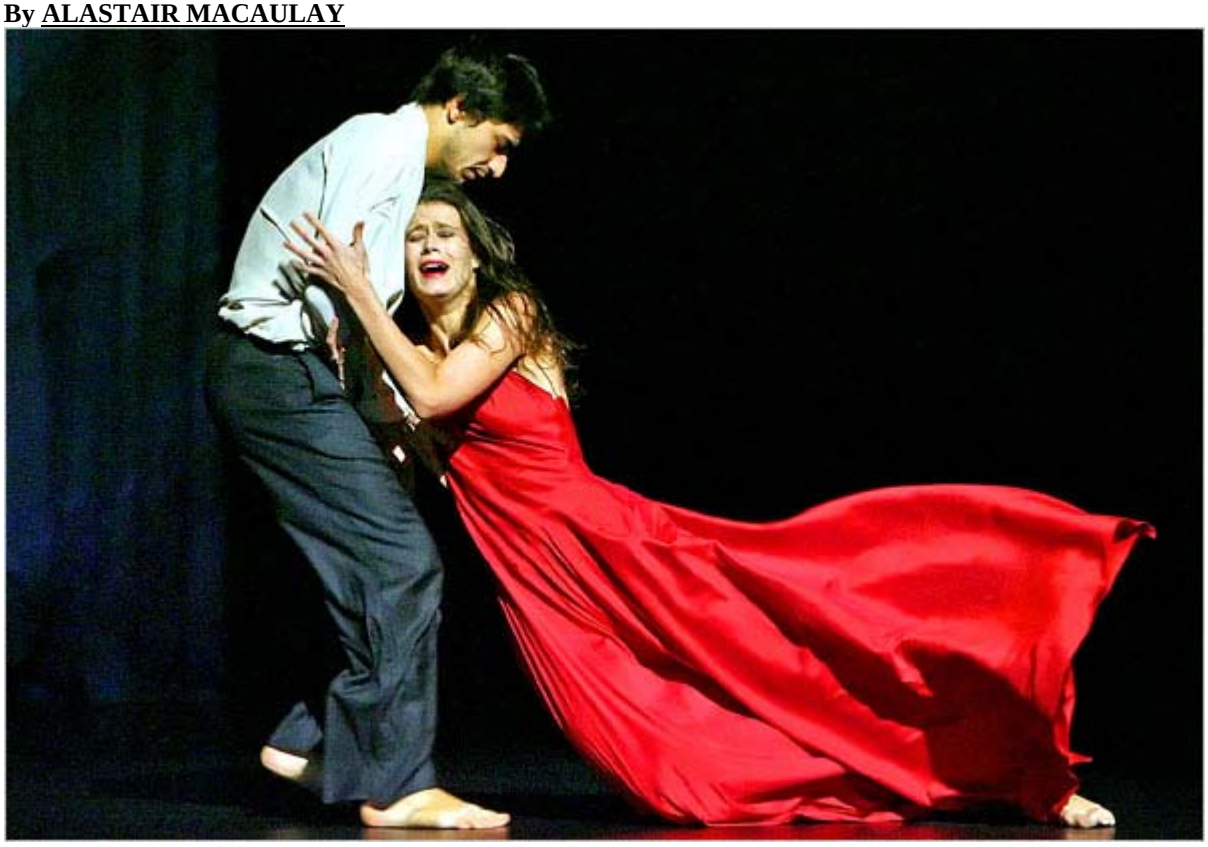
"European homes will keep the same quality of lighting, while saving energy, CO2 and money," he said.

Several nations including Australia, New Zealand, Canada and the Philippines have already announced they will phase out or restrict sales of traditional bulbs.

http://news.bbc.co.uk/2/hi/europe/7772412.stm

PINA BAUSCH
Glimpses of India, Eruptions of Chaos, Flashes of Choreography

By ALASTAIR MACAULAY



Pina Bausch's "Bamboo Blues" (currently at the Brooklyn Academy of Music) is, like most or all of her work, an incoherent dreamscape. Sometimes strikingly picturesque, always fluid in its comings and goings, it switches between episodes of sensual impulsiveness; coy, catwalklike audience-awareness; rushing scenes of harrowing need or anxiety; and diverse aspects of melancholia.

Even this much analysis is risky: Ms. Bausch, who has been a leading figure in world theater (not just dance) since the 1970s and is the director and choreographer of the Tanztheater Wuppertal in Germany, is the most deliberately vague of artists.

If you go with the flow of "Bamboo Blues" (2007), there are, as throughout the Bausch oeuvre, many memorable images along the way. A curtain hangs in folds along the back of the stage, gray or white, according to the light; the way dancers emerge from it or vanish into it is always striking. A man runs around the stage several times with a woman clinging to his back: she keeps emitting little yelps. While a male-female couple lie sensually on a bed that rolls on bamboo rods, elsewhere a woman lies on a man who, beneath her, rolls as if he were the bamboo.

A man rushes a woman in a hectic circuit around the stage that includes making her step on and over a stool so fast that she keeps starting (it seems) to injure herself. Women in long dresses, smiling at us, process in pairs across the stage, as if parading fashions, while tucking, folding and wrapping those dresses until they become loincloths; then men, wearing towels, do the same. Five men are standing together, as if breaking from work to talk, when a woman wearing an elephant's head joins them; they all carry on as if this were normal.

My selection of images is random; none seems more salient than another. But "Bamboo Blues" tries for a tighter structural coherence than most of Ms. Bausch's work. A two-act, 140-minute show, it even draws to a close, like an old-style musical, by quickly reprising its own greatest hits. Formal structure, however, is scarcely a Bausch virtue, even when, as on this occasion, she demonstrates a bit more of it than usual. Does its imagery in any way add up?

"Bamboo Blues" happens to have film and projections of scenery, dance and images from India (from jungle to Bollywood), as well as some use of Indian dress and references to Indian food. It employs a wide range of Indian music, and its choreography makes a few references to Indian dance, chiefly in arm gestures and footwork that occur in a meandering solo for Shantala Shivalingappa (an expert in the Kuchipudi style).

Yet all this is mere surface. "Bamboo Blues" should not be interpreted as a serious view of India. Ms. Bausch's works cohere only as dreamscapes (where incoherence is a large part of the point): "Bamboo Blues" feels like the dream of a European who has spent time in India but whose mind is mainly elsewhere. Most of the anxieties, melancholias, sensual vignettes and comic episodes here resemble those of most other works in the Tanztheater Wuppertal repertory.

Which is not to say that this is like every other Bausch work; or that all Bausch works are fundamentally alike. This one has much less to do with politics or man's ruin of the natural environment than, say, "Nelken" ("Carnations," 1982) and "Viktor" (1986). There is a fair quantity of men's violence to women, a standard feature of Bausch theater, but also a smattering of the reverse (two women tease a man by holding cigarette-lighter flames to the soles of his feet) and even of same-sex aggression (one man tries desperately to put on his trousers while two other men try to prevent him), something I don't recall seeing in the Bausch repertory before.

And "Bamboo Blues" is, by this artist's standards, relatively upbeat. Some of its happy moments are canceled by depictions of distress or need, but by no means all. It has several of the most detailed dance moments I have seen from Ms. Bausch; there is even some rhythmic footwork.

Critics differ wildly on Ms. Bausch. I'm inclined to think that if you sent psychoanalysts to interpret her dreamscapes, they would differ too. Perhaps the most interesting dichotomy of her work lies between its presentation of the intensely social self (in which her characters' artful awareness of an audience often makes them become bizarre or grotesque) and its images of the less affected but often more driven inner person.

You see a woman smiling wanly at the audience as she saunters across the stage; later you see her bending ardently this way and that in a quasi-expressionistic solo, her mane of hair thrashing more powerfully than her torso. You may be watching now ego, now id.

Yet even this division in Ms. Bausch's work doesn't actually get you very far. Although I try to follow "Bamboo Blues" as dreamscape, in truth I don't even believe in that aspect of it. It strikes me as toying coyly with India, with sincerity and with happiness.

"Bamboo Blues" runs through Dec. 20 at the BAM Howard Gilman Opera House, 30 Lafayette Avenue, at Ashland Place, Fort Greene, Brooklyn; (718) 636-4100, bam.org.

http://www.nytimes.com/2008/12/13/arts/dance/13baus.html?th&emc=th

Age-related Farsightedness May Affect More Than 1 Billion Worldwide

ScienceDaily (Dec. 12, 2008) — It is estimated that more than 1 billion individuals worldwide in 2005 had presbyopia, or age-related difficulty in seeing objects nearby, with an estimated 410 million with the condition unable to perform tasks requiring near vision, according to a new report.

Presbyopia occurs with age, as the eye's lens loses its elasticity and ability to focus on close objects, according to background information in the article. "Although known physiology and population demographics suggest that presbyopia is common or nearly universal in people older than 65 years, direct estimates of prevalence are rare," the authors write. "The total number of people with presbyopia is primarily of interest as a precursor to the figures of greatest public health interest: the number of people with impaired vision due to uncorrected or undercorrected presbyopia and the effect on their lives."

Brien A. Holden, Ph.D., D.Sc., of the University of New South Wales, Sydney, Australia, and colleagues analyzed multiple surveys to estimate the global prevalence of presbyopia, along with the rate at which the condition is corrected and the vision impairment caused when it is not. They then used the International Data Base of the U.S. Census Bureau to extrapolate estimates for the future.

Using projections from these surveys, the researchers estimate that 1.04 billion people globally had presbyopia in 2005, 517 million of whom had no eyeglasses or inadequate eyeglasses or spectacles. Most (386 million, or 94 percent) of the individuals whose daily tasks were impaired by uncorrected presbyopia lived in the developing world.

These estimates are based on the best available information, the authors note. "More epidemiological research in presbyopia is needed to decrease the assumptions and generalizations required for a better global estimate," the authors write. "As more data become available, an increasingly accurate picture of the burden of presbyopia will emerge."

The researchers predict that the worldwide prevalence of presbyopia will increase to 1.4 billion by 2020 and 1.8 billion by 2050. "Without intervention to make spectacles more accessible, the global number of individuals who will have a disability associated with uncorrected presbyopia is predicted to grow to 563 million people by 2020," the authors conclude. "If the goal of Vision 2020 to eliminate unnecessary blindness and impaired vision, in this case due to uncorrected refractive error, is to be achieved, planning will have to include the provision of human resources, affordable spectacles and systems of delivery for these half-billion people in need."

This work was supported by a public health grant from the Institute for Eye Research.

Journal reference:

1. Holden et al. **Global Vision Impairment Due to Uncorrected Presbyopia**. *Archives of Ophthalmology*, 2008; 126 (12): 1731 DOI: 10.1001/archopht.126.12.1731

Adapted from materials provided by JAMA and Archives Journals.

http://www.sciencedaily.com/releases/2008/12/081208180329.htm

Double Threat: Deadly Lung Disease Also Linked To Heart Attacks

ScienceDaily (Dec. 12, 2008) — Patients with idiopathic pulmonary fibrosis (IPF) are three times as likely to experience severe coronary events—including heart attacks—than people without the disease, according to a recent study that analyzed the risk of cardiovascular disease in nearly 1,000 patients with IPF and more than 3,500 matched controls."If you look at them over time, people with IPF have roughly a three-fold increased risk of acute coronary syndrome, which is a greater increase than you get from smoking," said Richard B. Hubbard, M.D., British Lung Foundation professor of epidemiology at the University of Nottingham and lead author of the study.

The study was published in the second issue for December of the American Thoracic Society's American Journal of Respiratory and Critical Care Medicine.Dr. Hubbard and colleagues analyzed data from the computerized records of the UK's Health Improvement Network for 920 patients with idiopathic pulmonary fibrosis and 3,593 control subjects without IPF for diagnoses of coronary events and disease incidence.

In addition to having a markedly increased risk of heart problems, patients with IPF were 23 percent more likely to have angina, had a 60 percent higher risk of stroke, and a three-fold increased risk of deep vein thrombosis, according to Dr. Hubbard.Notably, those with IPF were more than twice as likely as control subjects to have been prescribed amiodarone, a medication used for irregular heartbeats that has also been implicated as a cause of fibrotic lung disease.This research could have serious implications for the 60,000 people with IPF who currently live in the United States and the 21,000 people who receive this diagnosis for the first time each year. Median survival from the time of diagnosis is about three years, and there are currently no treatments that have been shown to increase survival.

Unfortunately, medical knowledge about IPF is limited. "We know that genetic factors play some role in IPF because it clusters in families in about 10 percent of cases— and in a similar number of people there is evidence that environmental factors, such as exposure to metal dust at work and cigarette smoking may have a role," said Dr. Hubbard. "[But] studies from the U.S.A. and the U.K. suggest that IPF is becoming more common, and the reasons for this are unclear.""Future investigations are required to better understand the relationship between IPF and systemic vascular disease as well as the mechanisms shared by the two syndromes," wrote David Zisman, M.D., and Steven Kawut, M.D., in an editorial in the same issue of the journal. "[I]f a causal association were confirmed… the presence of IPF itself could constitute a sufficiently potent risk factor for coronary artery disease such that more aggressive goals in risk factor modification would be warranted."

Such a mysterious disease as IPF raises a host of questions, but the most pressing ones are about how to improve and extend the lives of its victims."People with IPF have got a very bad outlook, and we may need to focus on other aspects of their health. The current guidelines are focused on palliative care so that people get oxygen and their symptoms treated, but maybe patients should go on heart prevention treatments right away," Dr. Hubbard said. "Future strategies could include a trial of anti-coagulant therapy in IPF patients," he added.

John Heffner, M.D., past president of the ATS, commented that this study introduces a change in our thinking of IPF. "As with other chronic, progressive respiratory disorders, the lungs in IPF may be the bellwether of other more systemic pathogenic events. What is first expressed in the lung becomes manifest later in other organ systems. This perspective will both realign research efforts and also direct more comprehensive healthcare to patients diagnosed with early IPF."

Adapted from materials provided by American Thoracic Society, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2008/12/081205094500.htm

Mystery Of Gravity Fingers Mathematically Explained

ScienceDaily (Dec. 12, 2008) — Researchers at MIT recently found an elegant solution to a sticky scientific problem in basic fluid mechanics: why water doesn't soak into soil at an even rate, but instead forms what look like fingers of fluid flowing downward.Scientists call these rivulets "gravity fingers," and the explanation for their formation has to do with the surface tension where the water—or any liquid—meets the soil (or other medium). Knowing how to account for this phenomenon mathematically will have wide-ranging impact on science problems and engineering applications, including the recovery of oil from reservoirs and the sequestration of carbon underground.

The solution reported in the Dec. 12 issue of Physical Review Letters involves borrowing a mathematical phrase, if you will, from the mathematical description of a similar problem, a solution both simple and elegant that had escaped the notice of many researchers in earlier attempts to describe the phenomenon.Co-authors Luis Cueto-Felgueroso and Ruben Juanes of the MIT Department of Civil and Environmental Engineering discovered the solution while studying the larger question of how water displaces oil in underground reservoirs. (Petroleum engineers commonly flush oil reservoirs with water to enhance oil recovery.)"Our paper addresses a long-standing issue in soil physics," said Cueto-Felgueroso. "Lab experiments of water infiltration into homogeneous, dry soil, repeatedly show the presence of preferential flow in the form of fingers. Yet, after several decades, the scientific community has been unable to capture this phenomenon using mathematical models."

"This was the type of problem that required someone from a different research discipline to take a look at it and come up with the solution," said Juanes, the ARCO Assistant Professor in Energy Studies. "Luis applied his expertise to a fluid mechanics problem in another medium—porous media flows—and quickly figured out the solution."Cueto-Felgueroso, a post-doctoral associate who has previously worked primarily on airflow fluid mechanics problems, had a Eureka! moment when he realized that gravity fingers in soil (or clay or sand) look very similar to water flowing down a window pane, a fairly well-understood phenomenon. He and Juanes then pulled the mathematical explanation (think of it as a phrase of words or music) from the equation describing water on a window, and included that mathematical phrase in the equation describing liquid moving downward through soil.

After rigorous comparison of data produced by the new mathematical model with observed phenomena, the two realized they'd found the solution, a solution described by one scientist reviewing the paper in Physical Review Letters as "simple and elegant" and a "major breakthrough" in the field.The Cueto-Felgueroso and Juanes solution also describes one aspect of the water-flowing-down-a-windowpane phenomenon that previously was not understood by scientists, who actually refer to this as "the flow of thin films": why water builds up at the tips of the fingers. Again, the answer has to with the surface tension. Before the water can flow down the film, it must build up enough energy to overcome the tension holding it in place.So what was missing from earlier models of water moving downward through soil that made it appear to move as a steady, horizontal front, rather than in finger-like paths—even when the soil was homogenous in particle size and shape?

The missing mathematical phrase describes the surface tension of the entire finger of water, which may be several centimeters in width, as opposed to the tension existing at the micron-scale of pores between soil particles.And that phrase will sound like music to the ears of physicists and engineers.

Adapted from materials provided by Massachusetts Institute of Technology, Department of Civil and Environmental Engineering, via EurekAlert!, a service of AAAS

http://www.sciencedaily.com/releases/2008/12/081211141934.htm

Keeping The Weight Off: Which Obesity Treatment Is Most Successful?

ScienceDaily (Dec. 12, 2008) — Severely obese patients who have lost significant amounts of weight by changing their diet and exercise habits may be as successful in keeping the weight off long-term as those individuals who lost weight after bariatric surgery, according to a new study published online by the International Journal of Obesity.

While weight loss and maintenance were comparable between the two treatments, patients who relied on non-surgical methods had to work harder over a longer duration to maintain their weight losses, say researchers from The Miriam Hospital's Centers for Behavioral and Preventive Medicine.

"Our findings suggest that its possible to maintain large weight losses through intensive behavioral efforts, such as changing your approach to eating and exercise, regardless of whether you lost weight with bariatric surgery or through non-surgical methods," says lead author Dale Bond, PhD, of The Miriam Hospital's Centers for Behavioral and Preventive Medicine. "Behavioral modifications and lifestyle changes are critical components to long-term weight loss maintenance."

Researchers matched each surgical patient with two non-surgical patients through the National Weight Control Registry. All participants – 315 total – lost an average of 124 lbs and had maintained their weight loss for an average of 5.5 years at the beginning of this two-year study.

Individuals were surveyed at both the start of the study and at the one-year follow-up about weight-maintenance behaviors (including food records and physical activity levels) and various psychological factors (such as dietary restraint, feelings of hunger and food cravings, stress and depression). Weight-related information was collected at both the one- and two-year follow-up.

There were no significant differences in the caloric intake or the amount of weight regain between the surgical and non-surgical groups; both regained an average of about four lbs. each year. However, researchers identified behavioral differences between the two groups, with bariatric patients reporting greater fat and fast food consumption, less conscious control over their eating and higher incidences of depression and more stress than non-surgical patients.

Similar differences were observed with physical activity behaviors. Only one-third of the surgical group reported engaging in a level of physical activity consistent with recommendations for preventing weight regain compared with 60 percent of the non-surgical group.

The researchers note that susceptibility to cues that trigger impulsive overeating was the only behavior associated with a greater risk of weight regain in both groups.

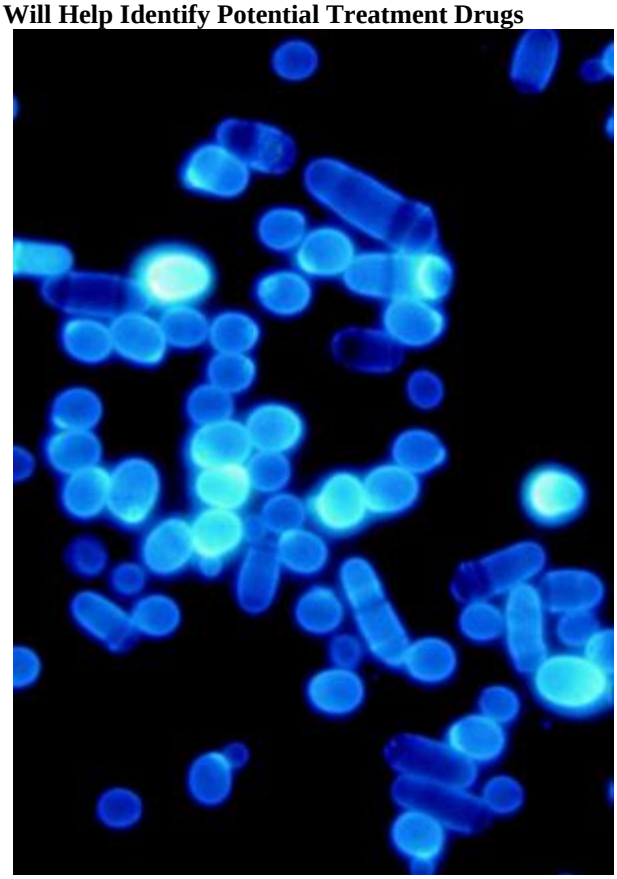
"These findings underscore the need for eating and activity interventions focused on bariatric surgery patients," says Bond, who is also a research fellow in psychiatry (weight control) at the Warren Alpert Medical School of Brown University. "Future research should focus on ways to increase and maintain physical activity and better monitor psychological parameters in bariatric surgery patients to facilitate optimal long-term weight control."

The study was supported by a grant from the National Institutes of Health. Co-authors include Rena Wing, PhD, and Tricia Leahey, PhD., both of The Miriam Hospital and Alpert Medical School; Suzanne Phelan, PhD of California Polytechnic State University-San Luis Obispo, and James Hill, PhD, of the University of Colorado at Denver and Health Sciences Center.

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

http://www.sciencedaily.com/releases/2008/12/081208123257.htm

Alzheimer's Disease Screening Breakthrough Will Help Identify Potential Treatment Drugs



Yeast species like these could be used to develop a rapid screening process for identifying compounds which inhibit Alzheimer's disease. (Credit: CSIRO)

ScienceDaily (Dec. 12, 2008) — CSIRO scientists have developed a new system to screen for compounds that can inhibit one of the processes that takes place during the progression of Alzheimer's disease. Certain yeast species could be used to develop this rapid screening process. Folate has been shown to be beneficial in the screening system.

Lead author, CSIRO's Dr Ian Macreadie says folate is already well known to have a protective effect against Alzheimer's disease which is believed to be caused by the loss of neurons in the brain due to a process whereby toxic multimers of a small protein called Aβ are formed.

"However, a team of scientists working within CSIRO's Preventative Health Flagship has discovered a rapid screening system to identify inhibitors of this process. Compounds that inhibit the formation of the toxic multimers may lead to the prevention or delay of the disease," Dr Macreadie says.

"The yeast trial we developed could lead to the discovery of new agents which may prove useful in preventing or delaying the onset of Alzheimer's disease,"

Dr Macreadie says. "Although many other research groups and drug companies around the world are trying to find compounds that act in the same way, the advance by the Flagship team involves using live yeast with the Aβ protein fused to a green fluorescent protein that comes from jellyfish.

"The significance of this development is that the yeast trial we developed could lead to the discovery of new agents which may prove useful in preventing or delaying the onset of Alzheimer's disease."

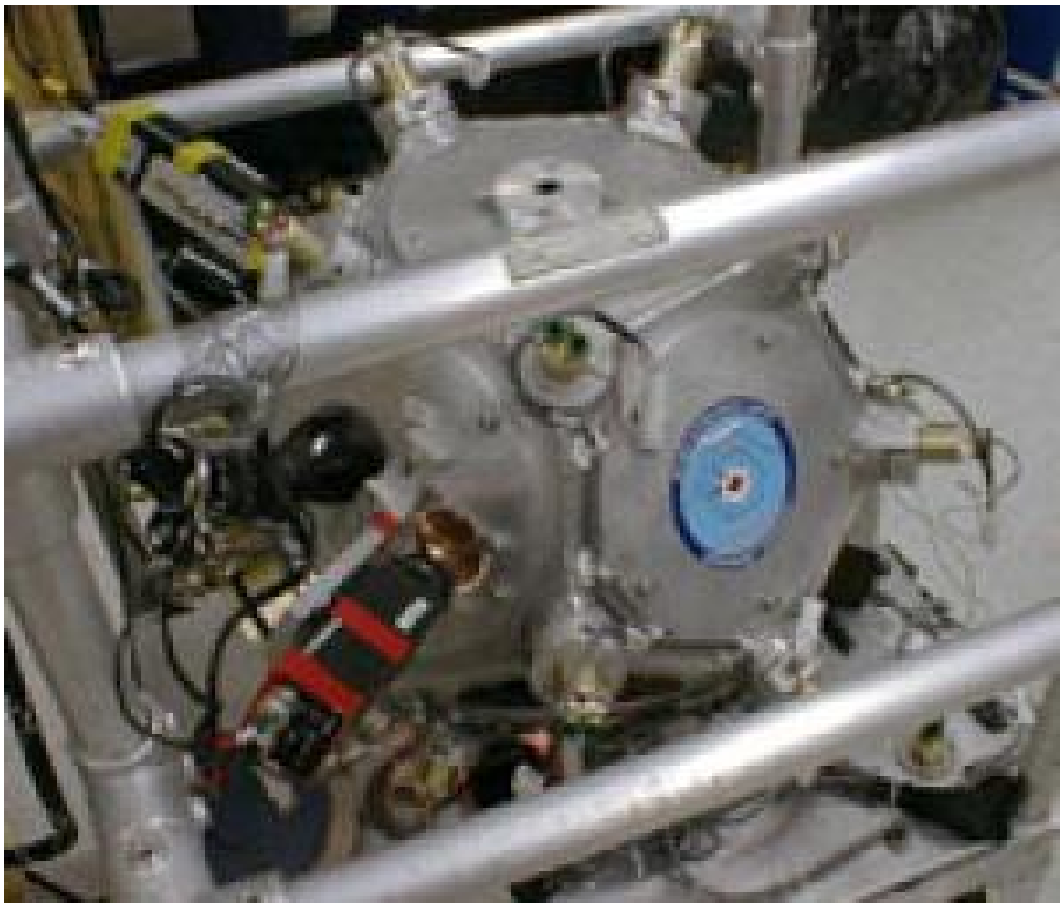
Currently Alzheimer's disease is an incurable illness and the fourth leading cause of death in people aged 65 years and over.

Although folate is abundant in foods like leafy green vegetables, pulses and liver, CSIRO studies have shown that many Australians do not consume enough folate to benefit from its ability to prevent cell damage. Folate levels can, however, be readily restored by dietary folate supplementation.

Adapted from materials provided by CSIRO Australia.

http://www.sciencedaily.com/releases/2008/12/081208100854.htm

Pioneering Space Station Experiment Keeps Reactions In Suspense



Space-DRUMS uses fingers of sound to position samples so that they don't come into contact with the walls of the container. (Credit: Image courtesy of University of Bath)

ScienceDaily (Dec. 12, 2008) — A revolutionary container-less chemical reactor, pioneered by the space research team at Guigné International Ltd (GIL) in Canada with scientists at the University of Bath, has been installed on the International Space Station. The reactor, named Space-DRUMS, uses beams of sound to position chemicals in mid-air so they don't come into contact with the walls of the container.

Space-DRUMS is based on the DRUMS device (Dynamically Responding Ultrasonic Matrix System), originally developed by Professor Jacques Yves Guigné, Chief Scientist of GIL (now with PanGeo Subsea Inc) to survey the sea floor using sonar.

With participation from Professor Nick Pace from the University of Bath's Department of Physics, and aerospace industrial associates of GIL, Professor Guigné has adapted the system to enable scientists to produce new materials in zero-gravity without using a container.

Professor Guigné, who gained his PhD at Bath and is now a Visiting Professor in the University's Department of Physics, explained: "Space-DRUMS uses beams of sound energy to position solids or liquids which are floating in zero-gravity.

"If you've ever been to a really loud rock concert and stood in front of the speakers, you can actually feel the force of the sound when they turn up the volume. Space-DRUMS works like this but on a much gentler scale – the beams of sound energy work like invisible fingers that gently push the sample into the centre of the container so that it doesn't touch the walls.

"Space-DRUMS uses 20 of these 'fingers of sound' arranged within a dodecahedron configured reactor such that the positions of the samples can be adjusted accurately.

"This method of acoustic levitation means there is no chemical contamination from the container, which is vital for making ultra-pure materials such as temperature-resistant ceramics used in coatings for planes and engines."

The equipment was initially tested in a low-gravity environment created by the vertical climbing and nose-diving flight path of a KC135 aeroplane, nick-named the vomit comet, similar to that used to train astronauts.

Space-DRUMS was launched into space in partnership with NASA and installed on the International Space Station on 14 November, coinciding with the International Space Station's 10th anniversary celebrations. The final components will be sent into orbit in July 2009, with experiments starting shortly afterwards.

Professor Nick Pace said: "We are delighted that this key step has been achieved; we have waited several years to witness this milestone.

"The most exciting thing is that we can control the experiments from Earth. Our physics students will be able to use it as part of their final year projects – there aren't many universities that can offer their students a chance to conduct experiments in space!"

In addition to making new materials, Space-DRUMS will also be used to study the physics of turbulence, which has diverse applications such as predicting the paths of hurricanes and helping biopharmaceutical studies.

Deputy Director of the Centre for Space, Atmospheric & Oceanic Sciences at Bath, Dr Philippe Blondel explained: "Even with large computer clusters, the understanding of complex weather patterns is still limited. Using Space-DRUMS will help us to better understand the behaviour of complex systems like hurricanes, their interaction with the atmosphere and hopefully anticipate where a hurricane can go next.

"Bath is at the forefront of this pioneering technology and we are really privileged by this opportunity to do these ground-breaking experiments in space."

Adapted from materials provided by University of Bath.

http://www.sciencedaily.com/releases/2008/12/081211081805.htm

'Impossible' Nanoscale Process Succeeds: Molecular Chain Reaction On Metal Surface Offers Potential For Information Storage

ScienceDaily (Dec. 12, 2008) — People said it couldn't be done, but researchers from the University of Pittsburgh and the U.S. Department of Energy National Energy Technology Laboratory (NETL) in Pittsburgh demonstrated a molecular chain reaction on a metal surface, a nanoscale process with sizable potential in areas from nanotechnology to developing information storage technology.

The researchers report in the Dec. 12 edition of Science that a single electron caused a self-perpetuating chain reaction that rearranged the bonds in 10 consecutive molecules positioned on a gold surface. As each molecule's original bond was broken by the reaction, the molecule rearranged itself to form a new molecule.

Study coauthor Kenneth Jordan, a Distinguished Professor of Chemistry in Pitt's School of Arts and Sciences and codirector of the University's Center for Simulation and Modeling, said that the ability to initiate molecular chain reactions and self-assembly has potential applications in information storage and in nanolithography, a process used in producing microchips and circuit boards.

Because the demonstrated reaction involved several molecules on a surface, it reframes researchers' understanding of surface-based chain reactions. "The conventional wisdom held that a surface reaction would fizzle soon after the electron was introduced," Jordan said. "Our work, however, shows that reactions on metal surfaces can be sustained over long distances."

Jordan and his colleagues worked with dimethyldisulfide molecules—two CH(3) methyl groups bonded by two adjoining sulfur atoms. The added electron split the bond between the sulfur atoms of one molecule, creating a highly reactive free radical that attacked the sulfur-sulfur bond of the neighboring molecule. The radical split the bond, resulting in a new molecule and a new radical that proceeded to the sulfur-sulfur bond of the next molecule. The process repeated itself through a series of molecules.

Jordan conducted the research with Peter Maksymovych, who received his PhD degree in physical chemistry from Pitt in 2007 and is now at the U.S. Department of Energy Center for Nanophase Materials Sciences; Dan C. Sorescu of NETL; and John T. Yates Jr., a former Pitt Mellon Professor of Chemistry and now at the University of Virginia. Maksymovych and Yates carried out the experiments and Jordan and Sorescu performed the supporting theoretical calculations.

Adapted from materials provided by University of Pittsburgh, via EurekAlert!, a service of AAAS.
http://www.sciencedaily.com/releases/2008/12/081211141932.htm

Harm-reduction Cigarettes Are More Toxic Than Traditional Cigarettes, UC Riverside Study Finds

ScienceDaily (Dec. 12, 2008) — Typically, tobacco companies market harm-reduction cigarettes as being safer than traditional "full-flavored" brands, leading many smokers to conclude that the use of harm-reduction brands lowers their exposure to toxicants.

But a UC Riverside study now shows that smoke from these "light" or "low-yield" harm-reduction cigarettes retains toxicity and that this toxicity can affect prenatal development.

"Many chemicals found in harm-reduction cigarette smoke have not been tested, and some are listed by manufacturers as safe," said Prue Talbot, a professor of cell biology who led the study. "But our tests on mice clearly show that these chemicals adversely affect reproduction and associated development processes. The effects are likely to be the same in humans, in which case pregnant women would be particularly vulnerable to the effect of smoke from these cigarettes."

Talbot's research team used mouse embryonic stem cells (mESCs) as a model for pre-implantation embryos—embryos that have not yet implanted in the wall of the uterus—and compared the toxicity on these cells of cigarette smoke emanating from traditional and harm-reduction brands.

Further, they studied the effects on the mESCs of two kinds of cigarette smoke: mainstream smoke, which is smoke actively inhaled by smokers; and sidestream smoke, which is smoke that burns off the end of a cigarette.

They found that both kinds of smoke from traditional and harm-reduction cigarettes are toxic to pre-implantation embryos and can retard growth or kill embryonic cells at this stage of development. Equally surprising to them was their discovery that mainstream smoke and sidestream smoke from harm-reduction cigarettes are more potent than the corresponding smoke from traditional brands of cigarettes.

"This result was unexpected since harm reduction brands purportedly have lower concentrations of toxicants," Talbot said.

"Dr. Talbot's work significantly enhances our understanding of the harmful effects of smoking on very early pregnancy," said Olga Genbacev, a senior scientist in the Department of Obstetrics, Gynecology and Reproductive Sciences at UC San Francisco, who was not involved in the research. "This study for the first time sends a clear message to nonsmoking women of reproductive age who are planning to become pregnant that they must avoid exposure to sidestream smoke."

Study results appear in the journal Human Reproduction (published online, Nov. 29). The hardcopy version of the research paper is scheduled to appear in January 2009.

"Clearly, the tobacco companies have not eliminated all toxins from harm-reduction brands of cigarettes," said Talbot, who also is the director of the UCR Stem Cell Center. "We found that both mainstream and sidestream smoke from traditional and harm-reduction cigarettes hindered the attachment of mESCs to extracellular materials. Such attachment is crucial to normal embryonic development. Moreover, cell survival and proliferation—also necessary for embryonic growth—were hindered as well."

The researchers' experiments on the mESCs showed, too, that on a per puff basis sidestream smoke was more potent than mainstream smoke in both traditional and harm-reduction brands of cigarettes.

"This may be because sidestream smoke is produced at a lower temperature and therefore contains higher concentrations of toxicants," Talbot said.

When she and her colleagues performed the experiments directly on pre-implantation mouse embryos that had been cultured for one hour in mainstream or sidestream smoke solutions from a harm-reduction brand, they found that the effect of smoke on the embryos was similar to the effect it had on the mESCs.

"This strongly supports our use of embryonic stem cells as a valuable and effective model to study embryo toxicity during pre-implantation development," said Sabrina Lin, a graduate student in the Cell, Molecular and Developmental Biology Program working towards her doctoral degree, and the first author of the research paper. "This means we can use human embryonic stem cells to draw conclusions about the effect of cigarette smoke on pre-implantation human embryos."

Next in their research, Talbot and Lin plan to conduct their experiments on human embryonic stem cells.

"To relate this research more strongly to humans, we have to use human embryonic stem cells," Talbot said. "Sabrina has already started working on them, and her preliminary results are similar to those with mESC."

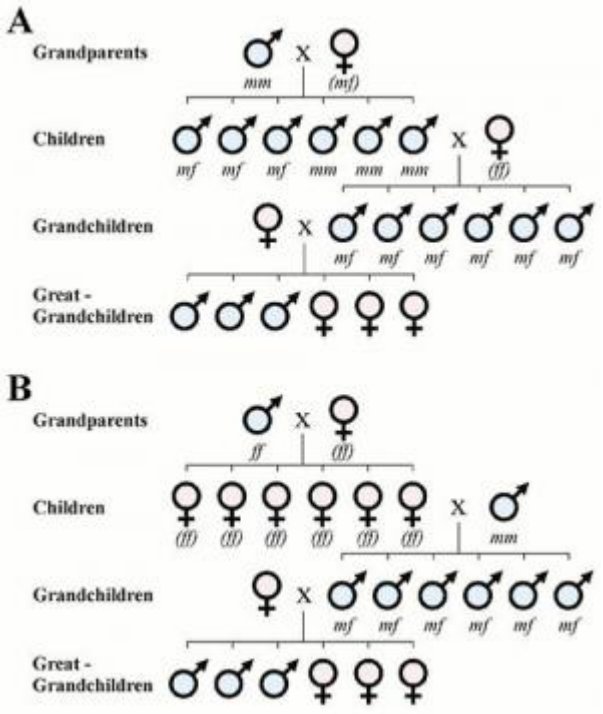
Talbot and Lin were joined in the 18-month study by Vu Tran, who graduated from UCR in 2007 and is now at the Ross University School of Medicine, West Indies.

The Tobacco-Related Disease Research Program of the University of California provided funding for the study.

Adapted from materials provided by University of California - Riverside.

http://www.sciencedaily.com/releases/2008/12/081208180510.htm

Boy Or Girl? It's In The Father's Genes



A simplified diagram in which men either have only sons, only daughters, or equal numbers of each, though in reality it is less clear cut. (Credit: Image courtesy of Newcastle University)

ScienceDaily (Dec. 12, 2008) — A Newcastle University study involving thousands of families is helping prospective parents work out whether they are likely to have sons or daughters.

The work by Corry Gellatly, a research scientist at the university, has shown that men inherit a tendency to have more sons or more daughters from their parents. This means that a man with many brothers is more likely to have sons, while a man with many sisters is more likely to have daughters.

The research involved a study of 927 family trees containing information on 556,387 people from North America and Europe going back to 1600.

"The family tree study showed that whether you're likely to have a boy or a girl is inherited. We now know that men are more likely to have sons if they have more brothers but are more likely to have daughters if they have more sisters. However, in women, you just can't predict it," Mr Gellatly explains.

Men determine the sex of a baby depending on whether their sperm is carrying an X or Y chromosome. An X chromosome combines with the mother's X chromosome to make a baby girl (XX) and a Y chromosome will combine with the mother's to make a boy (XY).

The Newcastle University study suggests that an as-yet undiscovered gene controls whether a man's sperm contains more X or more Y chromosomes, which affects the sex of his children. On a larger scale, the number of men with more X sperm compared to the number of men with more Y sperm affects the sex ratio of children born each year.

Sons or daughters?

A gene consists of two parts, known as alleles, one inherited from each parent. In his paper, Mr Gellatly demonstrates that it is likely men carry two different types of allele, which results in three possible combinations in a gene that controls the ratio of X and Y sperm;

- Men with the first combination, known as mm, produce more Y sperm and have more sons.
- The second, known as mf, produce a roughly equal number of X and Y sperm and have an approximately equal number of sons and daughters.
- The third, known as ff produce more X sperm and have more daughters.

"The gene that is passed on from both parents, which causes some men to have more sons and some to have more daughters, may explain why we see the number of men and women roughly balanced in a population. If there are too many males in the population, for example, females will more easily find a

mate, so men who have more daughters will pass on more of their genes, causing more females to be born in later generations," says Newcastle University researcher Mr Gellatly.

More boys born after the wars

In many of the countries that fought in the World Wars, there was a sudden increase in the number of boys born afterwards. The year after World War I ended, an extra two boys were born for every 100 girls in the UK, compared to the year before the war started. The gene, which Mr Gellatly has described in his research, could explain why this happened.

As the odds were in favour of men with more sons seeing a son return from the war, those sons were more likely to father boys themselves because they inherited that tendency from their fathers. In contrast, men with more daughters may have lost their only sons in the war and those sons would have been more likely to father girls. This would explain why the men that survived the war were more likely to have male children, which resulted in the boy-baby boom.

In most countries, for as long as records have been kept, more boys than girls have been born. In the UK and US, for example, there are currently about 105 males born for every 100 females.

It is well-documented that more males die in childhood and before they are old enough to have children. So in the same way that the gene may cause more boys to be born after wars, it may also cause more boys to be born each year.

How does the gene work?

The trees (above) illustrate how the gene works. It is a simplified example, in which men either have only sons, only daughters, or equal numbers of each, though in reality it is less clear cut. It shows that although the gene has no effect in females, they also carry the gene and pass it to their children.

In the first family tree (A) the grandfather is mm, so all his children are male. He only passes on the m allele, so his children are more likely to have the mm combination of alleles themselves. As a result, those sons may also have only sons (as shown). The grandsons have the mf combination of alleles, because they inherited an m from their father and an f from their mother. As a result, they have an equal number of sons and daughters (the great grandchildren).

In the second tree (B) the grandfather is ff, so all his children are female, they have the ff combination of alleles because their father and mother were both ff. One of the female children has her own children with a male who has the mm combination of alleles. That male determines the sex of the children, so the grandchildren are all male. The grandsons have the mf combination of alleles, because they inherited an m from their father and f from their mother. As a result, they have an equal number of sons and daughters (the great-grandchildren).

Journal reference:

1. Gellatly et al. **Trends in Population Sex Ratios May be Explained by Changes in the Frequencies of Polymorphic Alleles of a Sex Ratio Gene**. *Evolutionary Biology*, Dec 11, 2008; DOI: 10.1007/s11692-008-9046-3

Adapted from materials provided by Newcastle University.

http://www.sciencedaily.com/releases/2008/12/081211121835.htm

Future of Plastics: Designing Tomorrow's Sustainable Polymer

Marina Guenza, theoretical chemist at the University of Oregon. (Credit: Photo by Jim Barlow)

ScienceDaily (Dec. 12, 2008) — Tomorrow's specialty plastics may be produced more precisely and cheaply thanks to the apparently tight merger of a theory by a University of Oregon chemist and years of unexplained data from real world experiments involving polymers in Europe.

The work, which researchers believe may lead to a new class of materials, is described in a paper appearing in the Dec. 18 issue of the Journal of Physical Chemistry B (online Dec. 11). The findings eventually could prove useful in the fields of engineering, nanotechnology, renewable energy and, potentially, medicine, because proteins, DNA, RNA and other large molecules within cells may well move in the same way as those in plastics.

Traditional theory behind the processing of plastic materials since the 1960s has focused on the movement of individual macromolecules as they move by one another. Materials researchers, under this approach, end up with poorly understood products and unexplained data. The new theory of cooperative motion in liquids of polymers successfully explains these observations by considering the coordinated motion of macromolecules with their surrounding neighbors. The end result could remove guesswork and the costly, time-consuming testing of thousands of samples at various stages of production.

"The level of agreement between the data and the theory is remarkable," said Marina G. Guenza, a professor of theoretical physical chemistry at the UO. "We are making the connection between the chemistry of molecules and how they behave. It is really fundamental science. Our findings are exciting for experimentalists because we can see phenomena that they cannot understand. This theory is now explaining what is happening inside their samples. They are no longer dealing with just a set of data; our theory provides a picture of what is happening."

Guenza simplifies her mathematics-heavy theory -- built on Langevin equations that describe the movement of particles in liquid or gas -- to watching students disembark from a crowded bus. Any one student wanting to exit is stuck in place -- or meanders randomly in available spaces -- until other students begin moving toward the exit. As students organize into a group they become coordinated and speed their departure.

The theory addresses the often-seen subdiffusive behavior of molecules as they begin to form a glass under processing -- explaining why molecules slow and freeze into disorganized structures rather than

ordering into a crystal, Guenza said. "We would really like to be able to control the properties of the material so that we can tailor the synthesis to achieve exact results."

The theory was put to the test under a variety of scenarios in labs in Germany, France and Switzerland after German plastics researcher Dieter Richter of the Max Planck Institute for Solid State Research, a co-author on the paper, approached Guenza after a conference session and said he had unexplained data that might be explained by Guenza's theory. The unexplained data and Guenza's theory merged under examination, which included the use of neutron spin-echo spectroscopy, a high-energy resolution-scattering technique.

"If you look at just one polymer, as is the case under conventional theory, you don't see any anomalous motion," said Guenza, whose research is funded by the National Science Foundation and the Petroleum Research Fund. "You don't see slowing one molecule alternating between slow and fast motion. Only if you treat the dynamics of a group of molecules together can you predict anomalous behaviors. That's what my theory can give you."

The theory now is being applied to other experiments to test its application to other anomalies, said Guenza, who is a member of three UO interdisciplinary institutes: the Institute of Theoretical Science; the Materials Science Institute and the Institute of Molecular Biology.

Co-authors of the paper with Guenza and Richter were Richter's colleagues M. Zamponi, A. Wischnewski, M. Monkenbusch and L. Willner, and researchers P. Falus and B. Farago, both of the Institut Laue-Langevin, a leading international neutron research center in Grenoble, France.

Adapted from materials provided by University of Oregon.

http://www.sciencedaily.com/releases/2008/12/081211093557.htm

Rust-proof -- Even Without Chromium

ScienceDaily (Dec. 12, 2008) — For a long time, chromium plating protected car bodies against rust – but this has been prohibited since 2007. However, chromium-free coatings are not suitable for universal use; they have to be adapted to the respective application. A new chromium-free coating can help.

Years ago, the ice-cream van used to drive through residential areas, ringing a bell to entice people out of their houses. Today their place has been taken by scrap metal collectors. Whether it be refrigerators, washing machines or car parts – the dwindling natural resources mean that scrap metal is worth money.

To ensure that the recycling of old cars, for example, does not pose a risk to human health and the environment, the European Parliament has issued a guideline: The use of toxic and carcinogenic chromium(VI) compounds in car manufacturing has been prohibited since mid-2007. Until then, a chromate layer underneath the paint protected the car body against corrosion. Since that time, several chromium(VI)-free protective coatings have made their way into industrial halls – but they do not afford the same degree of protection as chromium(VI) plating, and cannot be used on all types of metal surface.

Researchers at the Fraunhofer Institutes for Silicate Research ISC in Würzburg and for Machine Tools and Forming Technology IWU in Chemnitz, along with colleagues at the Institute for Corrosion Protection Dresden GmbH, have developed an alternative – based on nanocomposites.

“The new nanomaterials we developed using the sol-gel method adhere very well to most types of galvanization that we examined,” reports ISC project manager Dr. Johanna Kron.

To produce them, the researchers dipped galvanized steel sheets into a coating sol and applied a powder coating. They subjected the coated sheets to a variety of load tests. One such test was to keep scratched steel sheets in a chamber filled with atomized brine for 360 hours, or 15 days, at a temperature of 35 degrees. They also placed the metal sheets in an environment chamber with a relative humidity of 100 percent for 240 hours, or 10 days.

“These coatings protect most galvanized materials almost as well as commercial yellow chrome plating. Indeed, the new coatings are often even more effective than the chromium-free system and chromium(III) passivation currently on the market,” says Kron.

Good anti-corrosion measures are one thing, but is it also possible to deep-draw and bend the metal sheets treated in this way without destroying the coating? “As the coatings are less than a thousandth of a millimeter thick, you can form the chromium-free coated metal sheets in exactly the same way as yellow chrome plated sheets,” says Kron. The researchers can already produce the corrosion proofing on a laboratory scale. Kron believes that the system could be launched on the market in about five years’ time.

Adapted from materials provided by Fraunhofer-Gesellschaft.

http://www.sciencedaily.com/releases/2008/12/081209100938.htm

Climate Change Alters Ocean Chemistry

During a time of climate change 13 million years ago the chemical makeup of the oceans changed dramatically. Researchers warn that the chemical composition of the ocean today could be similarly affected by climate changes now underway -- with potentially far-reaching consequences for marine ecosystems. (Credit: Copyright Michele Hogan)

ScienceDaily (Dec. 12, 2008) — Researchers have discovered that the ocean's chemical makeup is less stable and more greatly affected by climate change than previously believed. Researchers report that during a time of climate change 13 million years ago the chemical makeup of the oceans changed dramatically. The researchers warn that the chemical composition of the ocean today could be similarly affected by climate changes now underway – with potentially far-reaching consequences for marine ecosystems.

"As CO_2 increases and weather patterns shift, the chemical composition of our rivers will change, and this will affect the oceans," says co-author Ken Caldeira of the Carnegie Institution's Department of Global Ecology. "This will change the amount of calcium and other elements in ocean salts."

The research team, which included Caldeira, Elizabeth M. Griffith and Adina Paytan of the University of California, Santa Cruz, plus two other colleagues, studied core samples of deep oceanic sediment recovered from the Pacific Ocean Basin. By analyzing the calcium isotopes in grains of the mineral barite in different layers, they determined that between 13 and 8 million years ago the ocean's calcium levels shifted dramatically. The shift corresponds to the growth of the Antarctic ice sheets during the same time interval. Because of the huge volume of water that became locked up in the ice cap, sea level also dropped.

"The climate got colder, ice sheets expanded, sea level dropped, and the intensity, type, and extent of weathering on land changed," explains Griffith.

"This caused changes in ocean circulation and in the amount and composition of what rivers delivered to the ocean," adds Paytan. "This in turn impacted the biology and chemistry of the ocean."

Calcium-bearing rocks such as limestone are the largest storehouse of carbon in the Earth's carbon cycle because they are primarily made up of calcium carbonate. "The ocean's calcium cycle is closely linked to atmospheric carbon dioxide and the processes that control seawater's acidity," says Caldeira. Acidification of seawater is already a growing threat to coral reefs and other marine life.

"What we learned from this work is that the ocean system is much more sensitive to climate change than we have previously appreciated," says Griffith. "We thought that the concentration of calcium, which is a major element in seawater, would change slowly and gradually over tens of millions of years. But what our data suggests is that there could be a more dynamic relationship between climate and ocean chemistry, which can sometimes result in rapid biogeochemical reorganization."

"We see here how dynamic the climate-ocean system is and that the responses to change are not always what we would expect" says Paytan. "We need to keep this in mind when considering future climate and other anthropogenic changes, like ocean acidification, and their impact on the ocean and ocean resources."

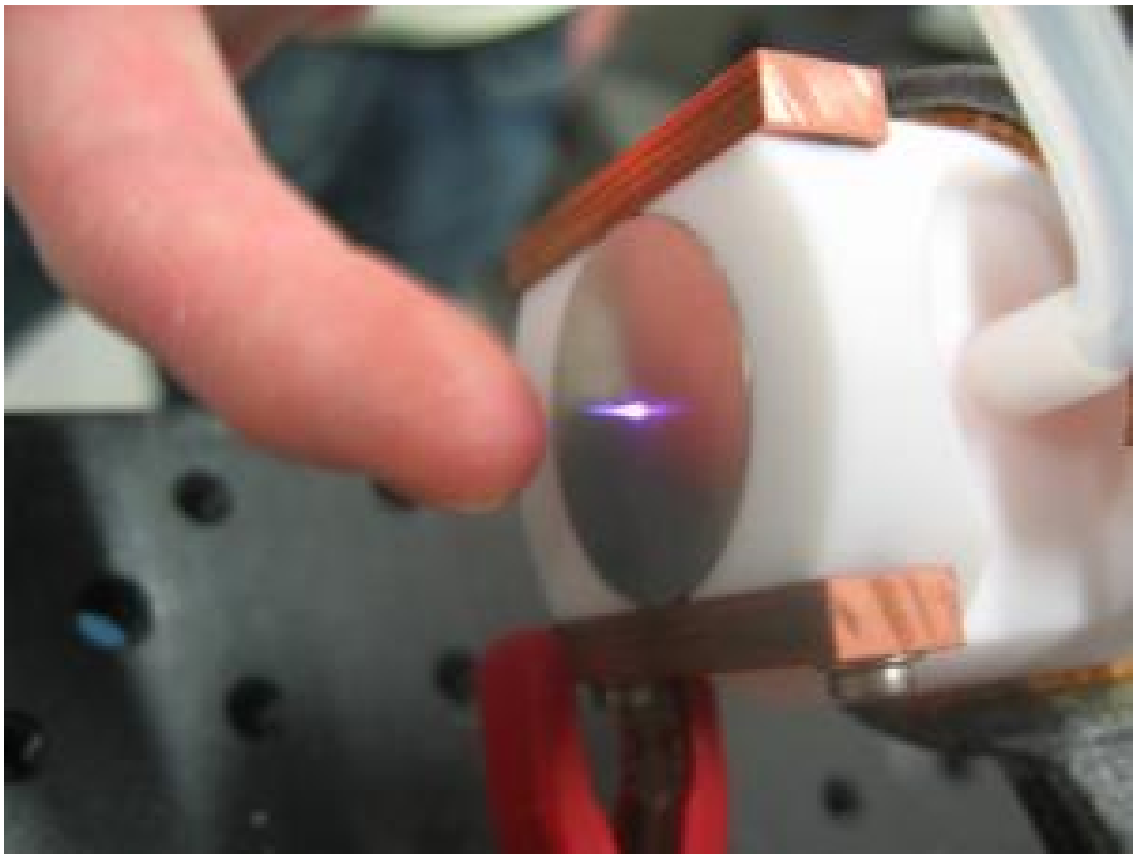
Journal reference:

1. Elizabeth M. Griffith, Adina Paytan, Ken Caldeira, Thomas D. Bullen and Ellen Thomas. **A dynamic marine calcium cycle during the past 28 million years**. *Science*, December 12, 2008

Adapted from materials provided by Carnegie Institution.

http://www.sciencedaily.com/releases/2008/12/081211141832.htm

Pesticides Are In For It Now



Does away with the laborious extraction of pesticides from fruit and vegetable samples: the atmospheric pressure glow discharge source ionises the molecules on the surface of fruit peel. The molecules detached from the peel are then transferred into a mass spectrometer, where the chemical substances are analysed. (Credit: Zenobi Group)

ScienceDaily (Dec. 12, 2008) — ETH Zurich chemists have developed a method to detect pesticide residues in foodstuffs – a method that may also be of interest for other areas and may enable quality checks on a running basis.

When customers stand in front of a fruit and vegetables shelf in a supermarket, they have their last chance to decide whether to buy standard Granny Smith apples or rather the Gala variety from an organic orchard?

If they decide in favour of Granny Smiths grown non-organically, they run the risk of ingesting harmful poisons together with valuable vitamins when they eat them. To combat pest organisms, fruit and vegetables are sprayed with plant protection agents, less euphemistically called pesticides. As a consequence, pesticide residues remain in the foods and are eaten by consumers in their diet. Renato Zenobi, Professor of Analytical Chemistry at the Laboratory of Organic Chemistry and his doctoral student Matthias Jecklin have now developed a mass spectrometric method enabling pesticide residues in foodstuffs to be detected quickly.

Mass spectrometer analyses toxic substances

A year ago the group presented a method based on mass spectrometry that enables the surfaces of objects of any kind to be analysed (cf. the ETH Life article of 7.9.2007). The new method to determine pesticides

also uses what is known as a quadrupole time-of-flight mass spectrometer (QTOF-MS), but how do the chemical compounds get into the mass spectrometer?

Normally the pesticides in samples of fruit and vegetables need to be extracted before they can be analysed in a mass spectrometer. To avoid this time-consuming process, Jecklin built an atmospheric pressure glow-discharge source (APGD source), an electric source which generates a plasma, i.e. an ionised gas, at atmospheric pressure. When aimed at a piece of fruit peel, the plasma stream detaches molecules from the surface of the peel. These are then transferred directly into the mass spectrometer where the ions can be fragmented using a collision gas, thus enabling the researchers to identify the chemical substances in a fruit.

The method has many applications

Zenobi admits that, "Although this method can determine chemical compounds faster and more straightforwardly, the method is not yet a suitable way to quantify the amounts identified." He says that, currently, the method can be used for preliminary probing – if pesticide residues are found in fruit and vegetables, conventional methods can be used to quantify how much of the substances has been discovered.

Nevertheless, the method for determining pesticide residues in fruit and vegetables is very promising. Zenobi and Jecklin have in mind quality checks on a running basis: various foodstuff samples that are analysed on a moving belt by the mass spectrometer. Zenobi says the method is also attractive for forensic and medical purposes. For example traces of drugs or explosives on surfaces could be detected, or human sweat and breath analysed – which could help to diagnose an illness quickly.

Adapted from materials provided by ETH Zurich. Original article written by Saskia Wegmann.

http://www.sciencedaily.com/releases/2008/11/081129173816.htm

Drug Combination Improves Or Stabilizes Disease For Relapsed Multiple Myeloma Patients

ScienceDaily (Dec. 12, 2008) — Mayo Clinic researchers have found that a new combination of medications designed to maximize immune functions improved or stabilized multiple myeloma for 76 percent of patients who had relapsed after previous treatment.Interim results of an ongoing clinical trial evaluating pomalidomide, a new immunomodulatory agent, combined with dexamethasone (pom/dex), were presented today at the 50th Annual Meeting of the American Society of Hematology in San Francisco. Pomalidomide, also referred to as CC-4047, is the latest in the class of immunomodulatory agents that also includes thalidomide and lenalidomide.

Multiple myeloma is a cancer of the plasma cells, a type of white blood cells in the bone marrow, that affects approximately 3 in 100,000 people each year. There is no cure. While the condition can be managed, often with good results, the disease can lead to erosion of the bones, causing bone pain and fractures.Immunomodulatory drugs work by interfering with cancer cell growth and by stimulating the immune system to attack the cancer cells. The Food and Drug Administration (FDA) has approved the use of thalidomide and lenalidomide to be given with dexamethasone for previously treated cases of multiple myeloma.

The study opened in November 2007 and has accrued 60 patients. To date, 58 percent of patients have responded to therapy with at least a 50 percent drop in the detectable tumor burden as measured by blood protein levels, a marker for myeloma. This included one patient who achieved a complete remission -- no signs of the cancer -- and 14 patients (23 percent) who achieved at least a 90 percent drop in blood proteins. Eleven other patients (18 percent) remained stable."These are high remission rates, and they happened quickly," says Martha Lacy, M.D., Mayo Clinic hematologist and lead researcher on the study. Also encouraging, says Dr. Lacy, is that treatment did not cause significant side effects in most patients. Side effects included anemia and declines in blood counts, most often mild in both.

In the study, patients took pomalidomide (2 milligrams [mg]) orally daily for a 28-day cycle. Dexamethasone (40 mg) was taken orally on days 1, 8, 15 and 22 of each cycle. Patients also took 325 mg of aspirin daily to prevent blood clots, a concern associated with immunomodulatory agents. Blood clots can occur with use of any IMiD, but the risk increases as the dose of dexamethasone increases.

The dosage of dexamethasone in the current trial is one-third of the dose that was used in the registration trial that led to FDA approval for lenalidomide in previously treated myeloma patients. "We're getting good results with less toxicity compared to what we've seen in the past," says Dr. Lacy. "And, so far, no patients have had blood clots."Another key finding was that pom/dex was helpful for 29 percent of patients who previously did not respond to treatment with lenalidomide.

"We are excited about the potential of this drug combination to significantly help patients with myeloma," says Dr. Lacy. "Based on these encouraging results, we are expanding the study to include other patient populations that may benefit from this therapy."

This sponsored research study was funded by Celgene. Other Mayo researchers involved in this study include: Suzanne Hayman, M.D.; Morie Gertz, M.D.; Angela Dispenzieri, M.D.; Steven Zeldenrust, M.D., Ph.D.; Shaji Kumar, M.D.; Philip Greipp, M.D.; John Lust, M.D., Ph.D.; Stephen Russell, M.D., Ph.D.; Francis Buadi, M.D.; Robert Kyle, M.D.; Rafael Fonseca, M.D.; P. Leif Bergsagel, M.D.; Vivek Roy, M.D.; Joseph Mikhael, M.D.; Keith Stewart, M.B.Ch.B.; Jacob Allred; Kristina Laumann; Melanie Thompson; Sumithra Mandrekar, Ph.D.; and S. Vincent Rajkumar, M.D.

Adapted from materials provided by Mayo Clinic.

http://www.sciencedaily.com/releases/2008/12/081209111510.htm

Wind, Water And Sun Beat Biofuels, Nuclear And Coal For Clean Energy

Wind power is the most promising alternative source of energy, according to Mark Jacobson. (Credit: LM Glasfiber)

ScienceDaily (Dec. 11, 2008) — The best ways to improve energy security, mitigate global warming and reduce the number of deaths caused by air pollution are blowing in the wind and rippling in the water, not growing on prairies or glowing inside nuclear power plants, says Mark Z. Jacobson, a professor of civil and environmental engineering at Stanford.

And "clean coal," which involves capturing carbon emissions and sequestering them in the earth, is not clean at all, he asserts.Jacobson has conducted the first quantitative, scientific evaluation of the proposed, major, energy-related solutions by assessing not only their potential for delivering energy for electricity and vehicles, but also their impacts on global warming, human health, energy security, water supply, space requirements, wildlife, water pollution, reliability and sustainability. His findings indicate that the options that are getting the most attention are between 25 to 1,000 times more polluting than the best available options.

"The energy alternatives that are good are not the ones that people have been talking about the most. And some options that have been proposed are just downright awful," Jacobson said. "Ethanol-based biofuels will actually cause more harm to human health, wildlife, water supply and land use than current fossil fuels." He added that ethanol may also emit more global-warming pollutants than fossil fuels, according to the latest scientific studies.The raw energy sources that Jacobson found to be the most promising are, in order, wind, concentrated solar (the use of mirrors to heat a fluid), geothermal, tidal, solar photovoltaics (rooftop solar panels), wave and hydroelectric. He recommends against nuclear, coal with carbon capture and sequestration, corn ethanol and cellulosic ethanol, which is made of prairie grass. In fact, he found cellulosic ethanol was worse than corn ethanol because it results in more air pollution, requires more land to produce and causes more damage to wildlife. The paper with his findings will be published in the next issue of Energy and Environmental Science but is available online now. Jacobson is also director of the Atmosphere/Energy Program at Stanford.

To place the various alternatives on an equal footing, Jacobson first made his comparisons among the energy sources by calculating the impacts as if each alternative alone were used to power all the vehicles in the United States, assuming only "new-technology" vehicles were being used. Such vehicles include battery electric vehicles (BEVs), hydrogen fuel cell vehicles (HFCVs), and "flex-fuel" vehicles that could run on a high blend of ethanol called E85.Wind was by far the most promising, Jacobson said, owing to a better-than 99 percent reduction in carbon and air pollution emissions; the consumption of less than 3 square kilometers of land for the turbine footprints to run the entire U.S. vehicle fleet (given the fleet is composed of battery-electric vehicles);l the savings of about 15,000 lives per year from premature air-pollution-related deaths from vehicle exhaust in the United States; and virtually no water consumption. By contrast, corn and cellulosic ethanol will continue to cause more than 15,000 air pollution-related deaths in the country per year, Jacobson asserted.

Because the wind turbines would require a modest amount of spacing between them to allow room for the blades to spin, wind farms would occupy about 0.5 percent of all U.S. land, but this amount is more than 30 times less than that required for growing corn or grasses for ethanol. Land between turbines on wind farms would be simultaneously available as farmland or pasture or could be left as open space.Indeed, a battery-powered U.S. vehicle fleet could be charged by 73,000 to 144,000 5-megawatt wind turbines, fewer than the 300,000 airplanes the U.S. produced during World War II and far easier to build. Additional turbines could provide electricity for other energy needs.

"There is a lot of talk among politicians that we need a massive jobs program to pull the economy out of the current recession," Jacobson said. "Well, putting people to work building wind turbines, solar plants, geothermal plants, electric vehicles and transmission lines would not only create jobs but would also reduce costs due to health care, crop damage and climate damage from current vehicle and electric power pollution, as well as provide the world with a truly unlimited supply of clean power."Jacobson said that while some people are under the impression that wind and wave power are too variable to provide steady amounts of electricity, his research group has already shown in previous research that by properly coordinating the energy output from wind farms in different locations, the potential problem with variability can be overcome and a steady supply of baseline power delivered to users.

Jacobson's research is particularly timely in light of the growing push to develop biofuels, which he calculated to be the worst of the available alternatives. In their effort to obtain a federal bailout, the Big Three Detroit automakers are increasingly touting their efforts and programs in the biofuels realm, and federal research dollars have been supporting a growing number of biofuel-research efforts.

"That is exactly the wrong place to be spending our money. Biofuels are the most damaging choice we could make in our efforts to move away from using fossil fuels," Jacobson said. "We should be spending to promote energy technologies that cause significant reductions in carbon emissions and air-pollution mortality, not technologies that have either marginal benefits or no benefits at all"."Obviously, wind alone isn't the solution," Jacobson said. "It's got to be a package deal, with energy also being produced by other sources such as solar, tidal, wave and geothermal power."

During the recent presidential campaign, nuclear power and clean coal were often touted as energy solutions that should be pursued, but nuclear power and coal with carbon capture and sequestration were Jacobson's lowest-ranked choices after biofuels. "Coal with carbon sequestration emits 60- to 110-times more carbon and air pollution than wind energy, and nuclear emits about 25-times more carbon and air pollution than wind energy," Jacobson said. Although carbon-capture equipment reduces 85-90 percent of the carbon exhaust from a coal-fired power plant, it has no impact on the carbon resulting from the mining or transport of the coal or on the exhaust of other air pollutants. In fact, because carbon capture requires a roughly 25-percent increase in energy from the coal plant, about 25 percent more coal is needed, increasing mountaintop removal and increasing non-carbon air pollution from power plants, he said.Nuclear power poses other risks. Jacobson said it is likely that if the United States were to move more heavily into nuclear power, then other nations would demand to be able to use that option.

"Once you have a nuclear energy facility, it's straightforward to start refining uranium in that facility, which is what Iran is doing and Venezuela is planning to do," Jacobson said. "The potential for terrorists to obtain a nuclear weapon or for states to develop nuclear weapons that could be used in limited regional wars will certainly increase with an increase in the number of nuclear energy facilities worldwide." Jacobson calculated that if one small nuclear bomb exploded, the carbon emissions from the burning of a large city would be modest, but the death rate for one such event would be twice as large as the current vehicle air pollution death rate summed over 30 years.Finally, both coal and nuclear energy plants take much longer to plan, permit and construct than do most of the other new energy sources that Jacobson's study recommends. The result would be even more emissions from existing nuclear and coal power sources as people continue to use comparatively "dirty" electricity while waiting for the new energy sources to come online, Jacobson said.

Jacobson received no funding from any interest group, company or government agency.

Energy and vehicle options, from best to worst, according to Jacobson's calculations:

Best to worst electric power sources:

1. wind power
2. concentrated solar power (CSP)
3. geothermal power
4. tidal power
5. solar photovoltaics (PV)
6. wave power
7. hydroelectric power
8. a tie between nuclear power and coal with carbon capture and sequestration (CCS).

Best to worst vehicle options:

1. Wind-BEVs (battery electric vehicles)
2. wind-HFCVs (hydrogen fuel cell vehicles)
3. CSP-BEVs
4. geothermal-BEVs
5. tidal-BEVs
6. solar PV-BEVs
7. Wave-BEVs
8. hydroelectric-BEVs
9. a tie between nuclear-BEVs and coal-CCS-BEVs
10. coal-CCS-BEVs (tied with nuclear-BEVs)
11. corn-E85
12. cellulosic-E85.

Hydrogen fuel cell vehicles were examined only when powered by wind energy, but they could be combined with other electric power sources. Although HFCVs require about three times more energy than do BEVs (BEVs are very efficient), HFCVs are still very clean and more efficient than pure gasoline, and wind-HFCVs still resulted in the second-highest overall ranking. HFCVs have an advantage in that they can be refueled faster than can BEVs (although BEV charging is getting faster). Thus, HFCVs may be useful for long trips (more than 250 miles) while BEVs more useful for trips less than 250 miles. An ideal combination may be a BEV-HFCV hybrid.

Adapted from materials provided by Stanford University.

http://www.sciencedaily.com/releases/2008/12/081210171908.htm

Robots Designed To Save Lives Of Construction Workers

This HyDRAS serpentine robot prototype climbs a pole by converting the oscillating motion of the joints to a whole body rolling motion to climb up pole-like structures. (Credit: Image courtesy of Virginia Tech)

ScienceDaily (Dec. 11, 2008) — The Robotics and Mechanisms Laboratory (RoMeLa) of the College of Engineering at Virginia Tech won the grand prize at the 2008 International Capstone Design Fair with a trio of pole-climbing serpentine robots designed to take the place of construction workers tasked with dangerous jobs such as inspecting high-rises or underwater bridge piers.*

The autonomous robots are designed to climb scaffolding and buildings by wrapping around a poll or beam and then rolling upward via an oscillating joint motion. Using built-in sensors and cameras, the robots would then inspect the structures or handle other dangerous tasks now done by humans, said Dennis Hong, director of Virginia Tech's Robotics and Mechanisms Laboratory and the faculty adviser on the project.

The robots are each roughly three feet in length and use a movement unique even in nature. "These are really wicked cool robots," he added.

The need for autonomous tools in the construction field is great. Hong cites a 2006 U.S. Bureau of Labor Statistics report that tracked the workplace deaths of 1,226 construction workers in 2006, an increase of 3 percent from 2005. The same report listed 809 deaths as a result of falls from raised structures such as scaffolding, Hong said.

"Unlike inchworm type gaits often being developed for serpentine robot locomotion, this novel climbing gait requires the serpentine robot to wrap around the structure in a helical shape, and twist its whole body to climb or descend by rolling up or down the structure," Hong said.

The HyDRAS robots operate using electric motors, while the CIRCA robot uses a compressed air muscle. "The use of compressed air makes this approach feasible by enabling it to be light weight, providing compliant actuation force for generating the gripping force for traction, and allowing it to use a simple discrete control scheme to activate the muscles in a predetermined sequence," Hong said. For now, the robots operate by a tethered wire attached to a laptop, but Hong and his students are reconfiguring the devices to function independently using an onboard microprocessor and power source.

"This family of novel robots will serve as a practical inspection tool for construction sites without putting workers in harm's way," he added.

The robots were developed by mechanical engineering students Gabriel Goldman of Richmond, Va., and Nick Thayer of Poquoson, Va., who are both currently pursuing mechanical engineering doctoral degrees at Virginia Tech. The remaining student developers, all of which are recent graduates, are Michael Bloom, Florian Böss, Cory Kaser, Vic Kassoff, David McDowell, Spencer Patton, and Jeff Philis.

Goldman and Thayer traveled to Seoul with the robots to display and present the team's work at the international symposium. Universities from more than 15 countries submitted 44 entries, according to Hong, who remained in Blacksburg during the event. The prize of 1 million won, the currency of South Korea, prize equals roughly $690 U.S. Korea currency rates have been hard hit by recent worldwide economic woes and are now at half their normal power, Hong said.

"There was a lot of great talent in that room and everybody brought back some good experiences," said Thayer.

"Being able to compete against so many other great projects from around the globe and be recognized like that is truly an amazing feeling," said Goldman.

*Team RoMeLa scored the cash prize of 1 million won (won is the currency of South Korea) with its robots, the HyDRAS-Ascent (Hyper-redundant Discrete Robotic Articulated Serpentine for climbing), the HyDRAS-Ascent II, and CIRCA (Climbing Inspection Robot with Compressed Air), at the 2008 International Symposium on Educational Excellence 2008 competition. The event took place at Seoul National University of Technology in South Korea.

Adapted from materials provided by Virginia Tech, via Newswise.

http://www.sciencedaily.com/releases/2008/12/081210144936.htm

Chemist Tames Longstanding Electron Computation Problem

ScienceDaily (Dec. 11, 2008) — When the University of Chicago's David Mazziotti talks about chemistry, perhaps he is thinking about how the behavior of all of the electrons in a molecule can be anticipated from the behavior of just two of its electrons.

For 50 years theoretical chemists have puzzled over the problem of predicting many-electron chemistry with only two electrons, which many thought intractable and perhaps impossible to solve. Mazziotti, an associate professor in chemistry, will present a new approach to tuning his solution to the problem for exceptional computational accuracy and efficiency in the Dec. 12 issue of Physical Review Letters.

"We can do all these calculations using a desktop computer," Mazziotti said. "We're getting accuracy and efficiency that supercedes some of the traditional techniques, so it really opens up a whole new ballgame."

Scientists have grappled with the problem for decades because a detailed statistical description of electrons' positions in a molecule can reveal whether a particular chemical reaction will occur. But the number of electrons in an atom or molecule can range from 10 to hundreds or thousands.

Even the most powerful computers lack the power to perform these calculations, which become increasingly expensive as more electrons are added to the mix. The computational cost stems from the laws of quantum mechanics, the branch of physics that governs the behavior of atoms and molecules. Mazziotti's advance means that chemists will be able to compute the electronic properties of a given molecule with greater accuracy at a lower cost.

Mazziotti anticipates that his research tool will enable scientists to more rapidly solve a wide range of problems in chemistry, including the chemistry of free radicals. Free radicals are molecules with unpaired electrons that play a key role in reactions that deplete atmospheric ozone and create greenhouse gases. Radical-type reactions are also important in the design of new drugs and more efficient combustion engines.

Mazziotti began working on the problem of using two electrons to represent many electrons in the mid-1990s as a graduate student at Harvard University. His graduate school mentor, Nobel laureate Dudley Herschbach, has called the quest "a 'holy grail' of theoretical chemistry."

Speaking of Mazziotti's progress in 2006, Herschbach said that "David Mazziotti has made a major advance in fundamental theory."

Herschbach employed a football analogy to illustrate Mazziotti's method, known to theoretical chemists as the 2-electron Reduced Density Matrix (2-RDM) method.

In this analogy, a coach could automatically determine the actions of an entire team by simply plotting the motion of just two to three players: the quarterback and one running back/receiver, with auxiliary help from one lineman.

"His method requires dealing with just pairs and trios of electrons," Herschbach said.

The late Joseph Mayer, a professor in chemistry at the University of Chicago from 1946 until 1960, was one of the first scientists to propose doing electronic structure calculations for many-electron atoms and molecules by using just two electrons.

In the 2-RDM approach, one determines the probabilities for finding a pair of electrons at different locations in an atom or molecule. But a problem arises, Mazziotti said. "If one wants to work with these

two-electron distributions, one has to make sure that they actually represent the many-electron system adequately."

Mazziotti has in fact developed several two-electron approaches that target different levels of accuracy and efficiency. The previous approaches tuned for maximum accuracy have applications to highly challenging problems like bi-radicals (molecules with two unpaired electrons), electron-rich materials, and molecular conductivity.

The latest tool extends independent work by Christian Kollmar at the Zernike Institute for Advanced Materials in the Netherlands as well as work with University of Chicago graduate student Eugene DePrince. It is tuned for high efficiency and impressive accuracy for applicability to a very wide range of chemical problems.

"We view 2-RDM theory as a platform that we can now tune, essentially, to get high accuracy or high efficiency or some combination of both of those for different molecular systems," Mazziotti said.

Last year Mazziotti published a book, Two-Electron Density Matrix Mechanics for Many-Electron Atoms and Molecules, which serves as a roadmap for scientists in his field. More than 20 scientists contributed chapters to the volume, which summarizes historical and recent advances in the field.

Supporting Mazziotti's work are the National Science Foundation, the American Chemical Society Petroleum Research Fund, Microsoft Corporation, the Dreyfus Foundation and the David and Lucile Packard Foundation.

Adapted from materials provided by University of Chicago.

http://www.sciencedaily.com/releases/2008/12/081210131038.htm

Bail Out the Writers!

By PAUL GREENBERG

A little while back my daughter told me the following depressing joke:

Woman: What do you do?

Man: Me? Oh, I write books.

Woman: How interesting! Have you sold anything recently?

Man: Why, yes. My couch, my car and my flat-screen television.

A snarkier writer-father might have added, "and I sold those things to pay for your private school tuition!" But instead it got me thinking that there was a real problem here. Not just a small problem involving issues of respect between one writer and one teenager, but rather a national problem of respect where being a writer has become so widely associated with being a loser that we have become the stuff of common jokes.

My friends (as the nation's most famous loser, John McCain, likes to begin his appeals), in these times of plummeting consumer confidence and evaporating labor markets, it is time to address the problem head on. We must now go boldly forward and bail out the writers.

What would such a bailout consist of? In the 1930s, Franklin Delano Roosevelt started the Federal Writers' Project, under which some 6,000 out-of-work writers were hired over a period of several years to write guidebooks, oral histories, ethnographies and the like, and in the process "describe America to Americans." The program not only kept American writers alive but seems to have helped them multiply, to the point where there are now, according to a survey released last summer by the National Endowment for the Arts, approximately 185,000 people in the United States who support themselves primarily as writers of books, plays, poetry, speeches and other literary matter. Thanks to this group, America has been described and redescribed so many times that I fear a kind of word-based Strategic Defense Initiative is taking shape above us, shielding us from harsher but more realistic foreign words and creating resentment among our allies.

I am not suggesting that a Rooseveltian approach to the writing crisis is inappropriate. Rather, we should look elsewhere in Roosevelt's legacy for a modern solution. A good place to start would be the Agricultural Adjustment Administration. This entity recognized that an overcapacity of farms and farm produce was driving down crop prices, and that elimination of that overcapacity was needed.

Overcapacity has been something generally acknowledged across the writing industry for at least 10 years. In a 2002 essay in The New York Times, the onetime best-selling novelist and story writer Ann Beattie mourned the situation of the modern writer, living in a world where people are more interested in "being a writer" than in writing itself. "There are too many of us, and M.F.A. programs graduate more every year, causing publishers to suffer snow-blindness, which has resulted in everyone getting lost," she lamented. That Ann Beattie must now compete on Amazon with a self-published author named Ann Rothrock Beattie is proof of how enormous the blizzard has become.

So how would my big St. Bernard of a bailout dig the publishers out of their drifts? According to the industry tracker Bowker, about 275,000 new titles and editions are published in the United States each

year. Let's say we want to eliminate half of them. Assuming it takes about two years to write your average book, we would offer book writers two years of salary at the writers' average annual income of $38,000 a year. Add it all up and you get a paltry $10.5 billion to dramatically reduce the book overcapacity.

Unfortunately, not all writers would settle for a couple of years' salary to get out of the writing game. No sooner had I proposed this essay to the Book Review than I found a New Yorker humor piece by Andy Borowitz called "Too Big to Fail."; In it, Borowitz outlines a similar bailout (albeit a personal one for him alone), but our ideas were close enough to make me fear that maybe I was part of the overcapacity. Unless, of course, I could buy out Borowitz.

I quickly e-mailed him and asked what it would take for him to get out of my way. "I would like $400,000," Borowitz replied. "That would give me enough money to throw myself an A.I.G.-style party to celebrate."

O.K., let's take Borowitz at his word, since $400,000, according to the National Endowment for the Arts, is about what an average writer earns in a decade — more than enough time to find a better job. If we multiply $400,000 times 92,500 — half of the 185,000 Americans the N.E.A. identifies as "authors and writers" — we get a total bailout cost of $37 billion. That's about half of what the government paid for the first installment of the A.I.G. rescue. Should you still find that number too big to swallow, let me ask point blank: Whom would you rather bail out, a writer or an insurance executive?

Of course, putting this kind of money on the table would require the strictest of oversight, and for this we could make use of a structure already in place — i.e., the long-suffering spouses and domestic partners of writers. Under the terms of the bailout, these emotional custodians would be transformed into fiscal custodians and would release funds only when a full cessation of writing activities occurred. There might be a transitional period in which a quick "think piece" or travel junket would be allowed, but all major "projects" would be stopped cold. Custodians would have to bear the burden of a certain amount of re--education during the transition period. A bailed-out writer would no doubt for many months continue to begin conversations with phrases like "I just had a great idea for a n—." A custodian would intervene here and offer to end the sentence more constructively with something like "— new kind of delicious muffin?" The only problem with my bailout package is the same problem we've already seen with the financial sector: just because you bail out a sector doesn't mean the sector will behave itself (cf that $400,000 A.I.G. corporate retreat). Not long ago, inspired by the N.E.A., I distributed my own unscientific survey to the several hundred authors who share the "workspace for writers" I inhabit weekday mornings. Of those who replied, around 60 percent had spent more than $10,000 on their writing education, while a similar number were earning less than $20,000 a year from writing. But when asked what they would do "if given a subsidy with no strings attached that would support you at a comfortable income level for the rest of your life," 96 percent said they would write as much as or more than they do now.

The economy slips deeper and deeper into its trench, and yet the workspace for writers seems to get more crowded by the day as refugees from other professions take cover behind what they hope will be the respectability of the writing life. The other day, as I looked down on the field of cubicles from the "resting area" on the balcony, I felt an urge to read aloud from a Graham Greene story I had disregarded in my 20s: "Are you prepared for the years of effort, 'the long defeat of doing nothing well'? As the years pass writing will not become any easier, the daily effort will grow harder to endure, those 'powers of observation' will become enfeebled; you will be judged, when you reach your 40s, by performance and not by promise." Harsh stuff. But don't take Greene's word for it, or mine. I'm a writer. Maybe I'm just trying to clear a little more room for myself at the workspace.

Paul Greenberg is writing a book about fish.

http://www.nytimes.com/2008/12/14/books/review/Greenberg-t.html?8bu&emc=bub1

Tryst and Shoot

Reviewed by TOM McCARTHY

CAMERA By Jean-Philippe Toussaint. Translated by Matthew B. Smith

122 pp. Dalkey Archive Press. Paper, $12.95

The Belgian novelist Jean-Philippe Toussaint is frequently, if anachronistically, grouped with early cinematic masters like Buster Keaton and Jacques Tati. Reading the opening sequences of "Camera," one understands why. The hero — ambling into a driver's ed office, amusing himself by triggering and retriggering the automatic bell, fluttering his eyelids at the pretty secretary, opening drawers and moving objects around on her desk before posing as an employee when a rival customer-cum-suitor shows up — acts out a medley of moments instantly recognizable from Harold Lloyd or Charlie Chaplin films. When, a little later, he shaves in a cramped gas station office, elbowing the mechanic who plays pick-up sticks while a Slavic type suggests moves, I almost expected Groucho Marx to pop up, telephone in hand, and call room service for more room. Toussaint's writing is comic in a very formal sense — the sense in which, for example, Henri Bergson used the term. For Bergson, comedy entailed a tendency toward the mechanical. People, gestures and events become like automata — compressed, sprung, interlocked and endlessly repeating. Not for nothing does the action in "Camera" take place among automobiles: contraptions whose very name encodes self-generated motion without end. The hero's repeated trysts with the driving-school secretary (the book's only — and magnificently derisory — nod in the direction of plot) play out amid a mechanized landscape whose kinetic and linguistic rules must be learned and negotiated: gear-shifting, reverse-parking, street signage and game moves, on and off the board. Not much happens in "Camera." The hero takes driving lessons, falls in love, goes on a desultory journey. Who, then, is the opponent, the examiner, the rule-setter? Why, reality itself. In the first of several almost perfectly paced passages in which he waxes philosophical, the hero muses that "in my struggle with reality, I could exhaust any opponent with whom I was grappling, like one can wear out an olive, for example, before successfully stabbing it with a fork." That olive is reprised a few pages later, in a restaurant scene whose dialogue is passed over entirely, the better to let us appreciate the olive's lined surface, its "resistance diminishing" beneath the pressure of the tines. In moments like this, Toussaint closes in on the essence of literature as practiced by Francis Ponge or Wallace Stevens. For him as for them, writing enacts a head-on collision with the material realm, a struggle with brute facticity. Ponge and Stevens also use fruit as their battleground: Ponge's orange, "expressed," leaves sticky residue across the hands; Stevens's plum "survives its poems." It seems that Toussaint's fruit might prevail too — as "Camera" progresses there's a sense that reality, not the hero, will end up on top. In an interview reproduced at the novel's end, Toussaint cites Kafka: "In the fight between you and the world, back the world." What concentrates and frames this battle — literally frames it — is another of modernity's mechanisms, the camera. Snapshots appear throughout; sitting in a photo booth, the hero understands the flow of thought and the world, the artificiality of halting it before it must once more "give way to itself." Thinking, like living, is a question of capture and release, of shutter-speed. Here, too, the ultimate mood is capitulation. Before chucking a camera into the night-time ocean, the hero accepts that "having temporarily given up fighting a seemingly inexhaustible reality . . . you move progressively from the struggle of living to the despair of being." Comedy is much darker than tragedy, make no mistake. That "Camera" should have waited 20 years to find an English-language publisher is scandalous. That the wonderful Dalkey Archive has taken on the task is unsurprising. While Toussaint's long, chatty sentences sometimes trick the translator Matthew B. Smith into losing his syntactical thread, this version admirably renders the frankness that makes Toussaint so alluring.

Tom McCarthy, a novelist and artist in London, is the author of "Remainder" and "Tintin and the Secret of Literature."

http://www.nytimes.com/2008/12/14/books/review/McCarthy-t.html?ref=books

When to Intervene

By SCOTT MALCOMSON

THE THIN BLUE LINE

How Humanitarianism Went to War

By Conor Foley

266 pp. Verso. $26.95

THE RESPONSIBILITY TO PROTECT

Ending Mass Atrocity Crimes Once and for All

By Gareth Evans

349 pp. Brookings Institution Press. $29.95

It is hard to date exactly when humanitarianism got decisively bound up with making war, although many would point to Colin Powell's 2001 endorsement of relief workers in Afghanistan as a "force multiplier for us . . . an important part of our combat team." In these two very different books, Conor Foley, an experienced relief worker, laments the transformation of humanitarianism into an aspect of politics, while Gareth Evans, a doughty Australian politician and head of the International Crisis Group, argues for something like its institutionalization. Both books are poised to influence debate as we make the turn into a post-Bush world.

As Foley notes in "The Thin Blue Line: How Humanitarianism Went to War," human rights and humanitarianism became powerful movements in the 1980s and '90s, and by now Amnesty International

UK "has over a quarter of a million members, overtaking . . . the British Labor Party." This shift from class politics to values politics occurred across the Western political spectrum, particularly in the prosperous '90s. Nongovernmental organizations, or NGOs, proliferated; governments integrated human-rights advocacy into their budgets and their diplomacy; the United Nations bureaucracy likewise seized the opportunity to promote human rights as central to the organization's mission. Soon enough, a transnational "common culture," in Foley's phrase, of human rights and humanitarianism had taken hold among a surprisingly large number of people.

And soon after that, as Foley shows, frustration set in. If humanitarian values were now universal (or universal enough), then why did they seem so threatened in the Balkans, Central Africa, the Caribbean and elsewhere?

Foley says his fellow humanitarians looked to achieve their goals in two places: law and politics, not least armed politics. The legal route led in part through the United Nations, with its treaties and human-rights machinery, but the humanitarians' most fervent investment was in the International Criminal Court, whose efforts got under way in 2003. It's much too early to give up on the court, but Foley's disappointment is pretty thorough. Anticipating that the court will change "from an instrument of justice to one of diplomacy," he concludes: "The I.C.C. could become a useful mechanism for dealing with mid-level thugs and warlords, or retired dictators, where in-country prosecutions are considered too contentious. But it will not be the instrument of impartial, universal justice that its supporters claim. And for aid workers, this could make it as much of a problem as a solution in humanitarian crises."

Foley's treatment of the court's legal issues is informed and direct. He rightly draws attention to the coming debate on how the I.C.C. will define the crime of aggression, a question that was deferred by the drafters of the court's treaty. This debate cuts very close to the privileges of powerful states, and Foley implies that for that reason, the identification of the crime of aggression will effectively be left to the great powers themselves. We shall see.

His discussion of the humanitarians' use of politics to further their ends benefits not only from his legal training but also from his insider's experience. Foley seems to have been in almost every geopolitical mess from Kosovo to Afghanistan.He has watched as the nongovernmental organizations began, ever so slowly at first, to endorse the use of force for humanitarian purposes. And he has watched as "the integration of humanitarian assistance into military interventions" has led to "a steady increase in the number of attacks on aid workers over the last decade, partly because an increasing number of armed parties no longer respect the 'humanitarian space' within which aid workers operate." One reason for that, of course, is that aid workers have often accepted the militarization of their work. Foley concludes: "The only international principles that potentially fit all the situations in which humanitarians work are those of independence, impartiality and neutrality by which the movement has traditionally defined itself. The shift away from these principles in recent years has caused more problems than it has solved."

In many ways, the crucial flaw in the legal and political avenues is that they both lead back to the United Nations Security Council, which, since its first session in 1946, has been captive to the veto power of its five permanent members: Britain, Russia, China, France and the United States. There have been many proposals for changing or evading this, some of them quite ingenious. But Gareth Evans is probably right to say that "any concession that … there are some circumstances that justify the Security Council being bypassed. . . seriously undermines the whole concept of a rules-based international order. That order depends upon the Security Council . . . being the only source of legal authority for nonconsensual military interventions."

Evans cuts a fascinating figure on the world stage. Always informed, sometimes alarming, never dull, he has a diplomat's ability to listen and reflect, and a politician's will to dominate a room. He is also an able and prolific writer. His achievements as foreign minister of Australia in the late 1980s and early '90s were out of proportion to the influence of his country. And as the head of a nongovernmental organization, he took the International Crisis Group from being a modest advisory council to its current status as a global foreign-policy investigative, analytical and advocacy organization, with considerable

influence on governments (which pay some of its budget) and the general public. His purpose in writing "The Responsibility to Protect: Ending Mass Atrocity Crimes Once and for All" is to advance the doctrine known by the Spielbergian acronym R2P, for which Evans, in his capacity as political entrepreneur, has been a crucial spokesman.

Evans was extremely active on the international commissions that issued the reports in 2001 and 2004 that defined the doctrine of the responsibility to protect. And his reluctant acceptance of the centrality of the Security Council is of a piece with his general approach: that what matters in politics is the channeling of power toward humanitarian ends. He is seeking, with his advocacy of the responsibility to protect (and with this book), to institutionalize the idea that all states have an obligation to shield their own citizens from mass atrocities, and that if a state fails to do so, it falls to other states to take on that obligation. His encyclopedic knowledge of the international system enables him to make many specific proposals.

Evans goes to heroic lengths, here and in the commission reports he helped write, to show that this doctrine is intended to be preventive first, meliorative second and invasive only as a last resort. In short, the international community should be oriented toward preventing atrocities before they get under way by helping the state in question, and only in extreme cases by using military force. The responsibility to protect is, in a sense, the reverse of its immediate doctrinal ancestor, the "right of humanitarian intervention," which began its life as a direct challenge to state sovereignty. The R2P approach is to stress the duties of the sovereign state, rather than the power of the international community to trump that sovereignty.

Evans readily acknowledges that the nature of the Security Council-based system means no R2P-based military action is ever likely to be taken against any of the permanent Council members. Unfortunately, it's easy to see where this can lead. "If all this talk about responsibility to protect . . . is going to be used only to initiate some pathetic debate in the United Nations and elsewhere, then we believe this is wrong," Sergey V. Lavrov, the Russian foreign minister, told the Council on Foreign Relations not long ago. "So we exercised the human security maxim, we exercised the responsibility to protect." He was referring to Russia's protecting South Ossetia from Georgia. Neither author spends much time on Russia or China. But a values-based international system will not succeed without them.

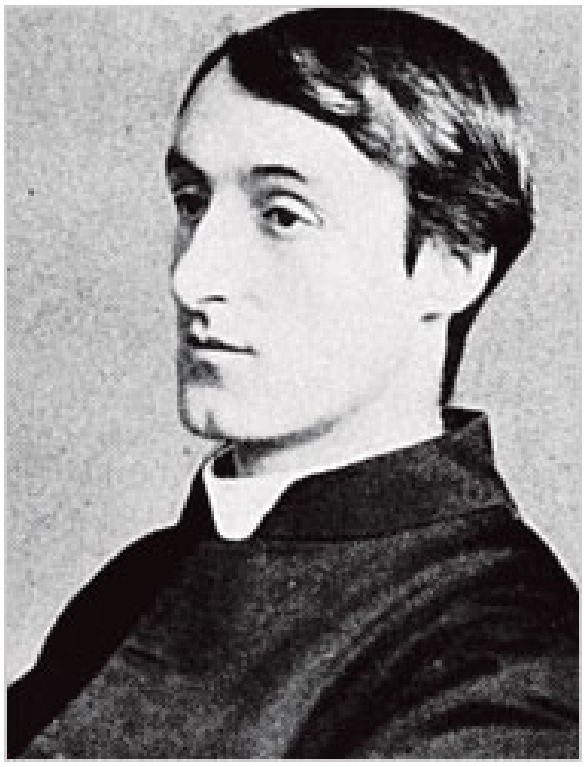
Foley and Evans both end their books with rather unexpected salvoes of anti-Bush feeling, which I take to be backhanded adieus to a man who, by enabling the international community to unite against Washington, has provided it with a coherence it might not otherwise have had. It will be fascinating to see what the community does when it no longer has George W. Bush to kick around — or to hold it together.

Scott Malcomson, a former adviser to the United Nations high commissioner for human rights, is an editor at The Times Magazine. His most recent book is "One Drop of Blood: The American Misadventure of Race."

http://www.nytimes.com/2008/12/14/books/review/Malcomson-t.html?ref=books

A Modern Victorian

By BLAKE BAILEY



GERARD MANLEY HOPKINS

A Life

By Paul Mariani

Illustrated. 496 pp. Viking. $34.95

In 1868, at the age of 23, Gerard Manley Hopkins decided to burn the poetry he'd written up to that time: "Slaughter of the Innocents," he noted in his journal. Recognizing that poetry depended on deep and perhaps dangerous feeling — and given what he would later concede was a disturbing affinity with Walt Whitman ("a very great scoundrel") — Hopkins decided it was incompatible with his calling to the Jesuit priesthood.

In that capacity Hopkins would persevere amid ghastly privations, though he could not entirely escape his destiny as one of the most influential poets of the 20th century (a century he would not live to see). As Paul Mariani points out in "Gerard Manley Hopkins," his generous new biography, the "unpromising beginnings" of Hopkins's prosodic revolution were in a Jesuit classroom in London, where as a teacher of rhetoric he tried to impart something of his enthusiasm for the later rhythms of Milton and the alliterative effects of the Anglo-Saxons. Then, in 1875, Hopkins was peculiarly moved by the sinking of the Deutschland — in particular by an article in The Times of London about five Franciscan nuns (fleeing the anti-Catholic laws of Bismarck's Kulturkampf) who clung together in the storm while the tallest cried, over and over, "O Christ, come quickly!" With his rector's blessing, Hopkins wrote a sprawling tour de force titled "The Wreck of the Deutschland," in which he first "realized on paper" the oratorical possibilities of so-called sprung rhythm. As Hopkins would tirelessly explain (in so many words) for the

rest of his life, this involved "scanning by accents or stresses alone, without any account of the number of syllables, so that a foot may be one strong syllable or it may be many light and one strong."

Robert Bridges, the future poet laureate of England, informed his friend Hopkins that he'd managed to read all 280 lines of "The Wreck of the Deutschland," but would not be persuaded for any amount of money to read it again. And yet Bridges remained beguiled by the possibilities of sprung rhythm, attempting (with indifferent results, as Hopkins saw it) to use it in his own work. When at last he saw fit to introduce Hopkins's singular poetry to the world, some 30 years after his friend's death, Bridges opened the volume with "The Wreck of the Deutschland," "like a great dragon," he wrote, "folded in the gate to forbid all entrance." Entrance would be gained, however, and toward the end of his biography Mariani gives us a nice glimpse of Bridges' venerable dotage, when he was visited by Virginia Woolf and Aldous Huxley — not because those two modernists wished to see the laureate himself, but rather because they wished to see "the Hopkins manuscripts" in the laureate's possession. "Even the self-contented Bridges must see a certain irony in all of this," Mariani observes.

Mariani, who has written biographies of Hart Crane and Robert Lowell, sketches such scenes to good effect, and writes with a deep, sympathetic knowledge of Hopkins's sometimes dauntingly esoteric religious and aesthetic concerns (insofar as the two can be properly separated). Where he fails, alas, is in organizing his material in such a way that the reader is tempted to keep turning pages. Aside from critical discussion, the book proceeds as a more or less chronological series of diary entries and letters, boiled down by the author in so random a manner that large themes are often subsumed amid a welter of trivia. Here, for example, Mariani summarizes a crucial section of Hopkins's diary from May 1865: "He quarrels with a friend and then cuts him. He spends an evening with Addis talking about nothing. He is troubled by erotic urges. He mocks Urquhart to Addis. He eats too much dessert. . . . " I was hoping Mariani would get back to those erotic urges — since, after all, they were much on Hopkins's mind at the time — and he does, briefly. But after a few piquant details ("He draws a crucified arm, which oddly rouses him"), the erotic bits are over, and Mariani goes on about Hopkins's reading Poe and mimicking his father and so forth. All in the same paragraph.

I guess it's not imperative for biographers to dwell on their subjects' sexual inclinations, though most would agree it's kind of crucial in Hopkins's case, and Mariani is almost coy on that point. In one case, we are told that Hopkins distanced himself from a younger classmate at Highgate, Alex Strachey, because he found the lad's company too "pleasurable" ("and therefore . . . too dangerous," Mariani adds in decorous parentheses). Various other hints are given — Hopkins likens a part of himself to Stevenson's Mr. Hyde, and never mind his disturbing Whitman affinity — until we can safely assume that, yes, Hopkins had strongly homoerotic impulses. What this conceivably had to do with his religious vocation, not to say every other significant aspiration (or denial thereof), is largely unexamined.

Nowhere is Mariani's evasiveness more curious than in the case of one Digby Mackworth Dolben, a 16-year-old cousin of Bridges who visited Hopkins at Oxford in February 1865. Among other eccentricities, Dolben wrote feverish poetry in praise of the masculine Christ ("Then, my own Beloved . . . Lay me on Thy Breast"), and, as even Mariani admits, Hopkins sensed the young man was a "kindred spirit." After Dolben's departure, Hopkins noted his dismaying erotic urges (that crucified arm) and wistfully asked Bridges to give his love to Dolben: "I have written letters without end to the latter without a whiff of answer." Finally, a sense of his own sinful nature became so oppressive that Hopkins sought consolation — or so a number of scholars would have it — in the solitary, ascetic life of a Jesuit. "My sap is sealed," he wrote toward the end of 1865. "My root is dry."

Mariani explains Hopkins's conversion in terms of a rather nebulous epiphany on the road to Horsham in 1866 (nothing about a dried root), and mostly he disposes of Dolben in a single, tortuous sentence, as if to be done with the whole disconcerting business at once: "Two weeks later, the handsome and irrepressible 19-year-old Digby Mackworth Dolben, Bridges' distant cousin who was so fascinated with the play of Catholic ritual, often to the point of delusion, and who the year before had walked the streets of Birmingham barefoot, dressed in the tattered brown robe of a Franciscan, the young man who at Hopkins's instigation and example had contacted Newman earlier to say he was undergoing a religious

crisis and would Dr. Newman see him, and then, talking it all over with his parents, wrote Newman back to say the whole thing had been a mistake — this brilliant, wispy flame who had expected to matriculate at Balliol and then fainted during the examinations and so missed his chance — drowns." Wait, who drowns? I traced the sentence back with my finger and found it: ah yes, Dolben, who is mentioned a few more times before sinking into the welter.

As one may gather from the preceding quotation, Mariani's prose is a little on the quirky side; the better for readers to get used to it, he may want to move his acknowledgments to the back of the book in future editions. As is, it's rather like being greeted by a friendly leprechaun: he thanks the "tykish" Rev. Joseph Feeney, and describes his agent as "a Virgil leading his erstwhile pilgrim through the underbrush and malebolges." Likewise, in his critical discussions — though he's very good at describing the technical aspects of Hopkins's work ("curtal" sonnets and the like) — he lapses into a kind of obscure lyricism that appropriates his subject's diction to such an extent that it's hard to tell where Mariani leaves off and Hopkins begins. Had I recently reread the poem "Inversnaid," say, I would have more readily grasped why Mariani would write about Hopkins, "His heart opens to the lightsome fawn-froth of the beadbonny stream twindling over the dark waters below"; as it happened, I was puzzled until I came to the poem itself, as quoted by Mariani, in which the words "fawn-froth," "beadbonny" and "twindles" appear.

Mariani is at his best in evoking the objective details of Hopkins's life, especially the squalor that seemed the lot of a Jesuit in 19th-century Britain. The nadir came during his last years in Dublin, where as a classics teacher he spent night after night poring over dreadful exams, making scrupulous "quarter-point and eighth-point" distinctions lest his pupils miss out on attending a university — "his eyes bleeding," as Mariani tells it, "plagued with diarrhea, the chamber pot filling, a small smoky coal fire, . . . the fate of thousands of students in his hands." After that, his death at 44 in 1889 must have been a positive comfort ("I am so happy" were the poet's dying words), all the more so in the wake of his last, cathartic "terrible sonnets," including his heartbreaking "Thou Art Indeed Just, Lord":

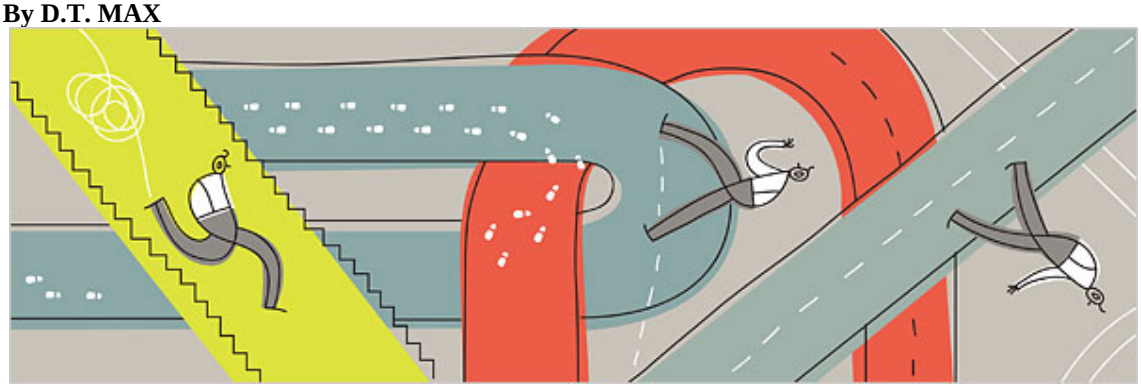
> Why do sinners' ways prosper? and why must
> Disappointment all I endeavor end?
> Wert thou my enemy, O thou my friend,
> How wouldst thou worse, I wonder, than thou dost
> Defeat, thwart me? . . .
> Mine, O thou lord of life, send my roots rain.

Blake Bailey is the author of "Cheever: A Life," which will be published in March.

http://www.nytimes.com/2008/12/14/books/review/Bailey-t.html?ref=books

Walk This Way

By D.T. MAX



THE LOST ART OF WALKING

The History, Science, Philosophy, and Literature of Pedestrianism

By Geoff Nicholson

276 pp. Riverhead Books. $24.95

If golf is a good walk spoiled, then walking is a great game made dull. How sluggish locomotion is, compared with the speed at which the mind absorbs new images and information. The brain strains at the body's tether, seethes for new scenery, new stimulation, bridles at the slow feet below. Look at that tree with such lovely orange leaves, how pretty it is. . . . A minute later: the same tree, the same leaves, still good looking. Walking is adding with an abacus, it's space travel on a donkey.

All the same, many people do it, and clearly Geoff Nicholson, the British author of "The Lost Art of Walking," is among them. "I've strolled and wandered, pottered and tottered, dawdled and shuffled, mooched and sauntered and meandered," he brags at the beginning of this pleasant tour of the literature and lore of ambulation. "I've certainly ambled and I could be said to have rambled. . . . I've also shambled, but I don't think I've ever gamboled."

It turns out that the highly prolific Nicholson also composes novels on his feet. It's how he keeps his productivity up. He solves plot twists and problems of characterization as he walks. One supposes that at some point, strolling along in the Hollywood Hills, the neighborhood in Los Angeles where he lives part of the year, Nicholson, with more than a dozen books to his credit, asked himself how he had overlooked writing about something so central to his life. Could he do it? Did he have the qualifications? "The overriding one was that I liked walking: I liked it a lot," he answered himself, feet pounding the canyon asphalt, and set to work

A disclaimer: I can't walk, at least not easily. I have a condition that makes it painful to do so. Nicholson writes of the pleasurable self-annihilation to be found in a purposeful stride, and another noted writer, the British novelist Iain Sinclair, tells him that "as well as hoovering up information," walking is "a way of actually shifting a state of consciousness, and you get into things you didn't know about, or you begin to find out about, and that's the interesting part." But I think only of hyperextended knees, strained lower backs and concussed heels. In fact, the part of "The Lost Art of Walking" with which I most easily identify is the book's opening, when Nicholson takes a spill on an ordinary hill and breaks his arm in three places. My heart felt not joy, to be sure, but at least the same soft oomph one experiences when Icarus falls into the sea. We were designed to move on all fours, at best knuckle-walk.

Nicholson's wipeout put him on the sidelines at an inopportune moment for this book. That may be why in "The Lost Art of Walking" he is not often on the road. This is not a travel book so much as an omnium-gatherum for those who like to ride what was once called "the marrow bone coach." It is perfect for the armchair walker. Nicholson's stance is that of the ordinary man on the street, fortified by his commonsense Englishness.

For instance, the Continent has recently given us the science of psychogeography, which its founder, Guy Debord, described as "the study of the precise laws and specific effects of the geographical environment, consciously organized or not, on the emotions and behavior of individuals." "This is fine as far as it goes," Nicholson notes, "but it doesn't go very far." Nor is Nicholson crazy about the neoromantic effusions that are common among New Agers when they walk. "Personally I blame Thoreau for a lot of this," he writes. For his part, Nicholson is just as happy in a parking lot as at Big Sur. A walk is a walk. It is "something but not much, certainly not a means of salvation." It can be made even better by a drink or two, as Nicholson shows when he wanders around Manhattan, trying, in a doff of the hat to psychogeography, to figure out whether certain streets in the Village outline a martini glass.

The loping pace of this book, comparable to the act of walking itself, invites time for trivia, and there is a lot in these pages. Nicholson's previous books, among them "Sex Collectors," reveal a taste for offbeat information, and the nuggets collected here must have taken him some work to unearth. According to Nicholson: Wordsworth walked more than 180,000 miles in his life; Norwegians have more than 50 words for walking; roughly 40 percent of pedestrians killed in car accidents are drunk. Private security guards keep what is called the Hollywood Entertainment District Public Urination Map to record instances of this unlawful act. Erik Satie liked to write his music while walking. "Before I compose a piece," he once said, "I walk around it several times, accompanied by myself." World War I hurt his productivity, because he could not write down his ideas under the blacked-out streetlamps of Paris. Mrs. Dalloway could have covered the distance in the famous walk in the eponymous novel in the time frame the book allows only by taking a taxi. There was a man who twice walked naked across England, from one corner to the other. In 1974, Werner Herzog walked from Munich to Paris because he believed it would cure the film historian Lotte Eisner, who was gravely ill. After his arrival she lived another nine years.

Walking turns out to have had a heyday, at least as a competitive sport. That heyday came in the 19th century, when for the first time it was no longer something nearly everyone had to do. The sport was called pedestrianism, which was not then, Nicholson says, a synonym for the act of walking as it is now. Pedestrians walked on bets, they walked to set records, they walked for love. On a bet, the great pedestrian Capt. Robert Barclay Allardice walked a mile in each of a thousand successive hours, which means, as Nicholson points out, that he never got to rest for more than an hour and a half at a stretch for more than 40 days.

One of Nicholson's favorite walkers, though, trod his path more recently. The explorer Sebastian Snow walked the 8,700 miles from Tierra del Fuego to the Panama Canal in 19 months in the early 1970s. Snow, who died in 2001, was "droll, debonair, tough as granite and an eccentric by any conventional standard," Nicholson writes. Asked how he did it, the Old Etonian commented: "By some transcendental process, I seemed to take on the characteristics of a Shire (horse), my head lowered, resolute, I just plunked one foot in front of t'other, mentally munching nothingness." Which is why I'd rather ride a bike or grab a cab.

D. T. Max is the author of "The Family That Couldn't Sleep: A Medical Mystery," recently published in paperback.

http://www.nytimes.com/2008/12/14/books/review/Max-t.html?ref=books

My Poetry Is Filthy — but Not I'

By STEVE COATES

MARTIAL'S EPIGRAMS

A Selection

Translated and with an introduction by Garry Wills

205 pp. Viking. $24.95

You have to admire a scholar who can produce a small library of erudite, elegant and accessible books on American history, the New Testament and his own powerful brand of Roman Catholicism, winning a Pulitzer Prize along the way. And you have to be impressed by a plucky Spanish provincial, in the dangerous days of Nero and Domitian, who could manage to earn a handsome living writing dirty poems for the urban sophisticates of ancient Rome. But can you condone what they get up to under a single set of covers? "Martial's Epigrams," Garry Wills's enthusiastic verse translations of Marcus Valerius Martialis, Rome's most anatomically explicit poet, offers a chance to find out.

The pairing is not as counterintuitive as one might imagine. Wills, who has a Ph.D. in classics and who once taught ancient Greek at Johns Hopkins, has long kept a foot in the ancient world. His Pulitzer winner, "Lincoln at Gettysburg," brilliantly analyzed Lincoln's greatest speech in terms of the conventions of ancient Greek funeral orations, and he has also translated the Latin of St. Augustine's "Confessions."

Martial, though, was no saint. Arriving in Rome around A.D. 64, he spent much of the next four decades composing short topical verse about life in the big city, an urban panorama as broad, as varied and as full of depraved humanity as any to have survived from classical times. In conventional but nimble Latin meters, he wrote gory epigrams about the Colosseum, sycophantic ones to flatter the ruler of the day, tender ones about such topics as a slave girl's early death and, above all, comic ones aimed squarely at Roman society's foibles. Preoccupations including comb-overs, stingy hosts, medical quacks, the poetry

racket, the futility of cosmetics, consumptive heiresses and one-eyed women lend his books the ambience of a front-row seat at the Roman carnival.

Modern readers, however, are drawn to Martial mostly for his scorpion-tailed epigrams of sexual invective, written, limerick- and graffiti-like, as raunchy entertainment. Even by today's standards, many are grotesquely obscene; Martial takes us down some of Rome's sleaziest streets ("I write, I must confess, for dirtier readers, / My verse does not attract the nation's leaders").

If Martial's poems weren't saintly, though, they were all in good fun ("My poetry is filthy — but not I," he insisted). His targets were types, not real people, and many of his outrageous sketches, it has been rightly said, "come no closer to plausible reality than a Victorian Punch cartoon." In this spirit, Martial riffs endlessly on prostitution, marital infidelity, oral sex, pederasty, exhibitionism, unapproved modes of homosexuality, and incest ("Of course we know he'll never wed. / What? Put his sister out of bed?"). Roman sexual humor, it seems, when not simply gross-out comic description of intimate body parts — Martial wrote a notorious poem involving a loquacious vagina — hinged largely on the question of who might be on the passive end of any copulatory squirming ("I thought 'twas you that played the man / But find receive is all you can").

In the case of lines far more lubriciously explicit than these, Wills embraces the Roman poet's copious Latin obscenities in tumescent Anglo-Saxon translations, and in this sense certainly conveys the authentic Martial. He suggests that his happy-go-lucky rhyming verse and dogged meters work toward the same end, preserving some of the strict formality of Martial's elegiacs and hendecasyllables. But in fact, Wills's commitment to rhyme, not a significant concern for Latin poets, forces his syntactical hand and allows much of the real Martial to fall between the cracks. One neat example is a two-line poem that Wills translates: "Her teeth look whiter than they ought. / Of course they should — the teeth were bought." A prose version reveals that Martial was able to insult not one woman but two in the same space: "Thais's teeth are black, Laecania's snow-white. The reason? The latter has ones she bought, the former her own."

Most of Wills's translations, denuded of Martial's enlivening proper names, are impressionistic in this same way, and readers wanting to get closer to the Latin text would be much better off picking up a volume or two of the well-annotated Loeb Classical Library prose edition by the great Latinist, textual critic and translator D. R. Shackleton Bailey, who died in 2005.

Educated Romans often translated Greek poetry, or even tried their hands at epigrams, as a cultured way of amusing themselves. From Wills's affectionately rambunctious dedication to the same Shackleton Bailey ("Martialissimo" — essentially, "Martial to the max") to the acknowledgments' revelation that most of these poems were translated at the Grand Hotel de la Minerve in Rome and the Grand Hotel Continental in Siena, this collection bespeaks a great scholar at play. Recreational classicists should feel flattered that he wants them to watch.

Steve Coates is an editor at the Book Review.

http://www.nytimes.com/2008/12/14/books/review/Coates-t.html?ref=books

David's Mirror: Illusions and Pain Perception

A mirror and massage curtail pain in a case where strong and dangerous pain drugs had failed.

By: Lisa Conti | November 20, 2008 | 11:43 AM (PST) |

David positioned near two mirrors.Courtesy of Beth Taylor-Schott

When his wife handed him a mirror, David didn't realize she was pioneering a cutting-edge therapy that had never been used on his condition. He didn't know that after spending years in the most pain imaginable and nearly losing his life, relief would come as an illusion. But when a captivating story about itching prompted Beth to try a simple experiment, David's condition improved and brain science progressed.

David suffers from anesthesia dolorosa, or AD, a painful affliction often caused by the hands of a well-intentioned surgeon. For David, it resulted from a 1999 surgery for trigeminal neuralgia, an irritation of the trigeminal nerve. Running from the brain to the eye and branching off to the upper and lower jaw, the nerve effectively wires facial sensations.

Following the surgery, David developed numbness and then pain — the pain of AD.

"For me, it was mostly like a cluster of crescendo kinds of pains. You could feel it coming on, then boom, you get this pain that goes through your eye or jaw that feels like you are being stabbed," he explained.

AD is often referred to as a "most dreaded condition." There is no effective treatment. While medications are the first line for attacking the pain, they are often ineffective. And for David, they were more of a pain than they were worth.

In fact, the drugs (pain medications and stimulants to counteract the doping effect) left David's heart compromised. He went to the emergency room several times with pericarditis — an inflammation of the lining of the heart — so bad that it had seriously lowered his blood pressure and then stopped his heart altogether.

"The cardiologist said, 'You may never take stimulants again,'" recalled Beth, who talks in carefully worded sentences with thoughtful demeanor with poignant insights. "Basically (saying), 'you are going to kill yourself.' And while on the pain medications alone, David did not have many waking hours. He was really disabled."

While David recovered in the hospital, Beth nervously cleaned out her e-mail inbox. In a message from her brother-in-law, she came across "The Itch," an article in *The New Yorker* by Harvard neurologist Atul Gawande. The article was also about nerve damage and numbness — and mirrors. "The Itch" describes how using mirrors to give some people with "phantom limb pain" — feelings from a limb that has been amputated — the illusion that the missing limb is present and functional can sometimes obliterate the pain.

Beth made the connection that the numbness, burning and electric bolt sensations were just that, sensations experienced in the brain and not the nerves in the face responding to something directly. It was a breakthrough. She realized that David's loss of sensation on the left side of his face was like a lost limb.

"Beth is a very astute, careful observer," said neurologist V.S. Ramachandran, director of the Center for Brain and Cognition at the University of California, San Diego. Ramachandran first wrote about mirror therapy in 1996. Since then, it has been used to effectively treat phantom limb pain and been carried over to help stroke victims and address other pain disorders.

Mirror therapy depends on the principal that pain becomes wired into the brain and intricately linked with the visual system. At the end of "The Itch," Gawande consults with Ramachandran, who speculates that having the patient with the itch look into a non-reversed image in the mirror while being touched by someone else might do the trick.

When she read "The Itch," Beth and David — both of them poets, writers and instructors — were living in upstate New York on the Canadian border, nowhere near a therapist or doctor who specialized in mirror therapy. So the day David left the hospital, the couple went to a thrift store, paid 25 cents for a

hand-held mirror and effectively rubbed away the pain, trying different massage techniques on the right side of his face — *the right side, not his afflicted left side* — to see what works. With 15-minute rubbing sessions three or four times a day, David has been able to wean himself off medication completely.

"I'm just a man in search of a mirror," said David, holding a hand-held mirror up at a slightly less than 90-degree angle to a larger wall mirror. The small mirror shows David his "true image," not a reversed one, as a single mirror would do. It creates the illusion — and the sensation — that when Beth massages the healthy side of the face, the injured side is being touched. The sensation in fact is coming from the good/right side of the face, and David knows which side he's really seeing, but the visual perception overrides the facts, and his pain fades.

Scientists believe that the illusion tricks the brain's visual system into remapping the body's image, essentially resetting the system. Since much of memory, including pain memory, corresponds with visual feedback, the optical cues along with the sensory sensation from the unaffected side provide the *voilà* effect.

In his book *Phantoms in the Brain*, Ramachandran notes that people who undergo mirror therapy often notice an almost immediate relief. For some, after a few weeks with the mirror, the pain is gone forever. Others keep the mirror close by for a quick fix. Since David has experienced so many types of therapies that provided no lasting relief, the current success doesn't seem to be wishful thinking.

David is the first AD patient to benefit from mirror therapy. He and Beth blog about the experience, and his case has gained recognition from pain and brain science experts, as well as *The New Yorker*.

"This is a promising start," Ramachandran said. "On the other hand, it needs to be studied systematically. The vision is kicking in. We have to learn to harness that in the best possible manner." He explained that getting clinicians to use the therapy is key, and ultimately this non-surgical, non-pharmacological therapy may circumvent more extreme treatments.

More sweeping yet is the change in view regarding pain origin and the possibility that treatment eliciting the eyes may carry over to more common pain problems.

Although the pain is significantly diminished, David is not completely pain-free and the couple continue to navigate the burgeoning pain management field, adding his own fragments of information.

Reflecting on how the experience has changed his own views, David said, "It closes the door for one kind of perception I would consider mainstream and opens another door that, most of the time, is a strange one to walk through — but I don't have the choice."

http://www.miller-mccune.com/article/david-s-mirror-illusions-and-pain-perception

Protect a Levee, Protect the World

A method of buttressing California's aging levees shows promise for capturing carbon dioxide.

By: Joan Melcher | December 12, 2008 | 07:54 AM (PST)

It's obvious that carbon is stored in wetlands. But could it be stored at a rate that would merit their inclusion in carbon cap-and-trade programs?

That question has been asked since researchers looking at the safety of levees uncovered a promising way to capture atmospheric carbon. The preliminary answer is a definite ... maybe.

Well before Katrina, scientists studying central California's Sacramento-San Joaquin River Delta speculated that restoring wetlands on abandoned farmland would mitigate the hydraulic force on miles of delta levees, which in some places hold back 20 feet of water. Then, Katrina's devastation of New Orleans drew national attention to concerns about the delta's aging levees and the potential for another catastrophic failure.

Exacerbating the problem was the likelihood of certain disasters (such as California's looming "Big One") allowing saltwater intrusion from San Francisco Bay, a threat to millions of acres of farmland in the state's Central Valley as well as freshwater supplies for some 25 million Californians.

As U.S. Geological Survey scientists studied the subsidence of land drained for agricultural uses in the delta, they began to notice surprisingly high rates of carbon captured — or accreted — in their study plots.

Could restoring these freshwater wetlands not only help save the levees, protect farmland and save freshwater supplies but also address global climate change? That was something USGS scientist Robin Miller said people inside and outside her 10-year-old project on Twitchell Island have started asking.

Let's Find Out

The USGS recently launched a three-year, $12.3 million project that will attempt to answer the question. Scientists from the USGS California Water Science Center and the University of California, Davis have joined Miller at Twitchell Island. If they find that "carbon capture" farming in the delta is a viable idea, farmers could be paid for restoring wetlands while helping save the planet.

Specifically, Miller's research has shown that as tule (a species of sedge grass also known as bulrush) and cattails grow in these soggy study plots, the land surface rises an average of 4 to 6 centimeters a year — from decomposing plants that form a peat soil — with some areas rising about 0.63 meter, or two feet, over 10 years. Typical rates documented in scientific literature are a centimeter or less a year, she said.

That decomposed matter contains lots of stored carbon. The project has shown an average of 1,000 grams of carbon per square meter per year has been captured over the past five years. That dwarfs the rate of carbon sequestration achieved in reforested agricultural land, which is typically less than 100 grams of carbon per square meter per year, according to a study by Gail Chmura, associate professor of geography at McGill University and director of the Global Environmental and Climate Change Center of Quebec.

The idea of looking at wetlands as carbon sinks is relatively new, and little scientific quantification has been made of wetlands' potential to offset global warming, Chmura said.

Scientists working with Miller put some numbers to what carbon-capture farming could do for California's efforts to offset greenhouse gas emissions. They claim restoring an area the size of subsided lands in the delta could see greenhouse gas reduction equal to turning all the SUVs in California into small hybrids or turning off all residential air conditioners in the state. They're looking to find a place for carbon farming in California's carbon-trading market, which state law requires be online by 2011.

But There's a Catch

Wait a minute, say other scientists, who note methane is typically released from freshwater wetlands, and methane is a much more potent greenhouse gas than carbon dioxide. To put it in perspective, one molecule of methane is equal to 70 molecules of carbon dioxide in the atmosphere, Chmura said.

Methane gas is released when a methane molecule uses carbon dioxide to produce energy. When sulfate is available in a wetland, however, the production of methane is inhibited.

Because sulfate is generally available in tidal wetlands, fluxes of methane are low in these areas. Marine wetlands, therefore, are getting attention as carbon sinks, while freshwater wetlands, such as those of the Sacramento-San Joaquin River Delta, continue to be viewed as marginal.

Chmura researches carbon sequestration in tidal marshes and has authored a paper on carbon accumulated in the Atlantic Ocean's Bay of Fundy marshes that recommends marine wetlands be included in global carbon budgets. She described the rate of accretion in the USGS project as "phenomenal," noting "it's four times the average for marine tidal wetlands."

However, "if they release methane, they need to have more like 70 times the carbon stored."

Scott Bridgham, an ecosystem ecologist at the University of Oregon, also doubts the overall benefit when it comes to global warming. He has seen some of Miller's data and thinks the rate of carbon sequestration will end up being "a wash" once methane emissions are factored in.

Bridgham is the lead author of the chapter on wetlands in *The First State of the Carbon Cycle Report* of the U.S. Climate Change Science Program and a leading researcher in methane release from wetlands. His work has shown freshwater wetlands are not likely to sequester enough carbon to offset methane release.

But It's Different Here

Miller counters that Bridgham's study does make a possible exception for certain peat soils because restoration keeps carbon in the soil while adding new carbon through plant growth and decomposition.

Another factor Miller identifies is high rates of sulfate in her study area compared with other freshwater wetlands, likely because the delta is hydrologically connected to the sea. This, Miller said, may give it some marine wetland advantages.

To date, measurements of methane release have varied widely at Twitchell Island, but the USGS plans to conduct a complete greenhouse gas inventory. "We'll have a lot of that up and running by the next growing season," she said.

Other concerns the researchers will be addressing are nitrous oxide emissions and production of methyl mercury.

Miller believes that the greenhouse gas balance from the project, when the huge amounts of carbon sink are tallied with methane emissions, will show carbon capture outweighing the release of methane gases.

Chmura and Bridgham will no doubt be interested in the results. There is one thing all the scientists will agree on: There are many ecosystem services associated with saving wetlands, among them ensuring a safe water supply, providing habitat to many species, coastal protection, flood regulation and recreation.

Carbon capture may be another, but the bets are still out.

Miller, for one, is quick to note that what may work at Twitchell Island won't work in many other wetlands. "We have specific conditions that occur in our wetlands that don't occur everywhere," she said. In her 15-acre study area, the 10-month growing season, peat soils and biogeochemical conditions favor high carbon production and low methane release.

What she is most pleased with is that she has been able to study this wetland for 10 years, a rare occurrence in scientific research: "It's been incredibly interesting to study it and access it as long as we have - to see it become a much more carbon-capturing environment."

It helps that she may be killing two birds with one study.

http://www.miller-mccune.com/article/Protect-a-Levee-Protect-the-World

A New Look at the Impact of Diversity

Much of the rhetoric about diversity is based on ideas about what happens when students are exposed (or are hardly ever exposed) to people who are from different backgrounds than they are. A new study that tracked 2,000 students at the University of California at Los Angeles attempts to move beyond the rhetoric by documenting exactly what does happen when students interact with different kinds of fellow students.

Some of the findings may cheer supporters of affirmative action. Notably, the research found a positive impact on racial attitudes from students who are exposed to those of other races and ethnicities. While many educators have long said that they believe in such an impact, the new study provides longitudinal research to back up what to many has been conventional wisdom more than scientific research. These findings may be crucial because court rulings upholding the legality of affirmative action have made the point that some broad societal gain is needed, not just the individual benefit that goes to an admitted minority students.

Other findings, however, may anger some diversity advocates (not to mention some fraternity and sorority leaders). The researchers examined the impact of membership in groups that are defined largely by race and ethnicity (such as black student unions) as well as membership in groups that do not have an explicit racial or ethnic mission, but have overwhelmingly white members (some fraternities and sororities). Generally, they found that a negative impact resulted from membership in these groups — white or minority — in which belonging to such a group led to an increase in feelings of victimization.

"The overall point of this study was to try to find out what effects the college experience has on intergroup attitudes of students," said Jim Sidanius, the lead author and a professor of psychology at Harvard University. The results are being released this month in *The Diversity Challenge: Social Identity and Intergroup Relations on the College Campus*, a book being published by the Russell Sage Foundation. (The other authors are Shana Levin of Claremont McKenna College, Colette Van Laar of Leiden University and David O. Sears of UCLA.)

Sidanius said that the research was conducted from the perspective of being "neutral" on affirmative action — with the scholars not seeking evidence to either bolster or hinder the practice. UCLA was selected both because of its racial and ethnic diversity (no group on campus is a majority) and because some of its policies lend themselves to work of this kind. For example, first-year roommates are assigned randomly, resulting in pools of students who live with someone of the same race and ethnicity and others who do not.

One key finding was the generally positive impact on racial attitudes of living with someone of a different race. Students were surveyed on their attitudes before being assigned someone to live with, and

after a year in which some lived with "outgroup roommates." Generally, and regardless of the attitudes with which students entered UCLA, those who lived with members of other ethnic groups showed statistically significant gains in comfort levels with people of different groups, having circles of friends beyond one's own group, and a variety of other measures of tolerance toward different groups. The changes in attitudes were most striking for those living with either black or Latino roommates.

The one exception to this positive impact was with Asian students as roommates: White and black students who lived with Asians tended to show increased prejudice against Asians on some measures after living with them.

From the surveys, Sidanius said that it was clear that whatever positive impacts occurred by having people live with those from other groups were more as a result of informal interaction. It's not that minority students are explaining the history of racism; they are just interacting as roommates do. "It largely is about becoming friends, and developing emotional friendships, not just trading information," Sidanius said.

This finding has several implications, Sidanius said. First it suggests that colleges and society benefit when there are enough people from different backgrounds at a college that people can end up rooming with people from different groups. Second, it says that colleges should place a premium on mixing students up with room assignments. "The first thing colleges should do is to randomly assign students to roommates or deliberately mix race and ethnicity of roommates to make sure students don't end up rooming in ethnic enclaves," he said.

Impact of Students' Choices

Enclaves can of course exist in areas beyond housing. The research team for *The Diversity Challenge* also did extensive research on the impact of participation in student groups associated with racial or ethnic groups or that were predominantly populated by members of one group. The book notes that researchers using "a multicultural framework" have long argued that minority student organizations represent both a source of support for participants and "a bridge" to the rest of the campus.

That's only correct in part, the book concludes, based on surveys of students involved and not involved in such organizations. Many minority students in such groups report positive feelings of ethnic identity and political engagement, the book says. But involvement with such groups also — in contrast to the more inclusive view of multiculturalism — increased students' sense that they are victims and that all racial and ethnic groups are locked in "zero-sum competition."

These "conflict-inducing" impacts, the book stresses, are not unique to membership in minority student organizations. They are present in white students who are involved in predominantly white fraternities and sororities.

Sidanius said in an interview that he realizes that one conclusion of this part of the book might be that colleges should stop supporting Greek systems that are largely segregated, or minority student organizations. Such a move would probably be "too costly politically" for a college president today, Sidanius said. But at the same time, he added that college leaders should focus more attention than they have on the fact that many Greek systems are more segregated than much of the rest of the campus. As for minority student organizations, he said he would "stop encouraging" their growth. Colleges might not eliminate them, but might not shower them with support and funds, he said.

As a scholar, Sidanius practices what he preaches. An African American, he is a member of several scholarly societies that have black caucuses — and while he participates in the societies, he doesn't join the caucuses.

— Scott Jaschik

The original story and user comments can be viewed online at
http://insidehighered.com/news/2008/12/19/diversity.

'WORSHIPING WOMEN'
The Glory That Was Greece From a Female Perspective

By HOLLAND COTTER

It's funny, given American political ideals, that our museums offer so few major exhibitions of ancient Greek art. The Met had one called "The Greek Miracle: Classical Sculpture From the Dawn of Democracy," but that was in 1993. It was an expensive, blockbustery thing that told a story we already knew, and one that is only partly true: that Western culture, or whatever is good about it, was a Greek invention.

Some of us asked at the time why the curators, who had been handed loans of almost mythic status — the "Kritios Boy," the "Grave Stele of Hegeso" — did so little with them. The show could have been an opportunity to break scholarly ground: to examine the role of class in ancient Greece, or to consider the lives of women and children, or to reconsider what classicism means as a value-laden historical concept. What we got was art-survey boilerplate.

Two years later the Walters Art Gallery in Baltimore mounted a show on women in ancient Greece, impressively. And now New York has one too. Moderate in size, efficiently presented and somewhat stiffly titled "Worshiping Women: Ritual and Reality in Classical Athens," it is not at the Met or any other museum but at the Onassis Cultural Center in Midtown, a kunstshalle-style space, now almost a decade old, devoted to Hellenic culture.

As conceived by its two curators — Nikolaos Kaltsas, director of the National Archaeological Museum of Greece, and Alan Shapiro, professor of archaeology at Johns Hopkins University — the show's intention is twofold: to present a nuanced view of a still-elusive subject, and to correct, or at least revise, existing misconceptions.

The main misconception is the notion that women had a universally mute and passive role in Athenian society. It is true that they lived with restrictions modern Westerners would find intolerable. Technically they were not citizens. In terms of civil rights, their status differed little from that of slaves. Marriages were arranged; girls were expected to have children in their midteens. Yet, the show argues, the assumption that women lived in a state of purdah, completely removed from public life, is contradicted by the depictions of them in art.

Much of that art is religious, which is no surprise considering the commanding female deities in the Greek pantheon. Like most gods in most cultures they are moody, contradictory personalities, above-it-all in knowledge but quick to play personal politics and intervene in human fate. Four of them make in-depth appearances here.

Athena comes on as a striding warrior goddess, armed and dangerous, avid as a wasp, in a tiny bronze statuette from the fifth century B.C. This is the goddess who, in "The Iliad," egged the Greeks on and manipulated their victory against Troy, and the one who later became the spiritual chief executive of the Athenian military economy.

Yet seen painted in silhouette on a black vase, she conveys a different disposition. She's still in armor but stands at ease, a stylus poised in one hand, a writing tablet open like a laptop in the other. The goddess of wisdom is checking her mail, and patiently answering each plea and complaint.

Artemis is equally complex. A committed virgin, she took on the special assignment of protecting pregnant women and keeping an eye on children, whose carved portraits filled her shrines. She was a wild-game hunter, but one with a deep Franciscan streak. In one image she lets her hounds loose on deer; in another she cradles a fawn.

But no sooner have we pegged her as the outdoorsy type than she changes. On a gold-hued vase from the State Hermitage Museum in St. Petersburg she appears as Princess Diana, to use her Roman name, crowned and bejeweled in a pleated floor-length gown.

Demeter was worshiped as an earth goddess long before she became an Olympian. Her mystery cult had female priests, women-only rites and a direct line to the underworld. And although you might not expect Aphrodite, paragon of physical beauty, to have a dark side, she does.

She was much adored; there were shrines to her everywhere. And she had the added advantage of being exotic: she seems to have drifted in from somewhere far east of Greece, bringing a swarm of nude winged urchins with her. But as goddess of love she was unreliable, sometimes perverse. Yes, she brings people amorously together, but when things go wrong, watch out:

"Like a windstorm/Punishing the oak trees,/Love shakes my heart."

So wrote the poet and worshiper of women, Sappho, who knew.

Actual worship took various forms. Some were simple gestures. In several vase paintings we see women pouring wine, milk or honey from flat bowls onto the ground as an offering. In others they lead sacrificial animals to altars, a reminder that the white marble temples we now so admire for their purity were once splashed with blood.

One vase fragment, showing a group of women looking jumpy and frazzled, was long assumed to depict an orgiastic festival in honor of Aphrodite's boy-toy lover, Adonis, the James Dean of Greek myth, who died young and left a beautiful corpse and mobs of inconsolable female fans. Recently, though, scholars have concluded that this is a marriage scene, with an anxious bride being prepared by hovering attendants for her wedding night.

The management of weddings was female turf, as was childbirth and the raising of children. So were the rituals surrounding death. Men were in charge of war and killing; women were in charge of washing and dressing bodies for the all-important last rites, without which souls were left to wander the earth. Birth and death — the only real democratic experiences, existentially speaking — were in women's hands.

There is no more moving image in the show than that of two women, one seated and one standing, facing each other in carved relief on a marble grave stele dated to the fourth century B.C. Both may be priests, or worshipers, in an earth-goddess cult; neither looks young. An inscription identifies the woman commemorated by the stele as Nikomache. The exhibition catalog suggests that she is the seated figure, the one who has settled in and will keep her place when the other walks away. The parting is evidently in progress as the women clasp hands and meet each other's gaze.

Sappho again, and a poem called "Long Departure":

Then I said to the elegant ladies:

"How you will remember when you are old

The glorious things we did in our youth!

We did many pure and beautiful things.

And now that you are leaving the city,

Love's sharp pain encircles my heart."

Despite this and other illustrations of female agency in ancient Athens, it would be a mistake to argue that the lot of women there was, after all, a fair deal. The record stands: no citizenship, no vote, little or no control over the use made of your time or your body. But the show is not making that argument. Instead it is using art to survey where, within a system of institutionalized restriction, areas of freedom for women lay.

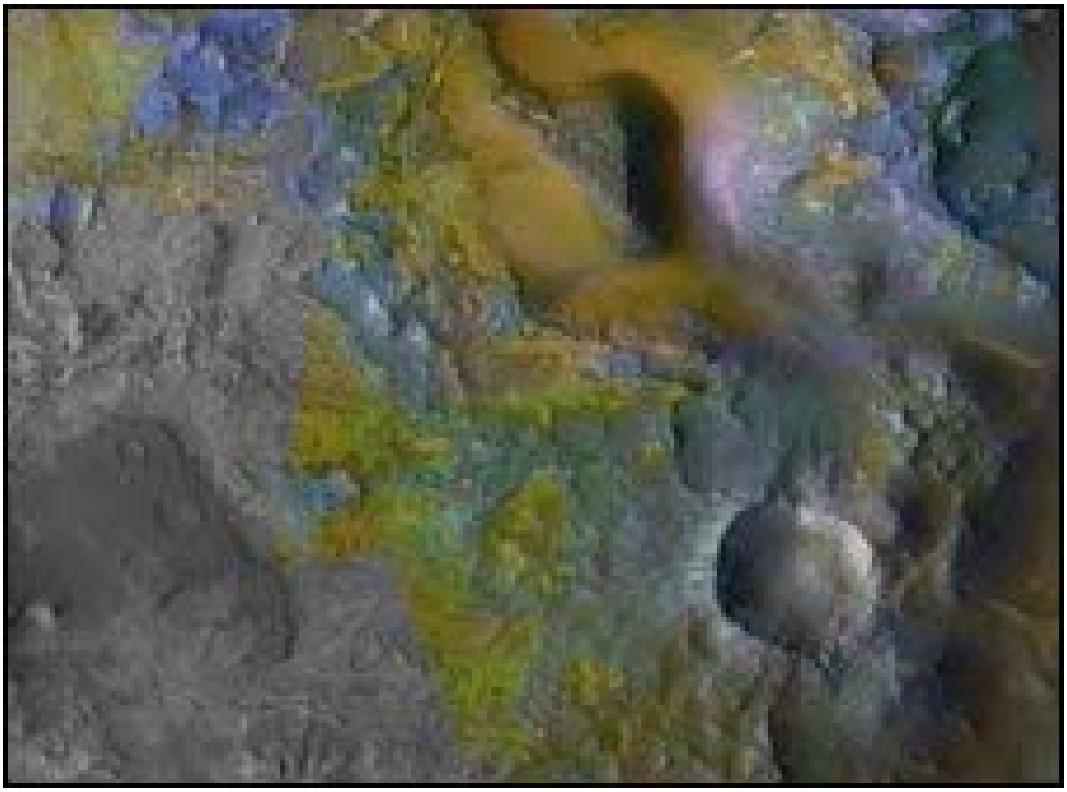
By doing so it makes a valuable, if by now no longer entirely novel, contribution to classical studies. And it presents art with a thematic focus, a historical tact and a relevance to the present that our museums — I am thinking particularly of the Met, with its beautiful but blandly generalizing Greek and Roman galleries — can learn a lot from. As can we. In ancient Athens, as in contemporary America, true democracy was always an ideal, never a fact.

"Worshiping Women: Ritual and Reality in Classical Athens" continues through May 9 at the Onassis Cultural Center, 645 Fifth Avenue, near 52nd Street; (212) 486-4448, onassisusa.org.

http://www.nytimes.com/2008/12/19/arts/design/19wome.html?_r=1&th&emc=th

Nasa finds 'missing' Mars mineral

By Jonathan Amos
Science reporter, BBC News, San Francisco



Nasa's Mars Reconnaissance Orbiter has finally spotted rocks on the Red Planet that bear carbonate minerals.

The ingredients needed to make the rocks are very evident, so their absence had been a major puzzle.

One theory to explain the omission is the idea that water on Mars has been too acidic to allow carbonates.

The rocks' identification now shows these harsh waters have not dominated all parts of Mars - and that is good news for the search for life.

"You want to get an environment that is basically as clement as possible, that's not difficult to live in," explained Bethany Ehlmann from Brown University in Providence, Rhode Island.

"It's difficult to live in a highly acidic environment; it's difficult to live in a very salty environment. If you have neutral waters then that presents a less difficult environment for microbial life," she told BBC News.

Weathered rocks

Ehlmann and colleagues have been detailing the discovery here at the American Geophysical Union's (AGU) Fall Meeting 2008. A paper explaining their findings is also being published in the journal Science.

The carbonate minerals were detected in a mid-latitude region called the Nili Fossae, on the western edge of the Isidis impact basin.

The landscape viewed by Mars Reconnaissance Orbiter (MRO) is believed to have formed more than 3.6 billion years ago.

Carbonates are produced in the weathering process that sees water with dissolved carbon dioxide re-fashion the original chemistry of rocks. The carbonates - in this case, magnesium carbonate - precipitate out of solution.

On Earth, carbonates are usually associated with great marine sediments like limestone and chalk; although the scientists here stressed the Martian carbonates would look nothing like that.

Life hunt

Previous data from orbiting spacecraft and from the robot rovers on the surface of Mars has revealed salt-rich, acidic waters affected much of the planet in more modern times.

Given that carbonates dissolve quickly in low pH solutions, it is possible that many large carbonate formations created on early Mars may simply have disappeared; and this could explain why it has taken so long to find a carbonate signature.

But the MRO discovery shows that some areas of the Red Planet at least must have been untouched by these harsher conditions. That makes Nili Fossae an interesting place for future Mars missions to explore.

"If you preserve carbonates on the surface then you know carbon-bearing compounds can survive in some environments on the planet," said Richard Zurek, the project scientist on MRO.

"That means there are some places we can go and look for evidence for past life - if it ever existed."

Interestingly, Nili Fossae lost out in the site selection contest to choose the landing location of the next Nasa rover, called the Mars Science Laboratory (MSL).

The vehicle's launch recently slipped from 2009 to 2011 and the scientists at AGU said it was possible the contest outcome could now be reviewed. However, they also said there would be other opportunities to visit Nili Fossae.

"MSL is not the last lander that we intend to send to the planet. With this diversity of environments, there are many places to explore," said Dr Zurek.

Jonathan.Amos-INTERNET@bbc.co.uk

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/science/nature/7791060.stm

Published: 2008/12/19 00:46:26 GMT

Climate outcome 'hangs on coal'

By Jonathan Amos
Science reporter, BBC News, San Francisco

If growth in carbon dioxide emissions is to be constrained and even reversed then the world cannot afford a coal renaissance, scientists have said.

Some commentators have argued that falling reserves of oil and gas will automatically limit CO2's rise.

But at an American Geophysical Union meeting, researchers said reserves of coal dwarfed those of other fuels.

It was even possible oil's demise could trigger an acceleration in emissions through more coal use, they added.

"We can replace oil with liquid fuels derived from coal," said Ken Caldeira from the Carnegie Institution at Stanford University in California.

"But these liquid fuels emit even more carbon dioxide than oil, so the end of oil can mean an increase in coal and even more carbon dioxide emissions to the atmosphere, and even more rapid onset of dangerous climate change."

Professor Caldeira's group has used climate and carbon cycle models to look at how future emissions and temperature projections would be altered by different fuel strategies.

The team tried to work out the maximum effects that would arise from replacing oil either entirely with coal-based liquid substitutes or entirely with renewable energy sources.

The assessment found that if coal-derived liquids are adopted, the Earth would achieve a 2C rise in temperature from pre-industrial times (a figure sometimes quoted as being a desirable ceiling to stay beneath in order to avoid "dangerous climate change") by 2042. This is three years faster than a business as usual future with oil.

If the renewables strategy is adopted, the 2C figure is not reached until 2056.

"Clearly, to address the climate issue we have to address the coal issue," Professor Caldeira told BBC News.

His assessment was shared by Pushker Kharecha from Nasa's Goddard Institute for Space Studies (Giss).

"We cannot move into things like coal-to-liquids and unconventional fossil fuels such as methane hydrates, tar sands, oil shale and so forth," he said.

"If they become large-scale substitutes for oil and gas, that would worsen things because they are much dirtier than oil and gas because they produce more emissions per unit energy delivered."

Reserve judgement

Dr Kharecha presented details of recent research from the US, UK and France looking at the feasibility of not only constraining the growth of CO2 emissions but actually reducing its concentration in the atmosphere to 350 parts per million by volume (it is currently up at about 385ppmv).

The group found it was possible, but only with a prompt moratorium on new coal use that does not capture CO2, and a phase out of existing coal emissions by 2030.

Reforestation together with improved agricultural practices could help draw down CO2.

"Efficiency and conservation have huge potential to offset emissions in the near term," Dr Kharecha told BBC News.

"And then in the mid-term and long-term we can focus on moving to alternatives such as renewable energies, and possibly a balanced look at nuclear because it does provide many benefits in addition to the numerous problems that it poses."

A new analysis presented here puts the total available global coal reserves at 662 billion tonnes.

The figure is substantially lower than the ones used in assessments by the Intergovernmental Panel on Climate Change (IPCC) to gauge possible future emissions scenarios.

"This is a radically different number from what is conventionally assumed," said Professor David Rutledge from the California Institute of Technology, who led the analysis.

"The IPCC assumes that about five times as much coal is available for burning."

But the scientists at this meeting said that if burnt, even this smaller amount of coal would radically alter the climate unless all the emissions were captured and stored.

"There is far more than enough currently useable coal and other fossil fuels to push us past the threshold beyond which we would not want to go with the climate," Dr Kharecha said.

Jonathan.Amos-INTERNET@bbc.co.uk

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/science/nature/7789249.stm

Published: 2008/12/18 16:25:02 GMT

Warning over pregnancy steroids

Pregnant women at risk of delivering early should not be given too many doses of steroids, say researchers.

The drugs are given to promote lung development in the foetus and increase the chances of survival.

But a study of 1,800 women suggested multiple courses of steroids do not improve outcomes after premature birth and may lead to smaller babies.

Doctors should stick to one course of treatment, the Canadian researchers wrote in The Lancet.

The first trial of steroid treatment in mothers of babies at risk of being born prematurely was carried out in the 1970s.

By the 1990s it had been established that a single course of treatment was beneficial for the baby.

But Dr Kellie Murphy, study leader and obstetrician at Mount Sinai Hospital in Toronto, said doctors then began to give further doses if women did not have their baby soon after the first course of treatment.

Some women, including patients in the UK, received treatment every seven to 14 days, she said.

Birth weight

In the study, women who were 25 to 32 weeks into their pregnancy and had received one course of steroids, but had not given birth after seven to 14 days, were either given further courses of steroids or a placebo.

Babies exposed to multiple steroid doses had very similar outcomes to those who had had only one dose.

But they weighed around 100g less at birth, were shorter and had a reduced head circumference.

The researchers are planning to follow the babies to the age of five to monitor if they develop any neuro-developmental problems.

"Our trial showed quite clearly there is the possibility of risk with repeated doses," Dr Murphy said.

"Even with one extra dose we need to be very cautious."

Professor Andrew Shennan, an obstetrician at St Thomas's Hospital in London, said the study was addressing a very practical issue.

"There is an opportunity to give many courses quite often," he said.

"But there is a big difference between giving steroids every week and giving them once or twice.

"If you give a dose to a woman at 24 weeks, by 28 weeks I would be happy to give another."

Dr Ronald Lamont, spokesman for the Royal College of Obstetricians and Gynaecology, said it used to be common practice to give steroids every 10 days or so.

"This confirms what we've suspected for a while."

He said doctors needed to "optimise" when they delivered the one dose.

"If you have a woman in spurious labour at 23 weeks, don't rush in - wait until you're sure it's the real thing."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/7790248.stm

Published: 2008/12/19 00:33:14 GMT

Milestone dates 'boost screening'

People are more likely to show up for cancer screening close to birthdays or other annual milestones such as Christmas, research suggests.

A Norwegian team suggests careful timing of invitations could maximise the number of people who show up for potentially life-saving checks.

The British Medical Journal findings were based on attendance at a bowel cancer screening programme.

Cancer experts said they would see if the study had any lessons for the UK.

Previous research has suggested some people are put off accepting invitations for checks by anxiety, or lack of knowledge about the test's risks and benefits.

The researchers, from the Cancer Registry of Norway, sent out screening appointments to 20,780 men and women aged 50-64, and 12,960 turned up for their appointment.

The researchers found that attendance rates were significantly higher in December (72.3%) compared with the rest of the year (64.2%).

Similarly, attendance rates were higher for people who had either received their invitation letter in the week of their birthday, or whose appointment was one to two weeks after their birthday.

Thoughts of ageing

The researchers suggest that people are more conscious of ageing - and its effects - around the time of annual milestones such as birthdays and Christmas.

However, researcher Dr Geir Hoff warned that any attempt to capitalise by synchronising appointment invitations to such days would have to be handled carefully.

He said: "Rubbing it in by actively pointing out 'you are getting older' may easily have the opposite effect."

Catherine Davison, of NHS Cancer Screening Programmes, said the research was interesting but did not reflect the UK experience.

She said: "Women seem reluctant to attend for either breast or cervical screening over the Christmas period. As far as I know there has been no work done on whether they attend around their birthdays.

"Bowel cancer screening is different as it is done at home.

"However, we will evaluate this study and see if it has any lessons for us as we're always looking for ways to improve our uptake."

Ed Yong, of the charity Cancer Research UK, stressed that no comparison could be made between bowel screening in Norway, which involves an invasive procedure, and in the UK, which involves a simple check that can be carried out at home.

He said: "The theory that people accept screening invitations near Christmas is interesting but it could be impractical to deliver all the invitations in December.

"According to the study, the number of people turning up for screening within two weeks of their birthday was only just over 3% more than people who were screened at random times so it doesn't seem practical to re-organise screening programmes on this basis."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/7786009.stm

Published: 2008/12/19 01:08:12 GMT

New World Post-pandemic Reforestation Helped Start Little Ice Age, Say Scientists

Forest in Costa Rica. Researchers believe that reforestation of agricultural lands in the Americas -- abandoned as the population collapsed -- pulled so much carbon out of the atmosphere that it helped trigger a period of global cooling, at its most intense from approximately 1500 to 1750, known as the Little Ice Age (Credit: iStockphoto/Cole Vineyard)

ScienceDaily (Dec. 19, 2008) — The power of viruses is well documented in human history. Swarms of little viral Davids have repeatedly laid low the great Goliaths of human civilization, most famously in the devastating pandemics that swept the New World during European conquest and settlement.

In recent years, there has been growing evidence for the hypothesis that the effect of the pandemics in the Americas wasn't confined to killing indigenous peoples. Global climate appears to have been altered as well.

Stanford University researchers have conducted a comprehensive analysis of data detailing the amount of charcoal contained in soils and lake sediments at the sites of both pre-Columbian population centers in the Americas and in sparsely populated surrounding regions. They concluded that reforestation of agricultural lands—abandoned as the population collapsed—pulled so much carbon out of the atmosphere that it helped trigger a period of global cooling, at its most intense from approximately 1500 to 1750, known as the Little Ice Age.

"We estimate that the amount of carbon sequestered in the growing forests was about 10 to 50 percent of the total carbon that would have needed to come out of the atmosphere and oceans at that time to account for the observed changes in carbon dioxide concentrations," said Richard Nevle, visiting scholar in the Department of Geological and Environmental Sciences at Stanford. Nevle and Dennis Bird, professor in geological and environmental sciences, presented their study at the annual meeting of the American Geophysical Union on Dec. 17, 2008.

Nevle and Bird synthesized published data from charcoal records from 15 sediment cores extracted from lakes, soil samples from 17 population centers and 18 sites from the surrounding areas in Central and South America. They examined samples dating back 5,000 years.

What they found was a record of slowly increasing charcoal deposits, indicating increasing burning of forestland to convert it to cropland, as agricultural practices spread among the human population—until around 500 years ago: At that point, there was a precipitous drop in the amount of charcoal in the samples, coinciding with the precipitous drop in the human population in the Americas.

To verify their results, they checked their fire histories based on the charcoal data against records of carbon dioxide concentrations and carbon isotope ratios that were available.

"We looked at ice cores and tropical sponge records, which give us reliable proxies for the carbon isotope composition of atmospheric carbon dioxide. And it jumped out at us right away," Nevle said. "We saw a conspicuous increase in the isotope ratio of heavy carbon to light carbon. That gave us a sense that maybe we were looking at the right thing, because that is exactly what you would expect from reforestation."

During photosynthesis, plants prefer carbon dioxide containing the lighter isotope of carbon. Thus a massive reforestation event would not only decrease the amount of carbon dioxide in the atmosphere, but would also leave carbon dioxide in the atmosphere that was enriched in the heavy carbon isotope.

Other theories have been proposed to account for the cooling at the time of the Little Ice Age, as well as the anomalies in the concentration and carbon isotope ratios of atmospheric carbon dioxide associated with that period.

Variations in the amount of sunlight striking the Earth, caused by a drop in sunspot activity, could also be a factor in cooling down the globe, as could a flurry of volcanic activity in the late 16th century.

But the timing of these events doesn't fit with the observed onset of the carbon dioxide drop. These events don't begin until at least a century after carbon dioxide in the atmosphere began to decline and the ratio of heavy to light carbon isotopes in atmospheric carbon dioxide begins to increase.

Nevle and Bird don't attribute all of the cooling during the Little Ice Age to reforestation in the Americas.

"There are other causes at play," Nevle said. "But reforestation is certainly a first-order contributor."

Adapted from materials provided by Stanford University.

http://www.sciencedaily.com/releases/2008/12/081218094551.htm

Botany: Nature's Shut-off Switch For Cellulose Production Found

Purdue researcher Nick Carpita said plants may be able to produce more biofuel mass if the means of shutting down cellulose production is disrupted. His research team learned that small RNAs are key in determining the duration of cellulose production. (Credit: Purdue Agricultural Communication photo/Tom Campbell)

ScienceDaily (Dec. 19, 2008) — Purdue University researchers found a mechanism that naturally shuts down cellulose production in plants, and learning how to keep that switch turned on may be key to enhancing biomass production for plant-based biofuels.

Nicholas Carpita, a professor of botany and plant pathology, said that small-interfering RNAs (siRNAs) play a normal role in plant development by shutting off genes involved in primary cell wall growth in order to begin development of thicker, secondary cell walls.

"These small RNAs were known to play a role in fending off disease-causing pathogens, but we are only now beginning to understand their involvement in normal plant development," he said.

Carpita's research team reported its findings in the Dec. 15 early online issue of the Proceedings of the National Academy of Sciences.

"If we can learn to interfere with the down-regulation of cellulose synthesis, then plants may be able to produce more cellulose, which is key to biofuels production," Carpita said.

Mick Held, a postdoctoral researcher in Carpita's lab, virologist Steve Scofield, a U.S. Department of Agriculture research scientist and adjunct assistant professor of agronomy at Purdue, and Carpita made the discovery in barley after introducing a virus as a way to "silence" specific genes and study their functions. The researchers noticed that the virus had more effect then anticipated.

"The virus hijacked a whole suite of genes, and when we compared the targeted plant to our control plants we found that the small RNAs were responsible and already in the controls even without adding the virus," Held said.

Carpita said this let researchers see that the siRNAs - among other things - regulate and shut down primary cell wall development to begin secondary wall growth.

"These secondary stages result in characteristics such as tough rinds of corn stalks, vascular elements to conduct water and fibers for strength," he said.

The researchers said that delaying or preventing the shutdown of both primary and secondary cellulose production might enhance total plant biomass.

"Most biofuel researchers believe that cellulose utilization offers the best path to sustainable ethanol production," Scofield said. "Our work uncovered a previously unknown mechanism that suggests a way to increase the amount of cellulose produced in plants."

Other members of the research team were Bryan Penning and Sarah Kessans of Purdue and Amanda Brandt of the USDA/Ag Research Service, Crop Production and Pest Control Research Unit located at Purdue.

The research was funded by a U.S. Department of Energy, Energy Biosciences grant.

Adapted from materials provided by Purdue University.

http://www.sciencedaily.com/releases/2008/12/081217190427.htm

Nearly Three-quarters Of Youths With Diabetes Insufficient In Vitamin D

ScienceDaily (Dec. 19, 2008) — Three-quarters of youths with type 1 diabetes were found to have insufficient levels of vitamin D, according to a study by researchers at the Joslin Diabetes Center – findings that suggest children with the disease may need vitamin D supplementation to prevent bone fragility later in life."To our surprise, we found extremely high rates of vitamin D inadequacy," said Lori Laffel, M.D., M.P.H., Chief of the Pediatric, Adolescent and Young Adult Section at Joslin, Investigator in the Section on Genetics and Epidemiology, and senior author of the paper. "We didn't expect to find that only 24 percent of the study population would have adequate levels."

The study, which appears in the January 2009 issue of The Journal of Pediatrics, measured levels of serum 25-hydroxyvitamin D in 128 youths with type 1 diabetes ranging in age from 1.5 to 17.5 years. The study sample included subjects with recent onset of diabetes as well as those who had long-established diabetes.It found 24 percent had sufficient levels, 61 percent with insufficient levels and 15 percent to be deficient or having the lowest levels. Generally, those with deficient levels were the oldest of the subjects. In fact, 85 percent of the adolescents in the sample demonstrated inadequate vitamin D levels.

The paper notes that diabetes itself can negatively impact bone health and is associated with a modest reduction in bone mineral density and strength and an increase in fracture risk among those middle-aged and older. At the same time, vitamin D deficiency in infants and children is associated with bone deformation, while less severe vitamin D insufficiency prevents youths from attaining their optimal bone mass and may contribute to increased fracture risk later in life, the paper adds.For these reasons, vitamin D deficiency or insufficiency poses an increased risk for children with diabetes, the paper says. In addition to reduced sun exposure, diminished milk intake, substituted by intake of sugar-free beverages among youth with diabetes, may account for inadequate vitamin D levels.

"In addition to inadequate levels of vitamin D, adolescent patients with type 1 diabetes potentially possess multiple risk factors for increased skeletal fragility," the paper notes.The researchers were interested in looking at vitamin D levels because of the vitamin's presumed role in immune modulation and because it is thought to possibly play a role in the occurrence of type 1 diabetes.

In addition, there has been a rise in vitamin D deficiency among children in general, mostly among those living in northern climates where sun exposure is lowest, and also in association with the increased use of sun block, recommended in efforts to prevent skin cancer. Protection from over-exposure to sunlight through use of sunscreens remains an important public health initiative, Laffel stressed.

"We need to make sure all youths in general are getting enough vitamin D in their diets," commented Britta Svoren, M.D., the primary author of the paper and a member of Joslin's Pediatric, Adolescent and Young Adult Section and the Section on Genetics and Epidemiololgy. "And, we need to pay particular attention to those with diabetes as they appear to be at an even higher risk of vitamin D deficiency. For children who are not drinking sufficient amounts of vitamin D fortified milk, we are encouraging them to take a vitamin D supplement of 400 IU daily. Many cereals are fortified with vitamin D as well."

The study was funded by the National Institutes of Health, the Charles H. Hood Foundation and a Pediatric Fellowship Grant from Eli Lilly and Company.

Also contributing to the research were Lisa K. Volkening, M.A. and Jamie R. Wood, M.D., both of Joslin.

Adapted from materials provided by Joslin Diabetes Center.

http://www.sciencedaily.com/releases/2008/12/081215121605.htm

Where Did Venus's Water Go?

Interaction between Venus and the solar wind. (Credit: ESA / C. Carreau)

ScienceDaily (Dec. 19, 2008) — Venus Express has made the first detection of an atmospheric loss process on Venus's day-side. Last year, the spacecraft revealed that most of the lost atmosphere escapes from the night-side. Together, these discoveries bring planetary scientists closer to understanding what happened to the water on Venus, which is suspected to have once been as abundant as on Earth.

The spacecraft's magnetometer instrument (MAG) detected the unmistakable signature of hydrogen gas being stripped from the day-side. "This is a process that was believed to be happening at Venus but this is the first time we measured it," says Magda Delva, Austrian Academy of Sciences, Graz, who leads the investigation.

Thanks to its carefully chosen orbit, Venus Express is strategically positioned to investigate this process; the spacecraft travels in a highly elliptical path sweeping over the poles of the planet.

Water is a key molecule on Earth because it makes life possible. With Earth and Venus approximately the same size, and having formed at the same time, astronomers believe that both planets likely began with similar amounts of the precious liquid. Today, however, the proportions on each planet are extremely different. Earth's atmosphere and oceans contain 100 000 times the total amount of water on Venus. In spite of the low concentration of water on Venus Delva and colleagues found that some 2x1024 hydrogen nuclei, a constituent atom of the water molecule, were being lost every second from Venus's day-side.

Last year, the Analyser of Space Plasma and Energetic Atoms (ASPERA) on board Venus Express showed that there was a great loss of hydrogen and oxygen on the night-side. Roughly twice as many

hydrogen atoms as oxygen atoms were escaping. Because water is made of two hydrogen atoms and one oxygen atom, the observed escape indicates that water is being broken up in the atmosphere of Venus.

The Sun not only emits light and heat into space, it constantly spews out solar wind, a stream of charged particles. This solar wind carries electrical and magnetic fields throughout the Solar System and 'blows' past the planets.

Unlike Earth, Venus does not generate a magnetic field. This is significant because Earth's magnetic field protects its atmosphere from the solar wind. At Venus, however, the solar wind strikes the upper atmosphere and carries off particles into space. Planetary scientists think that the planet has lost part of its water in this way over the four-and-a-half-thousand million years since the planet's birth.

"We do see water escaping from the night-side but the question remains, how much has been lost in the past in this way," says Stas Barabash, Swedish Institute of Space Physics, Kiruna and Principal Investigator of ASPERA, that looked at night-side data.

The discovery takes scientists a step towards understanding the details, but it does not provide the last piece of the puzzle. To be certain that the hydrogen is coming from water, Delva and colleagues must also detect the loss of oxygen atoms on the day-side and verify that there are approximately half as many leaving Venus as hydrogen.

So far, this has not been possible. "I keep looking at the magnetometer data but so far I can't see the signature of oxygen escaping on the day-side," says Delva.

It also highlights a new mystery. "These results show that there could be at least twice as much hydrogen in the upper atmosphere of Venus than we thought," says Delva. The detected hydrogen ions could exist in atmospheric regions high above the surface of the planet; but the source of these regions is unknown.

So like a true lady, Venus still retains some of her mystery.

Journal reference:

1. Delva et al. **First upstream proton cyclotron wave observations at Venus**. *Geophysical Research Letters*, 2008; 35 (3): L03105 DOI: 10.1029/2007GL032594

Adapted from materials provided by European Space Agency.

http://www.sciencedaily.com/releases/2008/12/081218094605.htm

Shedding Light On Cause Of Bowel Disease

ScienceDaily (Dec. 19, 2008) — Scientists have uncovered vital clues about how to treat serious bowel disorders by studying the behaviour of cells in the colon.

Researchers at the University of Edinburgh believe a chemical messenger that is essential for developing a baby's gut in the womb could hold the key to new treatments for inflammatory bowel disease (IBD), a condition which affects 1 in 250 people in the UK.

The team studied a chain of chemical reactions inside colon cells, called the Hedgehog signalling pathway, which controls the way it behaves and communicates with other cells.

The researchers found that some patients with IBD inherit a defective copy of one of the important links in this chain, a gene called GLI1. This defective GLI1 is only half as active as normal. Additionally, the Hedgehog pathway itself signals at lower levels than normal when the large bowel is inflamed.

The results suggest that the GLI1 protein may calm inflammation within the healthy colon, and that this process appears to go wrong in IBD patients, causing their gut to become inflamed.

The researchers now hope to test whether strengthening this weakened protein will help to prevent or treat inflammatory bowel diseases like Crohn's disease and ulcerative colitis.

Dr Charlie Lees from the University's Institute of Genetics and Molecular Medicine, who led the study, said: "Everybody has billions of bacteria in the gut, the vast majority of which do us no harm. Our body's natural immune responses identify and eliminate harmful bacteria, whilst living in harmony with the healthy bacteria. But in people with inflammatory bowel disease, that response goes wrong and an over-active immune response against these healthy bacteria leads to chronic inflammation in the gut.

"It now seems that the Hedgehog signalling pathway, and specifically the GLI1 protein, is crucial to that response. We think it provides an important signal to certain types of immune cells in the gut wall, instructing them to adopt an anti-inflammatory state. If we can find ways to bolster these responses in people with IBD, we may be able to help prevent the painful attacks which are so devastating to patients."

The research was carried out in collaboration with the Universities of Michigan (USA), Cambridge, and the Karolinska University Hospital and is published in the journal of the Public Library of Science (PLoS) Medicine.

Journal reference:

1. Lees et al. **Analysis of Germline GLI1 Variation Implicates Hedgehog Signalling in the Regulation of Intestinal Inflammatory Pathways**. *PLoS Medicine*, 2008; 5 (12): e239 DOI: 10.1371/journal.pmed.0050239

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

http://www.sciencedaily.com/releases/2008/12/081208203928.htm

Data Mining Of Inpatient Records Reveals The Disease Pattern Of Obstructive Sleep Apnea

ScienceDaily (Dec. 19, 2008) — A new study shows the full clinical picture of comorbid conditions associated with obstructive sleep apnea (OSA), quantify their frequency of occurrence and reveal their possible interrelationships.

Results show that the number of cases of OSA peaks between the ages of 0-4 years, is low during adolescence, and then rises from 25-29 years to a peak at 55-59 years. The rates are slightly higher for girls than boys in the 0-4 age group (9.4% and 6.7%) and the 5-9 age group (6.0% and 3.9%), and the occurrence rate in males is higher than in females after 20-24 years of age.

According to the study's co-author,Chin Moi Chow , PhD, Senior of health sciences, at the University of Sydney, this study will have a significant impact on the understanding of the disease pattern of OSA and conditions associated with it.

"This research provides a clinical picture of OSA from over six million hospital admissions of all medical conditions and those associated with OSA, and describes its occurrences according to age and gender groups," Chow said.

Findings indicate that OSA patients are high users of health-care services, with comorbid conditions most often involving cardiovascular diseases, endocrine/metabolic diseases (mainly diabetes) and respiratory diseases. Comorbid conditions most frequently appearing with OSA in adults are essential hypertension, obesity, hypercholesterolemia, type 2 diabetes, past or current tobacco use, and ischemic heart conditions.

Data plotting shows that the onset and peak occurrences of obesity and OSA are identical. From obesity onset there is a latent period of five years for the development of hypertension and type 2 diabetes and 15 years for chronic ischemic heart conditions.

A random dataset from the years 1999 through 2004 was extracted using a Health Outcomes and Information Statistical Toolkit. The data set was a representative collection of hospital records in the Inpatient Data Collection System of New South Wales, the most populated Australian state. The data included patient records from 278 public hospitals and 180 private hospitals.

The extracted dataset contained a total of 1.51 million hospital records. Four percent of all records – representing 60,197 patients - had a principal or secondary diagnosis of OSA, with a male to female ratio of 2.6:1. The authors report that previous knowledge of disease associations with OSA was fragmented and did not explain possible interrelationships between comorbid diseases. The data mining technique was used to provide the full clinical picture of comorbid conditions associated with OSA.

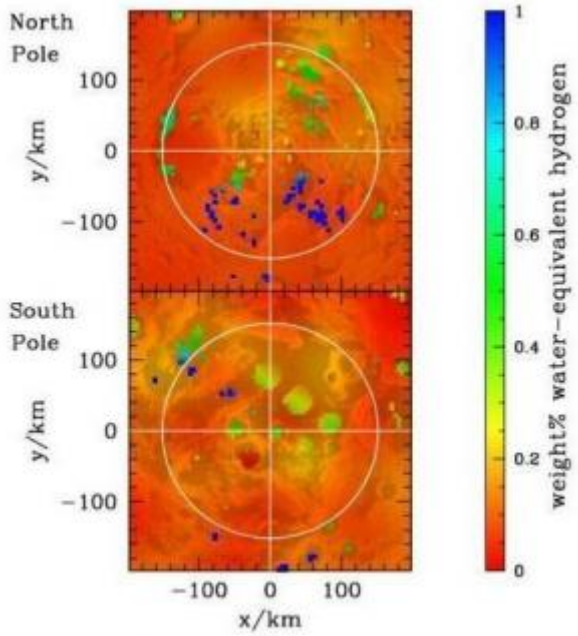
Journal reference:

1. . **Clinical Patterns of Obstructive Sleep Apnea and its Comorbid Conditions: A Data Mining Approach**. *Journal of Clinical Sleep Medicine*, Dec. 15, 2008

Adapted from materials provided by American Academy of Sleep Medicine, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2008/12/081215074353.htm

Moon's Polar Craters Could Be The Place To Find Lunar Ice, Scientists Report



A map showing the north and south polar regions of the moon. The dark blue shaded areas represent the highest concentrations of hydrogen. (Credit: Dr Vincent Eke, Durham University/NASA)

ScienceDaily (Dec. 18, 2008) — Scientists have discovered where they believe would be the best place to find ice on the moon. Astrophysicists, led by an expert at Durham University, say if frozen water exists then it is most likely to be found near to the moon's poles in craters that are permanently shaded from the sun.

Their findings are based on a new computer analysis of data from the Lunar Prospector, a space probe sent to the moon in 1998 by NASA. The researchers showed that hydrogen on the moon is concentrated into polar craters where temperatures are colder than minus 170 degrees Celsius.

Hydrogen, together with the oxygen that is abundant within moon rock, is a key element in making water.

If ice is present in the craters then the researchers say it could potentially provide a water source for the eventual establishment of a manned base on the moon. A moon base could be used as a platform for exploration into the further reaches of our solar system.

The findings are published in the International Journal of Solar System Studies, Icarus.

They show that if the hydrogen is present as water ice, then the average concentration in some craters corresponds to ten grams of ice in each kilogram of moon rock.

However the researchers say that instead of being water ice, hydrogen may be present in the form of protons fired from the sun into the dusty lunar surface.

Dr Vincent Eke, in the Institute for Computational Cosmology, at Durham University, said: "This research applies a newly developed technique to data from the Lunar Prospector mission to show that hydrogen is actually concentrated into the permanently shaded polar craters.

"Water ice should be stable for billions of years on the moon provided that it receives no sunlight.

"If the hydrogen is present as water ice then our results imply that the top metre of the moon holds about enough water to fill up Kielder Water."

Kielder Water, in Northumberland, holds 200,000 million litres of water, making it the largest UK manmade reservoir in Northern Europe.

The research may be of immediate use in lunar exploration. Dr Richard Elphic, in the Planetary Systems Branch, NASA Ames Research Center, said: "These results will help NASA's soon-to-be launched Lunar Crater Observation and Sensing Satellite (LCROSS) and Lunar Reconnaissance Orbiter (LRO) missions.

"For example, LCROSS aims to liberate water by impacting into permanently shadowed polar terrain where ice may exist, and our improved maps of hydrogen abundance can help LCROSS select a promising impact site.

"These maps will also help focus LRO's search for possible polar ice by identifying hydrogen-rich locales".

The research was led by Dr Eke together with colleagues from the University of Glasgow and the Planetary Systems Branch, Space Science and Astrobiology Division, of NASA Ames Research Center in California, USA.

The research was funded by a Royal Society University Research Fellowship, a Leverhulme Research Fellowship and the NASA Lunar Reconnaissance Orbiter Participating Scientist Programme.

Journal reference:

1. Eke, VR; Teodoro LFA; Elphic, RC. **The spatial distribution of polar hydrogen deposits on the Moon**. *International Journal of Solar System Studies*, 2008; DOI: 10.1016/j.icarus.2008.10.013

Adapted from materials provided by Durham University, via AlphaGalileo.

http://www.sciencedaily.com/releases/2008/12/081217192743.htm

Scientists Probe Limits Of 'Cancer Stem-cell Model'

A melanoma skin lesion on the chest of a 45-year-old male patient. The lesion measures 1.2 inches by 1.6 inches. (Credit: Dr. Timothy Johnson)

ScienceDaily (Dec. 18, 2008) — One of the most promising new ideas about the causes of cancer, known as the cancer stem-cell model, must be reassessed because it is based largely on evidence from a laboratory test that is surprisingly flawed when applied to some cancers, University of Michigan researchers have concluded.

By upgrading the lab test, the U-M scientists showed that melanoma---the deadliest form of skin cancer---does not follow the conventional cancer stem-cell model, as prior reports had suggested.

The findings, to be published as the cover article in the Dec. 4 edition of Nature, also raise questions about the model's application to other cancers, said Sean Morrison, director of the Center for Stem Cell Biology at the U-M Life Sciences Institute.

"I think the cancer stem-cell model will, in the end, hold up for some cancers," Morrison said. "But other cancers, like melanoma, probably won't follow a cancer stem-cell model at all. The field will have to be reassessed after more time is spent to optimize the methods used to detect cancer stem cells."

The cancer stem-cell model has steadily gained supporters over the last decade. It states that a handful of rogue stem cells drive the formation and growth of malignant tumors in many cancers. Proponents of the controversial idea have been pursuing new treatments that target these rare stem cells, instead of trying to kill every cancer cell in a patient's body.

But in a series of experiments involving human melanoma cells transplanted into mice, Morrison's team found that the tumor-forming cells aren't rare at all. They're quite common, in fact, but standard laboratory tests failed to detect most of them.

Scientists previously estimated that only one in 1 million melanoma cells has the ability to run wild, exhibiting the kind of unchecked proliferation that leads to new tumors. These aggressive interlopers are the cancer stem cells, according to backers of the model.

But after updating and improving the laboratory tests used to detect these aberrant cells, Morrison's team determined that at least one-quarter of melanoma cells are "tumorigenic," meaning they have the ability to form new tumors. The laboratory tests are known as assays.

"The assay on which the field is based misses most of the cancer cells that can proliferate to form tumors," Morrison said. "Our data suggest that it's not going to be possible to cure melanoma by targeting a small sub-population of cells."

Melanoma kills more than 8,000 Americans each year. The human melanoma cells used in the mouse experiments were provided---with the patients' consent---by a team from the U-M's Multidisciplinary Melanoma Program, one of the country's largest melanoma programs and part of the U-M Comprehensive Cancer Center.

"People were looking to the cancer stem-cell model as an exciting new source for the development of life-saving cures for advanced melanoma," said Dr. Timothy Johnson, director of the U-M melanoma program and a co-author of the Nature paper. "Unfortunately, our results show that melanoma does not strictly follow this model.

"So we'll need to redirect our scientific efforts and remain focused on the fundamental biological processes underlying the growth of melanomas in humans," said Johnson, a cutaneous oncologist. "And

as we pursue new treatments for advanced melanoma, we'll have to consider that a high proportion of cancer cells may need to be killed."

Morrison and Johnson stressed that the team's findings do not broadly invalidate the cancer stem-cell model. Cancer stem cells likely do exist in some forms of cancer but are "probably much more common than people have been estimating," Morrison said.

The standard technique used to detect tumor-causing cancer cells in mouse transplants is called the NOD/SCID assay. NOD/SCID mice have defective immune systems. Scientists use the severely immunocompromised mice because the rodents don't reject transplanted human cancer cells the way normal mice would.

However, while the immune system in NOD/SCID mice is impaired, it's not completely inoperative. The mice lack T and B immune cells but still possess natural killer cells, which attack and destroy many of the transplanted human cancer cells.

Morrison's team replaced NOD/SCID mice with mice that lacked T cells, B cells and natural killer cells---and made a few other improvements to the assay. Using the modified assay, they found that about one in four transplanted melanoma cells formed tumors in the mice.

They concluded that previous studies using NOD/SCID mice vastly underestimated the number of tumor-causing melanoma cells, partly because natural killer cells wiped out many of the cancer cells. But once the natural killer cells were eliminated, the "more permissive conditions" allowed many of the transplanted melanoma cells to survive and thrive, the authors wrote.

Co-lead authors of the Nature paper are Life Sciences Institute research fellows Elsa Quintana and Mark Shackleton. In addition to Morrison and Johnson, other co-authors are U-M surgical oncologist Dr. Michael Sabel and U-M dermatopathologist Dr. Douglas Fullen.

The work was supported by the Howard Hughes Medical Institute, the Allen H. Blondy Research Fellowship and the Lewis and Lillian Becker gift.

Adapted from materials provided by University of Michigan.

http://www.sciencedaily.com/releases/2008/12/081203131037.htm

Online Register Created To Flag Scientific Papers That May Be Tainted By Fraud Or Misconduct

ScienceDaily (Dec. 18, 2008) — A group of French research students is launching an online register to flag up scientific papers that have been tainted by fraud and other types of scientific misconduct.

Claire Ribrault, a PhD student in neurobiology at Ecole Normale Supérieure in Paris, unveiled the Scientific Red Cards project last month at a workshop on research integrity sponsored by the European Science Foundation (ESF). The idea is to identify papers that have been shown to be fraudulent but are still in circulation.

Scientific journals are the primary means by which the results of research are made public. Emma Campbell, of the European Association of Science Editors, told the meeting that editors were becoming more aware of their role as gatekeepers. Most journals now have guides to best practice for authors and reviewers and many require authors to sign a declaration before a paper is accepted.

The most important line of defence is peer review, where the submitted paper is subject to critical reading by a scientist familiar with the field. But by tradition reviewers are unpaid and may not be able to devote sufficient time and effort to detect signs of misconduct. Once a paper has passed peer review it can be difficult for editors to spot problems by themselves.

"How do you know if someone's fabricated their results if the reviewer didn't detect it?" Campbell asked. "How do you know if someone hasn't declared their conflict of interest?"

Modern tools available to editors can help them detect plagiarism in submitted articles and even whether digital images have been manipulated, but such services come at a price and evidence of misconduct may not be found until after the paper is published.

Guidelines to help editors and publishers deal with suspected misconduct are published by the Committee on Publication Ethics (COPE), as well as several other organisations.

"We retract a published paper if something has been found where perhaps the results have been fabricated," Campbell said. "Journals can ban submissions from someone in future if they decide that person is not someone they can trust to submit decent papers. And they can contact the author's employer or other authorities, for example the British Medical Association."

On the other hand, there is no formal system to prevent a paper discovered to be fraudulent from being resubmitted to a different journal, she said. She called for a consensus amongst publishers on the guidelines to be used. "Rather than having lots of different sets of guidelines in different professional groups, try and have one set of international guidelines for people to follow."

But once a fraudulent paper has been published it is very difficult to remove it. Journals can retract articles from their online databases but libraries all over the world are stocked with printed journals that cannot be recalled.

It was how to tackle this problem of fraudulent papers remaining in circulation that prompted Ribrault and her colleagues, all PhD students in life sciences, to set up their Scientific Red Cards website.

As a research student she was concerned that there was a lot of informal comment on which papers could not be trusted but little reliable information. "There were lots of people saying don't trust this paper because it has been falsified, don't trust this guy because he has been hiding a conflict of interest," she told the meeting.

She pointed out that even where a published paper is found to be tainted by fraud "sometimes the paper is not retracted, depending on the policy of the journal, and even if the paper is retracted sometimes it's still cited after the retraction."

The database will contain the bibliographic reference of the paper, the type of misconduct, and a link to a published account of the misconduct. Papers affected by falsification, fabrication and plagiarism will be included as well as cases where editorial policies and standards have not been respected or research subjects have been treated unethically. Ribrault said they had listed 30 papers so far.

"We think better visibility of misconduct for scientists could promote scientific integrity," she said. "Making scientific misconduct known to the scientific community could act as a deterrent to other misbehaviour."

The meeting gave a cautious welcome to the proposals but pointed out that unless the students were careful they could expose themselves to legal problems. There was also concern that the reputations of innocent co-authors might be tarnished. Others said that the project was in the tradition of the self-policing of the scientific community and should be supported.

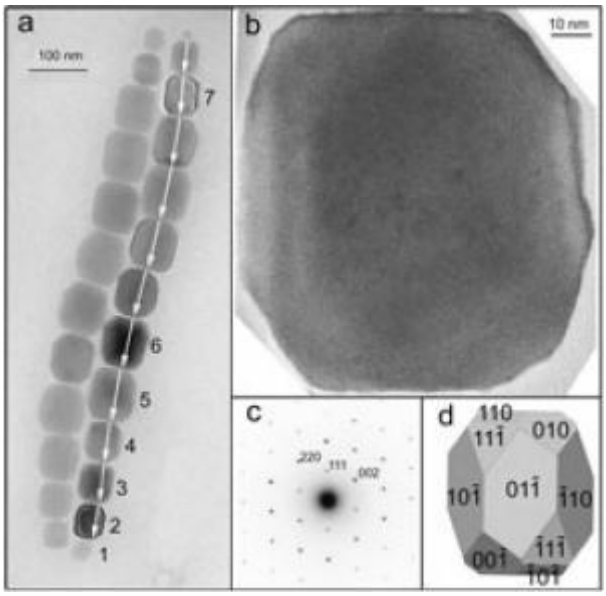
Ribrault stressed that access to reliable scientific information was essential for well-informed democratic decision-making. "We are all interested in the relation between science and society and the impact science has on society."

The meeting in Madrid on 17-18 November was organised by the newly formed Research Integrity Forum of the European Science Foundation (ESF) in collaboration with the Spanish National Research Council (CSIC). It continued work set in motion by the first world conference on research integrity held in Lisbon in September 2007.

Adapted from materials provided by European Science Foundation.

http://www.sciencedaily.com/releases/2008/12/081217075134.htm

Tiny Magnetic Crystals In Bacteria Are A Compass, Say Scientists



These tiny magnetic crystals (figures a, b,c and d) help the bacteria to navigate. (Credit: Image courtesy of Imperial College London)

ScienceDaily (Dec. 18, 2008) — Scientists have shown that tiny crystals found inside bacteria provide a magnetic compass to help them navigate through sediment to find the best food.Researchers say their study could provide fresh clues to explain biomagnetism – a phenomenon in which some birds, insects and marine life navigate using the magnetic field that encompasses the Earth.

The study focuses on magnetotactic bacteria, which contain chains of magnetic crystals, called magnetosomes. They exist all over the globe, living in lake and pond sediments and in ocean coastal regions.Since the discovery of magnetotactic bacteria in the 1970s, it has not been clear exactly what magnetosomes were for. Previous research suggested that some magnetosome chains would not be useful for navigation because their crystal sizes did not possess the right magnetic qualities.However, researchers at Imperial College London and the University of Edinburgh have now shown that previous modelling methods were inaccurate. New calculations prove that all known magnetosomes do posses the right magnetic qualities needed to facilitate navigation. Study leader, Dr Adrian Muxworthy, from Imperial's Department of Earth Science and Engineering, explains:"Magnetosomes align with one another to form a chain inside the bacteria and work like a magnetic compass. We are still not sure how, but this compass interacts with the Earth's magnetic field, helping the bacteria to navigate through sediment to the best feeding grounds."Dr Muxworthy says the study is a nice example of evolution which demonstrates how a relatively simple organism can develop a highly optimised navigational capability. He says it may provide fresh insights into the evolutionary processes that have helped other animals and aquatic species to become skilled navigators.

Journal reference:

1. Adrian R. Muxworthy, Wyn Williams. **Critical superparamagnetic/single-domain grain sizes in interacting magnetite particles: implications for magnetosome crystals**. *Royal Society Interface*, December 16, 2008

Adapted from materials provided by Imperial College London.

http://www.sciencedaily.com/releases/2008/12/081216201412.htm

Autism And Schizophrenia Share Common Origin, Review Suggests

ScienceDaily (Dec. 18, 2008) — Schizophrenia and autism probably share a common origin, hypothesises Dutch researcher Annemie Ploeger following an extensive literature study. The developmental psychologist demonstrated that both mental diseases have similar physical abnormalities which are formed during the first month of pregnancy.

Peculiar toes

Developmental psychologist Annemie Ploeger has investigated whether there is a connection between disorders in the first month of pregnancy and the development of schizophrenia and autism. Interestingly, many physical abnormalities of autistics are also prevalent in schizophrenics. For example, both autistics and schizophrenics sometimes have protruding ears and peculiar toes. There are also differences: a large head and intestinal problems, for example, are typical traits occurring in autistics. From this, Ploeger concluded that the two disorders share a common origin. The same error that occurs very early in pregnancy develops into autism in one individual and schizophrenia in another.

Early vulnerability

Ploeger's research reveals that in the period between 20 and 40 days after fertilisation, the embryo is highly susceptible to disruptions. In this period, early organogenesis, there is a lot of interaction between the different parts of the body. If something goes wrong with a given part of the body, it greatly influences the development of other parts of the body. As people with schizophrenia and autism frequently have physical abnormalities to body parts formed during early organogenesis, Ploeger concluded that the foundation for these psychiatric disorders is laid very early during pregnancy.

The existence of a relationship between unhealthy behaviour during pregnancy and the subsequent development of schizophrenia and autism in the child was already known. However, Ploeger's hypothesis that the early organogenesis stage is the most critical, is new. Ploeger bases her hypothesis on an extensive study of scientific literature in this area. She often had to make use of related studies; although a lot of research has been done into prenatal influences on the development of schizophrenia and autism, little is known about the influence that the period between 20 to 40 days after fertilisation has.

Toxic pregnancy medicine

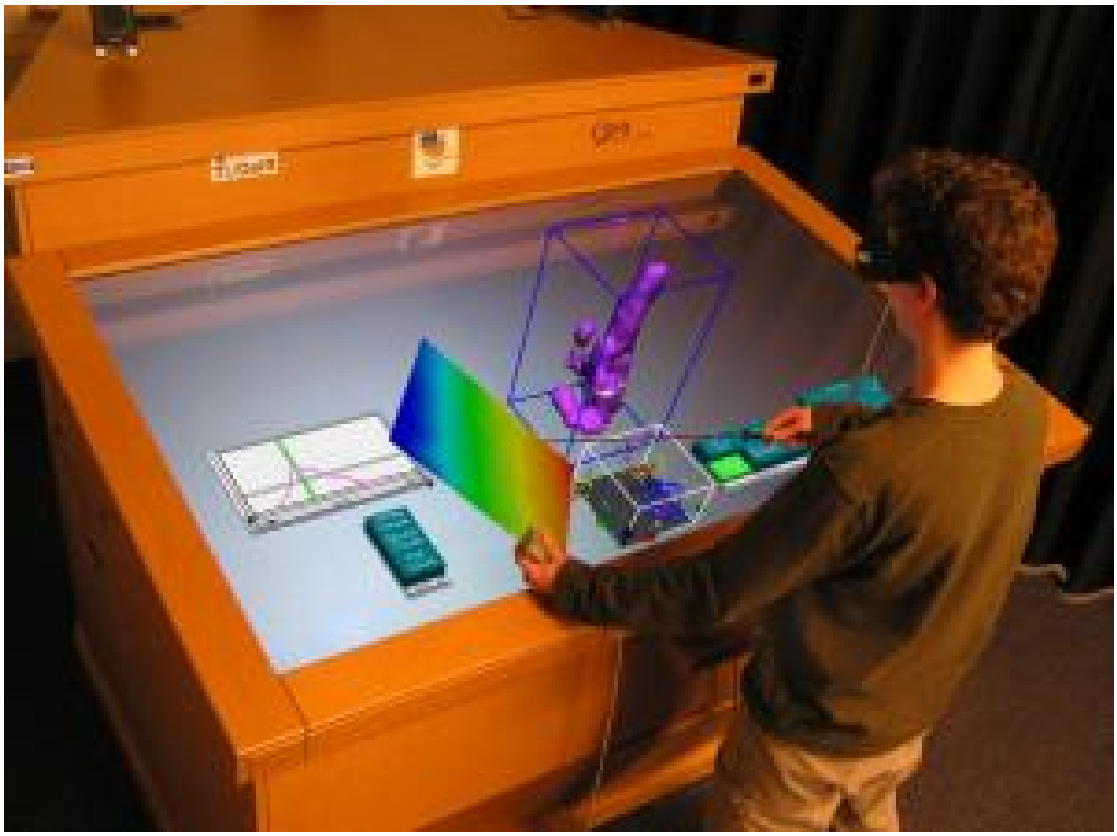
For example, she acquired information about autism from a study into softenon use. Softenon is a drug against morning sickness that was administered to women in the 1960s and 1970s. Later it was discovered that severely disabled children were born as a result of this medicine. Autistic children were born in four percent of pregnancies in which softenon was used, whereas normally this figure is 0.1 percent. Women could state exactly when they started to take softenon. The women who had taken softenon between the 20th and 24th day of the pregnancy had the greatest chance of giving birth to an autistic child. Ploeger advises women to stop risky behaviour such as smoking, medicine use and stressful activities before they even become pregnant. If you only start to live healthily once you know that you are pregnant, the basis for a disrupted development of your child could already have been laid.

Ploeger's research was partly financed by NWO is within the research programme Evolution and Behaviour. The doctoral thesis "Towards an integration of evolutionary psychology and developmental science: New insights from evolutionary developmental biology" was defended on 3 December 2008.The supervisor was Prof. H.L.J. van der Maas, associate supervisors: Dr M.E.J. Raijmakers, Dr F. Galis

Adapted from materials provided by NWO (Netherlands Organization for Scientific Research).

http://www.sciencedaily.com/releases/2008/12/081216114746.htm

New Research Into Fair-weather Clouds Important In Climate Predictions



A cloud's behaviour is affected over time by horizontal mixing; the air in a cloud appears not to rise continuously, but rather in bubble-shaped form. Using visualizations in a Virtual Reality-environment, Heus could reliably research this tendency for the first time. (Credit: Image courtesy of Delft University of Technology)

ScienceDaily (Dec. 18, 2008) — Research at the Delft University of Technology (The Netherlands) has led to better understanding of clouds, the unknown quantity in current climate models. Delft researcher Thijs Heus has tackled this issue with a combination of detailed computer simulations and airplane measurements. He charted data including cloud speed, temperature and the 'life span' of clouds to arrive at new observations.

Interaction

The behaviour of clouds is the great unknown quantity in current climate models. To make reliable predictions on climate change, more knowledge about clouds is thus essential. Heus explains, 'What we call fair-weather clouds have posed one of the biggest challenges in atmospheric science for decades. For accurate representation of clouds in weather and climate models, it is crucial to have a solid understanding of the interaction between clouds and the environment. Today, with the help of better observational methods and more powerful computers, we can get a much nicer picture of how it works.'

Downward

Heus continues, 'A cloud is normally described as an entity in which air rises. All around the cloud, air sinks downward in compensation for the upward movement.

'We demonstrated that air far away from the cloud on average displaces very little. The biggest amount of compensatory downward flow occurs immediately surrounding the cloud, in a ring of sinking air. This ring results because cloud air mixes with the surroundings, causing the cloud water to evaporate, air to cool, and thereby sink. The interaction between the cloud and its environment as such occurs indirectly, through the buffer zone of the ring. This buffer zone has not yet been incorporated into climate models until now.

'The ring is principally created by horizontal mixing. We showed that whatever happens on the cloud top has little influence on the underlying layers.'

Virtual Reality

A cloud's behaviour is likewise affected over time by this same horizontal mixing; the air in a cloud appears not to rise continuously, but rather in bubble-shaped form. Using visualizations in a Virtual Reality-environment, Heus could reliably research this tendency for the first time.

The Royal Netherlands Meteorological Institute (KNMI), Heus' current employer, and other scientific institutes have already expressed interest in the results of his study.

Adapted from materials provided by Delft University of Technology.

http://www.sciencedaily.com/releases/2008/12/081208114258.htm

Magma Discovered In Its 'Natural Habitat' For First Time

A volcanic eruption of molten lava at night as it flows into the ocean on the Big Island of Hawaii. (Credit: iStockphoto/Rick Rhay)

ScienceDaily (Dec. 18, 2008) — A crew drilling on the Big Island of Hawaii has discovered magma, the molten rock material — never before found in its natural habitat underground — that is the central ingredient in the evolution of planets and the lifeblood of all volcanoes.

The chance discovery far beneath the Earth's surface gives scientists an unprecedented opportunity to understand the important substance.

"As scientists, we've hypothesized about the nature and behavior of magma in literally countless studies, but before now the real thing has never been found or been physically investigated in its natural habitat within the earth," said Bruce Marsh, a professor of earth and planetary sciences at The Johns Hopkins University's Krieger School of Arts and Sciences.

Magma is the subterranean form of what, when it is ejected from the earth in volcanoes and cools, is known as lava. Underground, it reaches temperatures of more than 1,000 degrees Celsius, or more than 1,900 degrees Fahrenheit.

"Magma resides inside the earth and lava is its equivalent on the surface. But once magma erupts, it begins cooling unusually quickly and it loses any gases that it may contain, so it really is a different animal," Marsh said. "We've never seen, until now, the real animal in its natural habitat. And it's not going anywhere: it's caged, so to speak."

Earth scientists are excited about the discovery not only because it's a first, but also because the magma is a highly unusual type called "dacite." Evidence of cooled-off dacite magma is not common in the geology

of Hawaii; it is believed to be made by, in effect, distilling basalt, the material which makes up the floor of the ocean.

Marsh is collaborating on the discovery with William Teplow, a consultant to Nevada-based Ormat Technologies Inc., the company which discovered the magma during drilling operations at its Puna Geothermal Venture power plant.

"This gives scientists an extraordinary chance to examine magma in its natural habitat, which is very, very exciting," he said.

Teplow and Marsh will announce the discovery on Tuesday, Dec. 16, at the 2008 fall meeting of the American Geophysical Union in San Francisco.

Marsh, nicknamed the "Magma PI," has spent his career investigating the processes by which magma is forced from the bowels of the planet to the surface and creates the geologic features — continents, mountains, valleys — among which we live. He does much of his field work in an area quite different from Hawaii: Antarctica. In 2005, a glacial valley there, in the Olympus Range just south of Mount Hercules, was named "Marsh Cirque" in his honor.

Workers at Ormat, one of the world's largest geothermal producers, discovered the magma in October 2005 when they hit a chamber of the magma about a mile and a half down while drilling an injection well.The substance quickly rose about 20 feet up into the drill hole before becoming glasslike as it cooled. Ormat workers redrilled the area several times, with the same result.

It quickly became apparent that the magma was the highly unusual dacite, Marsh said.

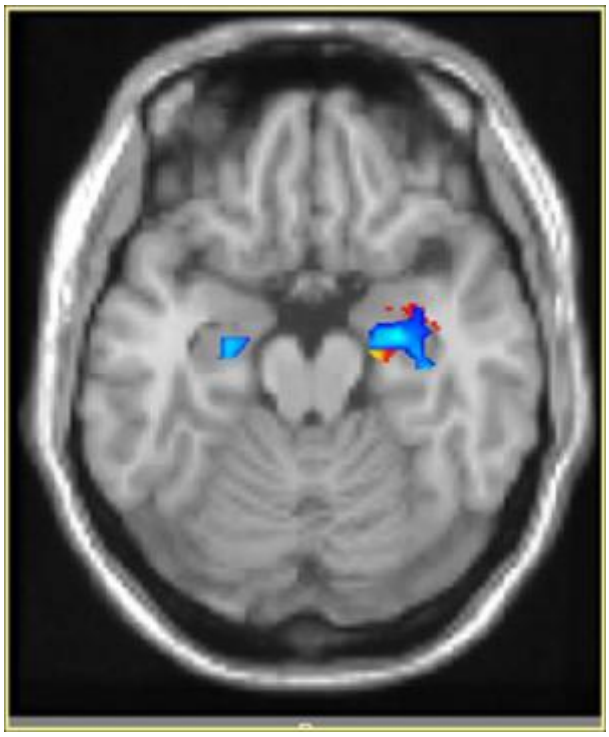
"No dacite lava or rocks have ever been found on the Big Island of Hawaii, though some have hypothesized that basalt can transform into dacite through a form of distillation through crystallization," he said.

After discovering the magma, Ormat installed a permanent seismic and ground monitoring network to provide early warning of any impending volcanic activity for the power plant and surrounding community.

Adapted from materials provided by Johns Hopkins University.

http://www.sciencedaily.com/releases/2008/12/081217230110.htm

Stress-related Disorders Affect Brain's Processing Of Memory



Brain fMRI image illustrating activation of the hippocampus during the memory suppression phase. (Credit: RSNA)

ScienceDaily (Dec. 18, 2008) — Researchers using functional MRI (fMRI) have determined that the circuitry in the area of the brain responsible for suppressing memory is dysfunctional in patients suffering from stress-related psychiatric disorders. Results of the study will be presented December 3 at the annual meeting of the Radiological Society of North America (RSNA).

"For patients with major depression and other stress-related disorders, traumatic memories are a source of anxiety," said Nivedita Agarwal, M.D., radiology resident at the University of Udine in Italy, where the study is being conducted, and research fellow at the Brain Imaging Center of McLean Hospital, Department of Psychiatry at Harvard Medical School in Boston. "Because traumatic memories are not adequately suppressed by the brain, they continue to interfere with the patient's life."

Dr. Agarwal and colleagues used brain fMRI to explore alterations in the neural circuitry that links the prefrontal cortex to the hippocampus, while study participants performed a memory task. Participants included 11 patients with major depression, 13 with generalized anxiety disorder, nine with panic attack disorders, five with borderline personality disorder and 21 healthy individuals. All patients reported suffering varying degrees of stressful traumatic events, such as sexual or physical abuse, difficult relationships or "mobbing" – a type of bullying or harassment – at some point in their lives.

After reviewing a list of neutral word pairs, each participant underwent fMRI. During imaging, they were presented with one of the words and asked to either recall or to suppress the memory of its associated word.

The fMRI images revealed that the prefrontal cortex, which controls the suppression and retrieval of memories processed by the hippocampus, showed abnormal activation in the patients with stress-related disorders compared to the healthy controls. During the memory suppression phase of the test, patients with stress-related disorders showed greater activation in the hippocampus, suggesting that insufficient

activation of the prefrontal cortex could be the basis for inadequate suppression of unwanted traumatic memories stored in the hippocampus.

"These data suggest that the mechanism for memory suppression is dysfunctional in patients with stress-related disorders primarily because of an alteration of the prefrontal cortex," Dr. Agarwal said. "These patients often complain of poor memory, which might in part be attributed to this altered circuitry," she added.

According to Dr. Agarwal, fMRI is an important tool in understanding the neurobiological basis of psychiatric disorders and in identifying imaging markers to psychiatric disease, helping clinicians target specific parts of the brain for treatment.

The study's principal investigator is Paolo Brambilla, M.D., Ph.D. Co-authors are Monica Baiano, M.D., Ph.D., Massimo Bazzocchi, M.D., Giuseppe Como, M.D., and Marta Maieron, Ph.D.

Adapted from materials provided by Radiological Society of North America.

http://www.sciencedaily.com/releases/2008/12/081203084310.htm

Scientists Find Increased Methane Levels In Arctic Ocean

ScienceDaily (Dec. 18, 2008) — A team led by International Arctic Research Center scientist Igor Semiletov has found data to suggest that the carbon pool beneath the Arctic Ocean is leaking.The results of more than 1,000 measurements of dissolved methane in the surface water from the East Siberian Arctic Shelf this summer as part of the International Siberian Shelf Study show an increased level of methane in the area. Geophysical measurements showed methane bubbles coming out of chimneys on the seafloor.

"The concentrations of the methane were the highest ever measured in the summertime in the Arctic Ocean," Semiletov said. "We have found methane bubble clouds above the gas-charged sediment and above the chimneys going through the sediment."The new data indicates the underwater permafrost is thawing and therefore releasing methane. Permafrost can affect methane release in two ways. Both underwater and on land, it contains frozen organic material such as dead plants and animals. When permafrost thaws, that organic material decomposes, releasing gases like methane and carbon dioxide. In addition, methane, either in gas form or in ice-like methane hydrates, is trapped underneath the permafrost. When the permafrost thaws, the trapped methane can seep out through the thawed soil. Methane, a greenhouse gas 20 times more powerful than carbon dioxide, is thought to be an important factor in global climate change.

The East Siberian Arctic Shelf is a relatively shallow continental shelf that stretches more than 900 miles into the Arctic Ocean from Siberia. The area is a year-round source of methane to the globe's atmosphere. However, until recently, scientists believed that much of the area's carbon pool was safely insulated by underwater permafrost, which is, on average, 11 degrees Celcius warmer than surface permafrost.

Semiletov said this year's expeditions used both chemical and geophysical measurement techniques, a first in the area. He also noted that while the high-arctic ocean readings were surprisingly high, on par with those from high-arctic lakes, they are still much lower than is being found in subarctic regions.

"That means we cannot extrapolate the subarctic data to the entire Arctic," he said.Semiletov, as associate research professor at IARC, leads the International Siberian Shelf Study, which has launched the multiple expeditions to the Arctic Ocean to collect data on methane release of the East Siberian Arctic Shelf. The ISSS includes 30 collaborating scientists from five countries. The project, which gained momentum during the International Polar Year, established more than 1,000 oceanographic stations in the Arctic and performed a few million measurements of methane mixing ratios of the Arctic atmosphere in the last five years. It is part of UAF's work during IPY, an international event that is focusing research efforts and public attention on the Earth's polar regions.Semiletov is a chemical oceanographer who has studied carbon cycling in the arctic atmosphere-land-shelf system with emphasis on carbon dioxide and dissolved methane from both terrestrial and oceanic sources since the early 1990s. He joined the International Arctic Research Center in 2001. Since 2004, he has collaborated with IARC scientist Natalia Shakhova to develop the methane study at IARC.International Siberian Shelf Study collaborators University of Alaska Fairbanks: Igor Semiletov, Natalia Shakhova, John Kelly, Vladimir Romanovsky, Gleb Panteleev, Sergei Marchenko, Dmitry Nicolsky, Alexander Kholodov; FEBRAS: Oleg Dudarev, Anatoly Salyuk, Irina Pipko, Viktor Karnaukh, Alexander Charkin, Denis Kosmach, Nina Bel'cheva, Svetlana Pugach, Nina Savelieva, Vladimir Iosoupov, Valentin Sergienko; Stockholm University: Orjan Gustafsson, Per Andersson, Jorien Vonk, Laura Sanchez-Garcia, Christoph Humborg, Vanja Alling; Gotheburg University: Leif Anderson, Goran Björk, Anders Olsson, Sara Jutterström, Sofia Hjalmarsson, Irene Wåhlström; Swedish Museum of Natural History: Per Andersson; Utrecht University: Celia Sapart, T. Roeckmanm; Institute of Atmospheric Physics RAS: Georgiu Golytsin, Irina Repina; Moscow State University: Nicolai Romanovskii, Vladimir Tumskoy; University of Manchester: Bart van Dongen; Luleå University of Technology: Johan Ingri, Fredrik Nordblad, Johan Gelting; Oxford University: Don Porcelli.

Adapted from materials provided by University of Alaska Fairbanks.

http://www.sciencedaily.com/releases/2008/12/081217203407.htm

Sex Difference On Spatial Skill Test Linked To Brain Structure

ScienceDaily (Dec. 18, 2008) — Men consistently outperform women on spatial tasks, including mental rotation, which is the ability to identify how a 3-D object would appear if rotated in space. Now, a University of Iowa study shows a connection between this sex-linked ability and the structure of the parietal lobe, the brain region that controls this type of skill.

The parietal lobe was already known to differ between men and women, with women's parietal lobes having proportionally thicker cortexes or "grey matter." But this difference was never linked back to actual performance differences on the mental rotation test.

UI researchers found that a thicker cortex in the parietal lobe in women is associated with poorer mental rotation ability, and in a new structural discovery, that the surface area of the parietal lobe is increased in men, compared to women. Moreover, in men, the greater parietal lobe surface area is directly related to better performance on mental rotation tasks.

The study results were published online Nov. 5 by the journal Brain and Cognition.

"Differences in parietal lobe activation have been seen in other studies. This study represents the first time we have related specific structural differences in the parietal lobe to sex-linked performances on a mental rotation test," said Tim Koscik, the study's lead author and a graduate student in the University of Iowa Neuroscience Graduate Program. "It's important to note that it isn't that women cannot do the mental rotation tasks, but they appear to do them slower, and neither men nor women perform the tasks perfectly."

The study was based on tests of 76 healthy Caucasian volunteers -- 38 women and 38 men, all right-handed except for two men. The groups were matched for age, education, IQ and socioeconomic upbringing. When tested on mental rotation tasks, men averaged 66 percent correct compared to 53 percent correct for women. Magnetic resonance imaging (MRI) revealed an approximately 10 percent difference between men and women in the overall amount of parietal lobe surface area: 43 square centimeters for men and 40 square centimeters for women.

"It's likely that the larger surface area in men's parietal lobes leads to an increase in functional columns, which are the processing unit in the cortex," said Koscik. "This may represent a specialization for certain spatial abilities in men."

The findings underscore the fact that not only is the brain structure different between men and women but also the way the brain performs a task is different, said Peg Nopoulos, M.D., a study co-author and professor of psychiatry and pediatrics at the University of Iowa Carver College of Medicine.

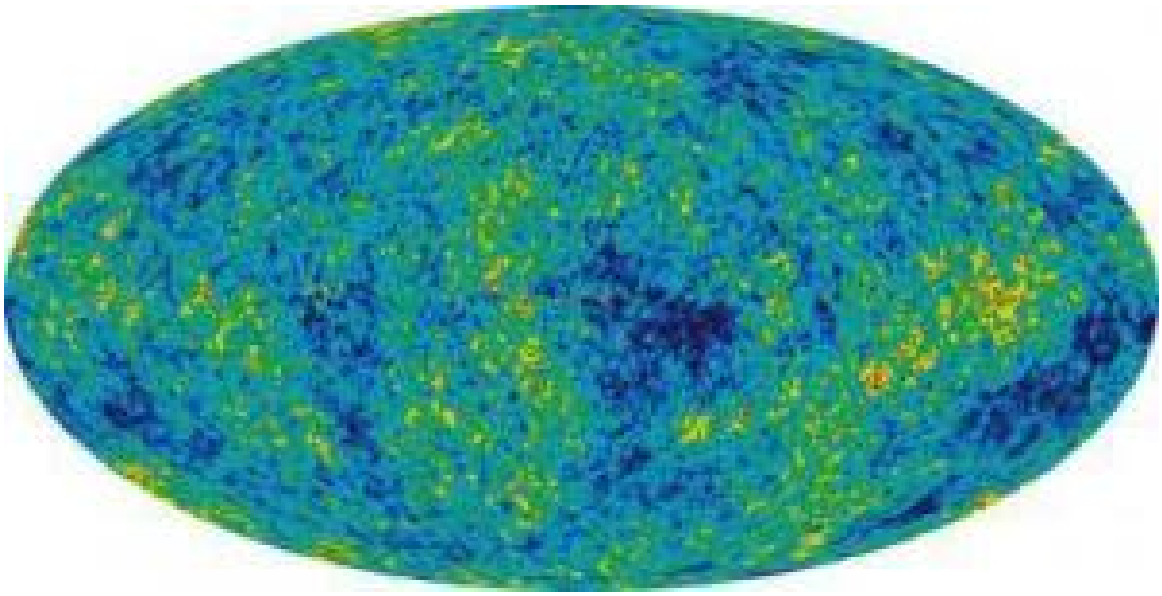
"One possible explanation is that the different brain structures allow for different strategies used by men and women. While men appear able to globally rotate an object in space, women seem to do it piecemeal. The strategy is inefficient but it may be the approach they need to take," said Nopoulos, who also is a psychiatrist with University of Iowa Hospitals and Clinics.

"The big question remains whether this is nature or nurture. On the one hand, boys, compared to girls, may have opportunities to cultivate this skill, but if we eventually see both a strong performance and parietal lobe structural difference in children, it would support a biological, not just environmental, effect," Nopoulos added.

Adapted from materials provided by University of Iowa.

http://www.sciencedaily.com/releases/2008/12/081217124430.htm

What Came Before The Big Bang? Interpreting Asymmetry In Early Universe



The cosmic microwave background as seen by the WMAP satellite. This radiation was emitted when the Universe was 380,000 years old and has an average temperature of 2.7 Kelvin. The red and blue spots are temperature fluctuations that differ from the average temperature by only 0.0002 degrees. The region of maximal variation is in the lower right quadrant. (Credit: NASA/WMAP Science Team)

ScienceDaily (Dec. 18, 2008) — The Big Bang is widely considered to have obliterated any trace of what came before. Now, astrophysicists at the California Institute of Technology (Caltech) think that their new theoretical interpretation of an imprint from the earliest stages of the universe may also shed light on what came before.

"It's no longer completely crazy to ask what happened before the Big Bang," comments Marc Kamionkowski, Caltech's Robinson Professor of Theoretical Physics and Astrophysics. Kamionkowski joined graduate student Adrienne Erickcek and senior research associate in physics Sean Carroll to propose a mathematical model explaining an anomaly in what is supposed to be a universe of uniformly distributed radiation and matter.

Their investigations turn on a phenomenon called inflation, first proposed in 1980, which posits that space expanded exponentially in the instant following the Big Bang. "Inflation starts the universe with a blank slate," Erickcek describes. The hiccup in inflation, however, is that the universe is not as uniform as the simplest form of the theory predicts it to be. Some parts of it are more intensely varied than others.

Until recently, measurements of the Cosmic Microwave Background (CMB) radiation, a form of electromagnetic radiation that permeated the universe 400,000 years after the Big Bang, were consistent with inflation--miniscule fluctuations in the CMB seemed to be the same everywhere. But a few years ago, some researchers, including a group led by Krzysztof Gorski of NASA's Jet Propulsion Laboratory, which is managed by Caltech, scrutinized data from NASA's Wilkinson Microwave Anisotropy Probe (WMAP). They discovered that the amplitude of fluctuations in the CMB is not the same in all directions.

"If your eyes measured radio frequency, you'd see the entire sky glowing. This is what WMAP sees," Kamionkowksi describes. WMAP depicts the CMB as an afterglow of light from shortly after the Big Bang that has decayed to microwave radiation as the universe expanded over the past 13.7 billion years. The probe also reveals more pronounced mottling--deviations from the average value--in the CMB in one half of the sky than the other.

"It's a certified anomaly," Kamionkowski remarks. "But since inflation seems to do so well with everything else, it seems premature to discard the theory." Instead, the team worked with the theory in their math addressing the asymmetry.

They started by testing whether the value of a single energy field thought to have driven inflation, called the inflaton, was different on one side of the universe than the other. It didn't work--they found that if they changed the mean value of the inflaton, then the mean temperature and amplitude of energy variations in space also changed. So they explored a second energy field, called the curvaton, which had been previously proposed to give rise to the fluctuations observed in the CMB. They introduced a perturbation to the curvaton field that turns out to affect only how temperature varies from point to point through space, while preserving its average value.

The new model predicts more cold than hot spots in the CMB, Kamionkowski says. Erickcek adds that this prediction will be tested by the Planck satellite, an international mission led by the European Space Agency with significant contributions from NASA, scheduled to launch in April 2009.

For Erickcek, the team's findings hold the key to understanding more about inflation. "Inflation is a description of how the universe expanded," she adds. "Its predictions have been verified, but what drove it and how long did it last? This is a way to look at what happened during inflation, which has a lot of blanks waiting to be filled in."

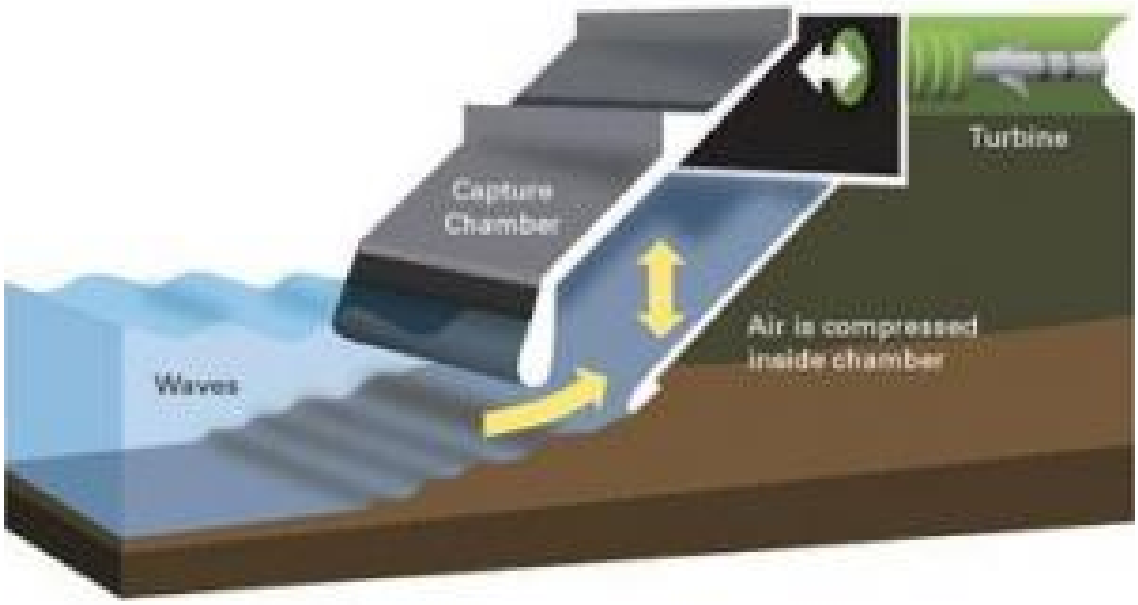
But the perturbation that the researchers introduced may also offer the first glimpse at what came before the Big Bang, because it could be an imprint inherited from the time before inflation. "All of that stuff is hidden by a veil, observationally," Kamionkowski says. "If our model holds up, we may have a chance to see beyond this veil."

The study appears December 16 in the journal Physical Review D. It was supported by the Department of Energy and by Caltech's Moore Center for Theoretical Cosmology and Physics.

Adapted from materials provided by California Institute of Technology, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2008/12/081216131106.htm

Wave Energy: New System Captures Significantly More Wave Energy Than Existing Systems



Schematic of an oscillating water column. Waves enter through a subsurface opening into the chamber with air trapped above. The wave action causes the captured water column to move up and down, pushing the trapped air into an electricity-generating turbine. The turbine turns continuously, despite the changing direction of the air stream as the waves come in and out. (Credit: Graphic courtesy / MIT Energy Initiative)

ScienceDaily (Dec. 18, 2008) — MIT researchers are working with Portuguese colleagues to design a pilot-scale device that will capture significantly more of the energy in ocean waves than existing systems, and use it to power an electricity-generating turbine.

Wave energy is a large, widespread renewable resource that is environmentally benign and readily scalable. In some locations — the northwestern coasts of the United States, the western coast of Scotland, and the southern tips of South America, Africa and Australia, for example — a wave-absorbing device could theoretically generate 100 to 200 megawatts of electricity per kilometer of coastline. But designing a wave-capture system that can deal with the harsh, corrosive seawater environment, handle hourly, daily and seasonal variations in wave intensity, and continue to operate safely in stormy weather is difficult.

Chiang Mei, the Ford Professor of Engineering in the Department of Civil and Environmental Engineering, has been a believer in wave energy since the late 1970s. After the recent oil-price spike, there has been renewed interest in harnessing the energy in ocean waves.

To help engineers design such devices, Professor Mei and his colleagues developed numerical simulations that can predict wave forces on a given device and the motion of the device that will result. The simulations guide design decisions that will maximize energy capture and provide data to experts looking for efficient ways to convert the captured mechanical energy to electrical energy.

One country with a good deal of expertise in wave energy research and development is Portugal. For the past three years, Mei has been working with Professors Antonio Falcao, Antonio Sarmento, and Luis Gato of Insitituto Superior Tecnico, Technical University of Lisbon, as they plan a pilot-scale version of a facility called an oscillating water column, or OWC. Situated on or near the shore, an OWC consists of a chamber with a subsurface opening. As waves come in and out, the water level inside the chamber goes up and down. The moving surface of the water forces air trapped above it to flow into and out of an opening that leads to an electricity-generating turbine. The turbine is a design by A.A.Wells in which the

blades always rotate in the same direction, despite the changing direction of the air stream as the waves come in and out.

The Portuguese plan is to integrate the OWC plant into the head of a new breakwater at the mouth of the Douro River in Porto, a large city in northern Portugal. Ultimately, the installation will include three OWCs that together will generate 750 kilowatts — roughly enough to power 750 homes. As a bonus, the plant's absorption of wave energy at the breakwater head will calm the waters in the area and reduce local erosion.

The challenge is to design a device that resonates and thus operates efficiently at a broad spectrum of wave frequencies — and an unexpected finding from the MIT analysis provides a means of achieving that effect. The key is the compressibility of the air inside the OWC chamber. That compressibility cannot be changed, but its impact on the elevation of the water can be — simply by changing the size of the OWC chamber. The simulations showed that using a large chamber causes resonance to occur at a wider range of wavelengths, so more of the energy in a given wave can be captured. "We found that we could optimize the efficiency of the OWC by making use of the compressibility of air — something that is not intuitively obvious," Mei says. "It's very exciting."

He is currently working with other graduate students on wave power absorbers on coastlines of different geometries and on how to extract wave power from an array of many absorbers.

Mei continues to be enthusiastic about wave energy, but he is not unrealistic in his expectations. Although costs have been falling in recent years, wave energy is unlikely to be commercially viable for a long time — perhaps several decades. Nevertheless, Mei is adamant that more attention should be given to this renewable source of energy, and he would like to see a team of MIT experts in different fields — from energy capture and conversion to transmission and distribution — working collaboratively toward making large-scale wave energy a reality.

"Given the future of conventional energy sources, we need lots of research on all kinds of alternative energy," he says. "Right now, wind energy and solar energy are in the spotlight because they've been developed for a longer time. With wave energy, the potential is large, but the engineering science is relatively young. We need to do more research."

This article is adapted from a longer version that appeared in the autumn 2008 issue of Energy Futures, the newsletter of the MIT Energy Initiative.

Adapted from materials provided by Massachusetts Institute of Technology.

http://www.sciencedaily.com/releases/2008/12/081216114102.htm

Tracking Community-wide Drug Use By Testing Water At Sewage Treatment Plants

ScienceDaily (Dec. 18, 2008) — Scientists in Oregon and Washington State are reporting the development and successful testing of a new method for determining the extent of illicit drug use in entire communities from water flushed down toilets that enters municipal wastewater treatment plants.

The technique may be an effective tool for comparing drug use in different regions of the United States and the world, they note in a study is scheduled for the December 15 issue of ACS' Environmental Science & Technology, a semi-monthly journal.

In the study, Aurea C. Chiaia and colleagues note that the new test eliminates the need for sample preparation — saving time and money and decreasing the risk of sample contamination. They proved the test's effectiveness by measured levels of illegal drugs like methamphetamine and legal drugs like prescription painkillers in wastewater from seven U.S. municipalities. The research team also tested the levels of 'urine indicators' such as creatinine, a metabolic byproduct that can be used as an indicator of drug use.

The scientists determined the 'index loads' of the different drugs — the amount of drug per person per day —based on estimates of the population served by each wastewater facility. These calculated index loads generally reflect known illegal drug use patterns in the US and worldwide. The loads for methamphetamine in western and southern U.S. were much larger than previous reports from Europe, for example.

The authors proposed that urine indicator compounds like creatinine could be used in place of population estimates — which can fluctuate and be unreliable — to determine more accurate community-level drug index loads, which can then be compared between municipalities.

Journal reference:

1. Aurea C. Chiaia, Caleb Banta-Green and Jennifer Field. **Eliminating Solid Phase Extraction with Large-Volume Injection LC/MS/MS: Analysis of Illicit and Legal Drugs and Human Urine Indicators in US Wastewaters**. *Environmental Science & Technology*, 2008; 42 (23): 8841 DOI: 10.1021/es802309v

Adapted from materials provided by American Chemical Society, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2008/12/081215151237.htm#

Girls Have Superior Sense Of Taste To Boys

How many taste buds have you got? As part of the large-scale experiment, pupils from all over Denmark had to colour their tongue bright blue with fruit dye and count the number of taste buds in a certain section of the tongue. Pupils from Amager Fælled School in Copenhagen. (Credit: Photo: Peter Willersted)

ScienceDaily (Dec. 18, 2008) — Girls have a better sense of taste than boys. Every third child of school age prefers soft drinks which are not sweet. Children and young people love fish and do not think of themselves as being fussy eaters. Boys have a sweeter tooth than girls. Teenagers taste differently. And finally, schoolchildren in northern Denmark have the best taste buds.

The findings of the world's largest study so far on the ability of children and young people to taste and what they like have now been published. The study was conducted jointly by Danish Science Communication, food scientists from The Faculty of Life Sciences (LIFE) at University of Copenhagen and 8,900 Danish schoolchildren.

In September, 8,900 schoolchildren from all over Denmark took part in a large-scale experiment conducted by Danish Science Communication and The Faculty of Life Sciences (LIFE) at University of Copenhagen. It is the first time that such a large-scale study has been done on the sense of taste of children and young people and what they like to eat.

One of the reasons why it was possible to include so many children and young people in the study was that the experiment itself was conducted in quite an unorthodox way: It was planned as a 'mass experiment' in conjunction with this year' s natural science festival at Danish primary and secondary schools.

All the participating groups of children were sent a complete kit of taster samples and very detailed instructions, and then conducted the experiment as part of their natural science classes. The various tests were designed to quantify the ability of children and young people to discover and recognise sweet and sour tastes at varying intensities, to establish which sourness or sweetness they prefer, how many taste buds they have and, finally, the children answered a number of questions on their eating habits and fussiness over food.

Both pupils and teachers have taken the experiment very seriously: "What is most surprising is that the results are so clear and of such a high quality," says Bodil Allesen-Holm, MSc in Food Science and

Technology, who is the scientific head of the project and head of the Sensory Laboratory at the Department of Food Science at LIFE. "The trends are very clear in all the answers from the many primary and secondary schools; the pupils and teachers have been very thorough and accurate."

Industry must do better, and parents could experiment more

According to Bodil Allesen-Holm, the results provide food for thought for both the food industry – and for parents: "It is quite clear that children and young people are very good tasters, and that there are bigger variations between them than most people would expect.

There is, for example, a marked difference between boys and girls, and the ability of children to recognise tastes changes with age. So one could easily develop more varied food products and snacks for children and young people. For example, it is quite clear that children do not necessarily prefer sweet things. According to the findings, healthy snacks could easily be developed for boys with slightly extreme and sour flavours."

"This experiment has focused on taste alone, while future studies will include more sensory aspects such as smells and appearance to provide a more all-round understanding of Danish children's preferences," says Wender Bredie, Professor of Sensory Science at the Department of Food Science at LIFE.

Girls are better at recognising tastes than boys

One of the many findings shows that girls are generally better at recognising tastes than boys. They are better at recognising all concentrations of both sweet and sour tastes. The difference is not dramatic, but it is quite clear. It is also a known fact that women generally have a finer sense of taste than men.

"We also asked the pupils to count 'taste buds' or organs of taste on the tongue. However, the experiment showed that boys and girls have largely the same number of taste buds. So it would appear that what makes the difference is the way in which boys and girls process taste impressions," says Michael Bom Frøst, Associate Professor at the Department of Food Science at LIFE.

According to the figures, boys need an average of approximately 10 per cent more sourness and approximately 20 per cent more sweetness to recognise the taste.

Every third schoolchild would prefer not to eat sweet things

Another sensational finding is that every third schoolchild would prefer non-sugary soft drinks. All the pupils did a blind test in which they were instructed to give scores to ten different variants of the same soft drink – with varying sweetness and sourness.

Surprisingly, as many as 30 per cent of the pupils preferred the variant which contained no sugar at all or very little. "This is new. In other words, soft drinks for children and young people do not always have to contain a lot of sugar," says Bodil Allesen-Holm.

On the other hand, 48 per cent of the pupils just couldn't get enough: They gave top marks to the sweetest of the variants. "It may be because many pupils are quite used to drinking a lot of soft drinks and eating a lot of sweets," says Bodil Allesen-Holm.

Boys like it wild, girls prefer more muted flavours

Funnily enough, girls generally prefer flavours which are not too strong. Boys, on the other hand, tend to like the more extreme flavours. Boys also have a sweeter tooth than girls – most of the boys preferred the super sweet soft drink variety. And most boys also gave top marks to the sourest samples.

Yes, I like fish!

The study shows that when you ask the children about their likes and dislikes, they actually like fish. As many as 70 per cent of the pupils said they like fish. And you can safely give them exciting foods. As many as 59 per cent of pupils do not consider themselves to be fussy eaters, and this applies to both girls and boys.

The world becomes more sour and exciting for teenagers

It would appear that you can safely notch up a gear when it comes to food, drinks and snacks for teenagers. The study showed that their sense of taste changes noticeably: The ability to recognise tastes increases gradually with age, and the greatest shift is seen at 13-14 years when children become markedly more sensitive to sour tastes.

At exactly the same time, their love of very sweet flavours starts waning. And it is here too that many more declare they are not fussy eaters. Past studies have shown that children who like sour things tend not to be nearly as fussy as children who are not mad about sour foods. Those who prefer sour flavours are also more open to tasting new foods.

Pupils in northern Jutland taste champions

Pupils from northern Jutland are better tasters than all other pupils in Denmark. The figures are clear, but the scientists cannot explain why. Firstly, they are clearly better at recognising sour tastes. Where most other children and young people require 0.5g of citric acid per litre to discern the sourness, children in northern Jutland need no more than 0.37g. This is a significant difference.

Children in northern Jutland are also better at recognising sweet tastes, although children from central Jutland and Copenhagen are on a par with them.

Adapted from materials provided by University of Copenhagen.

http://www.sciencedaily.com/releases/2008/12/081216104035.htm

Global Warming Impacts On U.S. Coming Sooner Than Expected, Report Predicts

The American West is likely to become more arid in the future due to global warming. (Credit: iStockphoto/Tobias Helbig)

ScienceDaily (Dec. 18, 2008) — A report released at the annual meeting of the American Geophysical Union on December 16 provides new insights on the potential for abrupt climate change and the effects it could have on the United States, identifying key concerns that include faster-than-expected loss of sea ice, rising sea levels and a possibly permanent state of drought in the American Southwest.

The analysis is one of 21 of its type developed by a number of academic and government agency researchers for the U.S. Climate Change Science Program. The work incorporates the latest scientific data more than any previous reports, experts say, including the 2007 Intergovernmental Panel on Climate Change.

While concluding that some projections of the impact of climate change have actually been too conservative – as in the case of glacier and ice sheets that are moving and decaying faster than predicted – others may not pose as immediate a threat as some scenarios had projected, such as the rapid releases of methane or dramatic shifts in the ocean current patterns that help keep Europe warm.

"We simulate the future changes with our climate models, but those models have not always incorporated some of our latest data and observations," said Peter Clark, a professor of geosciences at Oregon State University and a lead author on the report. "We now have data on glaciers moving faster, ice shelves collapsing and other climate trends emerging that allow us to improve the accuracy of some of our future projections."

Some of the changes that now appear both more immediate and more certain, the report concludes, are rapid changes at the edges of the Greenland and West Antarctic ice sheets, loss of sea ice that exceeds projections by earlier models, and hydroclimatic changes over North America and the global subtropics that will likely intensify and persist due to future greenhouse warming.

"Our report finds that drying is likely to extend poleward into the American West, increasing the likelihood of severe and persistent drought there in the future," Clark said. "If the models are accurate, it appears this has already begun. The possibility that the Southwest may be entering a permanent drought state is not yet widely appreciated."

Climate change, experts say, has happened repeatedly in Earth's history and is generally believed to be very slow and take place over hundreds or thousands of years. However, at times in the past, climate has also changed surprisingly quickly, on the order of decades.

"Abrupt climate change presents potential risks for society that are poorly understood," researchers wrote in the report.

This study, in particular, looked at four mechanisms for abrupt climate change that have taken place prehistorically, and evaluated the level of risks they pose today. These mechanisms are rapid changes in glaciers, ice sheets and sea level; widespread changes to the hydrologic cycle; abrupt changes in the "Atlantic Meridional Overturning Circulation," or AMOC, an ocean current pattern; and rapid release to the atmosphere of methane trapped in permafrost or on continental margins.

Considering those mechanisms, the report concluded:

- Recent rapid changes at the edges of the Greenland and West Antarctic ice sheets show acceleration of flow and thinning, with the speed of some glaciers more than doubling. These "changes in ice dynamics can occur far more rapidly than previously suspected," the report said, and are not reflected in current climate models.
- Inclusion of these changes in models will cause sea level rises that "substantially exceed" levels now projected for the end of this century, which are about two feet – but data are still inadequate to specify an exact level of rise.
- Subtropical areas around the world, including the American West, are likely to become more arid in the future due to global warming, with an increasing likelihood of severe and persistent drought. These are "among the greatest natural hazards facing the United States and the globe today," the report stated, and if models are correct, this has already begun.
- The strength of "AMOC" ocean circulation patterns that help give Europe a much warmer climate than it would otherwise have may weaken by about 25-30 percent during this century due to greenhouse gas increases, but will probably not collapse altogether – although that possibility cannot be entirely excluded.
- Climate change will accelerate the emissions of methane, a potent greenhouse gas, from both hydrate sources and wetlands, and they quite likely will double within a century – but a dramatic, potentially catastrophic release is very unlikely.

The "overarching" recommendation of the report is the need for committed and sustained monitoring of these climatic forces that could trigger abrupt climate change, the researchers concluded.Better observing systems are needed, better forecasting of droughts should be developed, a more comprehensive understanding of the AMOC system is needed, and monitoring of methane levels should be maintained, among other needs.The findings of this report will be used to inform federal agencies and policy makers, the researchers said. Another lead author on the report was Andrew Weaver at the University of Victoria in British Columbia, and the contributing authors included scientists from Columbia University, NOAA, the University of Colorado, and Edward Brook, a professor of geosciences at OSU.

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

http://www.sciencedaily.com/releases/2008/12/081216201404.htm

Truth About Give And Take In Social Situations: The More You Take The More You Lose

ScienceDaily (Dec. 18, 2008) — In everyday social exchanges, being mean to people has a lot more impact than being nice, research at the University of Chicago has shown.Feeling slighted can have a bigger difference on how a person responds than being the recipient of perceived generosity, even if the net value of the social transaction is the same, the research on reciprocity—giving and taking—shows.

"Negative reciprocity, or taking, escalates," said Boaz Keysar, Professor of Psychology at the University of Chicago and lead author of the paper "Reciprocity is Not Give and Take: Asymmetric Reciprocity to Positive and Negative Acts," published in Psychological Science. The study was based on giving-and-taking games conducted on students and people in downtown Chicago.The games provided data on how people respond to give-and-take social exchanges."For instance in driving, if you are kind and let someone go in front of you, that driver may be considerate in response. But if you cut someone off, that person may react very aggressively, and this could escalate to road rage," Keysar said.The situation can escalate when the person doing the slighting doesn't appreciate how strongly the slight is being experienced, Keysar said. "The one receiving the slight cannot imagine that the slighter lacks that appreciation. And so it goes, because of such differential perception, they respond more and more strongly. Small slights could escalate to unbelievable, irrational feuds," he explained.

Nicholas Epley, Professor in the University of Chicago Booth School of Business, and University graduate students Benjamin Converse and Jiunwen Wang joined Keysar in the research. To examine how people respond to situations involving reciprocity, researchers conducted experiments on campus as well as in downtown Chicago with people on the street.One such experiment tested 40 college students. The students were divided into two groups and asked to conduct experiments that began in two different ways using money which the players didn't actually keep at the end. In the first group, one player learned that another player had $100 and was going to share it. In each situation, the player with the money the other player $50. When the roles were reversed and the players who were the first to receive received $100. In that exchange, those players gave their partners on average $49.50.

In a companion experiment, the scholars found that the act of taking had a far bigger impact on people's responses than did the act of sharing. A player received $100 from which another player was able to take as much as desired. That player took $50, leaving the first player with $50 just like in the sharing experiment. But when the roles were reversed, the first players took back much more, an average of $48, leaving the partners with an average of $42.Another experiment confirmed the pattern, showing that taking quickly escalated as players became increasingly greedy over repeated exchanges. In the college experiments, the players did not keep the money, but the results were the same in an experiment in downtown Chicago, where $10 was exchanged and players kept their money.

The study shows various social exchanges differ from those in the marketplace, where goods are bought and sold, Keysar said. "Acts of giving are perceived as more generous in social exchanges than objectively identical acts of taking," Keysar said. "Taking tends to escalate. Reciprocity appears to operate on an exchange rate that assigns value to the meaning of events, in a fashion that encourages pro-social exchanges."

Journal reference:

1. Keysar et al. **Reciprocity Is Not Give and Take: Asymmetric Reciprocity to Positive and Negative Acts**. *Psychological Science*, Dec 2008; 19 (12): 1280 DOI: 10.1111/j.1467-9280.2008.02223.x

Adapted from materials provided by University of Chicago.

http://www.sciencedaily.com/releases/2008/12/081217074906.htm

Did Early Global Warming Divert A New Glacial Age?

Glacier and mountain peaks in East Greenland. Using three different climate models and removing the amount of greenhouse gases humans have injected into the atmosphere during the past 5,000 to 8,000 years, scientists observed more permanent snow and ice cover in regions of Canada, Siberia, Greenland and the Rocky Mountains, all known to be seed regions for glaciers from previous ice ages. (Credit: iStockphoto/Rob Broek)

ScienceDaily (Dec. 18, 2008) — The common wisdom is that the invention of the steam engine and the advent of the coal-fueled industrial age marked the beginning of human influence on global climate.

But gathering physical evidence, backed by powerful simulations on the world's most advanced computer climate models, is reshaping that view and lending strong support to the radical idea that human-induced climate change began not 200 years ago, but thousands of years ago with the onset of large-scale agriculture in Asia and extensive deforestation in Europe.

What's more, according to the same computer simulations, the cumulative effect of thousands of years of human influence on climate is preventing the world from entering a new glacial age, altering a clockwork rhythm of periodic cooling of the planet that extends back more than a million years.

"This challenges the paradigm that things began changing with the Industrial Revolution," says Stephen Vavrus, a climatologist at the University of Wisconsin-Madison's Center for Climatic Research and the Nelson Institute for Environmental Studies. "If you think about even a small rate of increase over a long period of time, it becomes important."

Addressing scientists on Dec 17 at a meeting of the American Geophysical Union, Vavrus and colleagues John Kutzbach and Gwenaëlle Philippon provided detailed evidence in support of a controversial idea first put forward by climatologist William F. Ruddiman of the University of Virginia. That idea, debated for the past several years by climate scientists, holds that the introduction of large-scale rice agriculture in Asia, coupled with extensive deforestation in Europe began to alter world climate by pumping significant amounts of greenhouse gases — methane from terraced rice paddies and carbon dioxide from burning

forests — into the atmosphere. In turn, a warmer atmosphere heated the oceans making them much less efficient storehouses of carbon dioxide and reinforcing global warming.

That one-two punch, say Kutzbach and Vavrus, was enough to set human-induced climate change in motion.

"No one disputes the large rate of increase in greenhouse gases with the Industrial Revolution," Kutzbach notes. "The large-scale burning of coal for industry has swamped everything else" in the record.

But looking farther back in time, using climatic archives such as 850,000-year-old ice core records from Antarctica, scientists are teasing out evidence of past greenhouse gases in the form of fossil air trapped in the ice. That ancient air, say Vavrus and Kutzbach, contains the unmistakable signature of increased levels of atmospheric methane and carbon dioxide beginning thousands of years before the industrial age.

"Between 5,000 and 8,000 years ago, both methane and carbon dioxide started an upward trend, unlike during previous interglacial periods," explains Kutzbach. Indeed, Ruddiman has shown that during the latter stages of six previous interglacials, greenhouse gases trended downward, not upward. Thus, the accumulation of greenhouse gases over the past few thousands of years, the Wisconsin-Virginia team argue, is very likely forestalling the onset of a new glacial cycle, such as have occurred at regular 100,000-year intervals during the last million years. Each glacial period has been paced by regular and predictable changes in the orbit of the Earth known as Milankovitch cycles, a mechanism thought to kick start glacial cycles.

"We're at a very favorable state right now for increased glaciation," says Kutzbach. "Nature is favoring it at this time in orbital cycles, and if humans weren't in the picture it would probably be happening today."

Importantly, the new research underscores the key role of greenhouse gases in influencing Earth's climate. Whereas decreasing greenhouse gases in the past helped initiate glaciations, the early agricultural and recent industrial increases in greenhouse gases may be forestalling them, say Kutzbach and Vavrus.

Using three different climate models and removing the amount of greenhouse gases humans have injected into the atmosphere during the past 5,000 to 8,000 years, Vavrus and Kutzbach observed more permanent snow and ice cover in regions of Canada, Siberia, Greenland and the Rocky Mountains, all known to be seed regions for glaciers from previous ice ages. Vavrus notes: "With every feedback we've included, it seems to support the hypothesis (of a forestalled ice age) even more. We keep getting the same answer."

Adapted from materials provided by University of Wisconsin-Madison.

http://www.sciencedaily.com/releases/2008/12/081217190433.htm

Light on the dark energy mystery

Astronomers have observed and analysed the effect of dark energy, the exotic form of energy thought to dominate the Universe, on galaxy clusters.

Using Nasa's Chandra x-ray space telescope, researchers watched the growth of dozens of clusters.

They say dark energy appears to be retarding the clusters' development.

Dark energy is not well understood, but scientists believe it is a repulsive force close to the "cosmological constant" proposed by Albert Einstein.

Another way of looking at it is that nothing - the vacuum of space - contains repulsive energy.

Observations over the last decade or so suggest this is accelerating expansion of the Universe.

"Putting all of this data together gives us the strongest evidence yet that dark energy is the cosmological constant, or in other words, that 'nothing weighs something'," said Alexey Vikhlinin, who led the research from the Smithsonian Astrophysical Observatory in Cambridge, US.

"A lot more testing is needed, but so far Einstein's theory is looking as good as ever."

It appears that dark energy makes up about 70% of the energy in the Universe, with dark matter accounting for a further 25% and "normal" matter just 5%.

The fact that observations appear to tally with the notion of a cosmological constant is further confirmation that Einstein's general theory of relativity applies at large scales, the astronomers say.

"For years, scientists have wanted to start testing how gravity works on large scales," said William Forman, also from the Smithsonian observatory.

"And now, we finally have. This is a test that general relativity could have failed."

Arrested development

The Chandra telescope is one of four original space-based observatories envisaged by Nasa that would, together, cover the electromagnetic spectrum from the infra-red through visible light into x-rays and gamma-rays.

Launched in 1999, it is named after the Indian physicist Subrahmanyan Chandrasekhar who gained a Nobel prize for his work on the evolution of stars.

The current research project, conducted over many years, involved observing hot gas inside galaxy clusters. Some of those observed are relatively close in space, others are halfway across the Universe.

The clusters grew more slowly than would have been indicated by the visible galaxies. The explanation is that dark energy is stretching space.

"This result could be described as 'arrested development of the Universe'," said Dr Vikhlinin.

"Whatever is forcing the expansion of the Universe to speed up is also forcing its development to slow down."

The new findings can now be combined with other evidence on dark energy coming from study of supernovae, the cosmic microwave background and the way galaxies are distributed across the cosmos.

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/science/nature/7787461.stm

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Obesity 'set before age of five'

Childhood obesity is set before the age of five, ministers will hear from researchers later.

Compared to children in the 1980s, today's youngsters are fatter and most of their excess weight gain happens before school age, they will say.

This suggests initiatives to prevent childhood obesity should be started before school, suggest the authors.

The EarlyBird Diabetes study of 233 children from birth to puberty is being published in the journal Pediatrics.

One in four children aged four to five in England are overweight, latest figures show.

Disease 'of our time'

At birth, the children in the study were of similar weight to babies 25 years ago, but had gained more fat by puberty compared with children of the same age in the 1980s.

The bulk of this excess weight was gained before the children were five.

Weight at five years bore little relation to birth weight, but closely predicted weight at nine years old.

Before an obese girl reaches school age she will have already gained 90% of her excess weight, and boys will have gained 70% of their excess weight.

Lead researcher Professor Terry Wilkin, of the Peninsula Medical School, Plymouth, said: "When they reach the age of five the die seems to be cast, at least until the age of puberty.

"What is causing it is very difficult to know."

He said there must be a factor now that was not there 25 years ago which is making today's children obese.

And, given the young age, this is likely to be in a child's home rather than school environment and linked to upbringing rather than schooling.

Diet blamed

Rather than lack of physical exercise, he believes diet could be to blame.

"It is entirely possible that the calorie density of food and portion sizes could be higher."

He said strategies to prevent childhood obesity and its associated health problems, such as type 2 diabetes, might do better to focus on pre-school children.

Professor Wilkin said there had been a lot of focus on school meals, PE time, school runs, television viewing and computer games in the development of childhood obesity, but these are all issues for school age children.

But he said the mandatory measurement of the height and weight of all children in England on school entry at the age of four or five could be helpful, not only as a record of national obesity trends, but also as a pointer to future risk for the individual child.

Sir Liam Donaldson, the chief medical officer for England, said it was no exaggeration to describe soaring rates of obesity as an "impending crisis".

He said: "We need to get in early and build the foundations to healthy living from a very early stage."

However, he added: "It is never too late. Obesity is one of the few serious medical problems that can be reversed very, very quickly."

Sir Liam said eating five portions of fruit and vegetables a day was one of the most important elements of a healthy diet.

David Haslam, of the National Obesity Forum, said: "It is never too late or too early to intervene. The earlier the better in terms of long-term outlook."

He said early childhood obesity was likely to be down to environment and learned behaviours.

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/7786229.stm

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Colonoscopies Miss Many Cancers, Study Finds

By GINA KOLATA

For years, many doctors and patients thought colonoscopies, the popular screening test for colorectal cancer, were all but infallible. Have a colonoscopy, get any precancerous polyps removed, and you should almost never get colon cancer.

Then, last spring, researchers reported the test may miss a type of polyp, a flat lesion or an indented one that nestles against the colon wall. And now, a Canadian study, published Tuesday in the journal Annals of Internal Medicine, found the test, while still widely recommended, was much less accurate than anyone expected.

In the new study, the test missed just about every cancer in the right side of the colon, where cancers are harder to detect but about 40 percent arise. And it also missed roughly a third of cancers in the left side of the colon.

Instead of preventing 90 percent of cancers, as some doctors have told patients, colonoscopies might actually prevent more like 60 percent to 70 percent.

"This is a really dramatic result," said Dr. David F. Ransohoff, a gasteroenterologist at the University of North Carolina. "It makes you step back and worry, 'What do we really know?' "

Dr. Ransohoff and other screening experts say patients should continue to have the test, because it is still highly effective. But they also recommend that patients seek the best colonoscopists by, for example, asking pointed questions about how many polyps they find and remove. They also say patients should be scrupulous in the unpleasant bowel cleansing that precedes the test, and promptly report symptoms like bleeding even if they occur soon after a colonoscopy.

The American Cancer Society says that even if the test is less effective than many had believed, it has no plans to change its recommended intervals between screenings — the test still prevents most cancers, but the expense and risk of the test argue against doing it more often.

The cancer society and the Centers for Disease Control and Prevention also are focusing on developing measurements of quality so that doctors who do colonoscopies can assess themselves and improve.

But gastroenterologists say that, if nothing else, the study points up the paucity of evidence for the common suggestion that anyone who had a clean bill of health from a colonoscopy is almost totally protected for at least a decade.

"We have to not overpromise," said Dr. Ransohoff, who wrote an editorial accompanying the colonoscopy paper. "We need to look at the evidence, and we shouldn't go beyond it."

The new study matched each of 10,292 people who died of colon cancer to five people who lived in the same area and were of the same age, sex and socioeconomic status. The researchers asked how many patients and control subjects had had colonoscopies and whether the doctors had removed polyps. Then the researchers compared the groups and asked how much the colon cancer death rate had declined in people who had had the screening test.

The results were "a shock," said Dr. Nancy N. Baxter, the lead author of the paper and a colorectal surgeon at the University of Toronto. When she saw them, she said, "I asked my analyst to rerun the data."

Now, researchers say, the challenge is to find out why the test missed so many cancers, in particular, those on the right side of the colon, and whether the problem can be fixed.

About 148,000 people will learn they have colon cancer this year, the American Cancer Society reports, and nearly 50,000 will die of it.

It might be that Canadian doctors were not sufficiently skilled. About a third of the colonoscopies were done by general internists and family practitioners who might not have had the experience to do the test well.

But, said Dr. Douglas K. Rex, director of endoscopy and professor of medicine at Indiana University, that cannot be the entire explanation because at least one study, as yet unpublished, involving California Medi-Cal patients also found the test missed many cancers on the right side of the colon.

That leaves several other possibilities.

Perhaps patients did not sufficiently cleanse their bowels of fecal material, a particular problem for the right side of the colon.

"After the prep has been completed, mucus and intestinal secretions start rolling out of the small intestine and colon," Dr. Rex explained. The secretions, he added, pour from the base of the appendix into the right side of the colon and are "very sticky" and can obscure polyps.

One solution, supported by six studies, is to be sure there is just a short time between when patients finish taking the strong laxative that cleanses their bowel and the colonoscopy, Dr. Rex said. That usually means taking half of the laxative the night before the screening test and the rest in the morning, something that often is not done, he added, but that he and others recommend.

Cancer may also be different in the right colon, researchers said.

Flat and indented polyps tend to cluster in the right colon. And so do another kind, serrated lesions, which, some studies indicate, might turn into cancer much more quickly than typical polyps.

"It's possible that we will never get as good a result" in the right colon, said Robert Smith, director of screening for the American Cancer Society.

Still, he said, that does not mean that patients should have more frequent colonoscopies. The tests are "hugely expensive," he said, and insurers may not pay for more frequent colonoscopies. The test also carries a small risk of perforating the bowel. Even if colonoscopies miss some cancers, colon cancer remains a rare disease and, after a colonoscopy, "the likelihood that you have cancer is very, very low," Dr. Smith said.

Dr. Harold C. Sox, editor of the Annals of Internal Medicine, is choosing another option. He is having a stool test, the fecal occult blood test, between colonoscopies. It looks for blood in the stool, which can arise from colon cancer.

Dr. Smith does not advocate that strategy, saying that the stool test can have false positives from things like red meat or broccoli that have nothing to do with colon cancer. He worries that frequent stool tests will lead to frequent false alarms and frequent colonoscopies without making much of a dent in the colon cancer death rate.

CT colonoscopies, so-called virtual colonoscopies, are not a solution, some screening experts said.

"The issues are prep quality, flat lesions, serrated lesions and people not being careful enough in the inspection process," Dr. Rex said. There is no evidence, he added, that a virtual colonoscopy will help with the inspection process. And, he said, "it almost certainly is not as effective a technology as colonoscopy for flat and serrated lesions."

Instead, patients should be compulsive about their bowel prep and be sure the test is done by one of the best colonoscopists in their area, gastroenterologists said. Doctors should find polyps in at least 25 percent of men and 15 percent of women. They should take at least eight minutes to withdraw an endoscope from the colon. And they should do a high volume of screening. Dr. Smith said a high volume was at least three or four colonoscopies a day.

After the test, patients can ask whether the doctor got to the right side of the colon and how that was documented.

Colon cancer experts said people should realize that even if colonoscopies prevent just 60 percent of colon cancer deaths, that still is a lot. Mammograms, for example, prevent 25 percent of breast cancer deaths, and the PSA test for men has not been shown to prevent prostate cancer deaths.

"If I was to provide one main message, it would be that colonoscopies are the way that colon cancer mortality gets reduced," Dr. Ransohoff said. "Colonoscopy is a good test, but it isn't completely effective. And you know what? We ought to be happy with that."

http://www.nytimes.com/2008/12/16/health/16cancer.html?nl=8hlth&emc=hltha1

Looking Under the Hood and Seeing an Incubator

By MADELINE DREXLER

The heat source is a pair of headlights. A car door alarm signals emergencies. An auto air filter and fan provide climate control.

But this contraption has nothing to do with transportation. It is a sturdy, low-cost incubator, designed to keep vulnerable newborns warm during the first fragile days of life.

Unlike the notoriously high-maintenance incubators found in neonatal intensive care units in the United States, it is easily repaired, because all of its operational parts come from cars.

And while incubators can cost $40,000 or more, this one can be built for less than $1,000.

The creators of the car parts incubator — a project being promoted by the Global Health Initiative at the Center for Integration of Medicine and Innovative Technology, or Cimit, a nonprofit consortium of Boston teaching hospitals and engineering schools — say it could prevent millions of newborn deaths in the developing world.

The main causes of newborn death — infections, preterm birth and asphyxiation — are readily treatable with the right expertise and equipment, said Dr. Kristian Olson, principal investigator on the project. He called them the “low-hanging fruit” of global health interventions.

“It’s so frustrating to see these preventable deaths,” he said. “They won’t name babies in Aceh, Indonesia, until they’re two months old. It’s a cultural adaptation to expect a death.”

Mechanically, incubators are simple devices, providing a warm, clean, womblike environment in which a baby can mature (though state-of-the-art models may have accessories like built-in X-ray machines and rotating mattresses). Low birth weight and other problems make it especially difficult for newborns to regulate their body temperature, a condition that can lead to organ failure.

In the car parts incubator, infants born at 32 weeks' gestation or longer can receive supplemental oxygen while their lungs gain strength, antibiotics if they have infections, and low-lit quiet in which to sleep if their mothers are away or are otherwise unable to hold them. In an emergency, the incubator's bassinet can be removed and carried to another part of the building or even to another hospital.

In truth, experts say, the developing world doesn't need more incubators. It needs incubators that work. Over the years, thousands have been donated from rich nations, only to end up in "incubator graveyards" — most broken, some never opened. According to a 2007 study from Duke University, 96 percent of foreign-donated medical equipment fails within five years of donation — mostly because of electrical problems, like voltage surges or brownouts or broken knobs, or because of training problems, like neglecting to send user manuals along with the devices.

To compensate for this philanthropic shortsightedness, medical staffs either crank up the temperature in "incubator rooms" to 100 degrees or more, or swaddle babies in plastic to hold in body heat.

Such makeshift solutions led the Boston team to ask: How can we make an incubator for the developing world that will get fixed?

One person pondering that question in 2006 was Jonathan Rosen, then director of Cimit's technology implementation program. A proponent of sustainable biomedical technology, Dr. Rosen, now at the Boston University School of Management, uses the term "organic resourcing" to describe the principle of fashioning medical devices from whatever materials were locally abundant.

In his discussions with doctors who practice in impoverished settings, Dr. Rosen learned that no matter how remote the locale, there always seemed to be a Toyota 4Runner in working order.

It was his "Aha!" moment, he recalled later: Why not make the incubator out of new or used car parts, and teach local auto mechanics to be medical technologists?

Cimit then hired Design That Matters, a nonprofit firm in Cambridge, Mass., to design the machine. "The idea was to start with a 4Runner," said Timothy Prestero, the firm's founder and chief executive, "and take away all the parts that weren't an incubator."

What resulted was a serious-looking gray-blue device that conjures up a cyborg baby buggy, but fits comfortably in hospitals and clinics with few resources. For one thing, the supply of replacement parts is virtually limitless, because the modular prototype can be adapted to any make or model of car.

"Junkyards are great sources for parts," said Robert Malkin, director of Engineering World Health, a program based at Duke University, who is not affiliated with the incubator project. "We have designs for pumps and a surgical aspirator that are based on car parts."

And the repair people will be right on the scene. "The future medical technologists in the developing world," Dr. Malkin said, "are the current car mechanics, HVAC repairmen, bicycle shop repairmen. There is no other good source of technology-savvy individuals to take up the future of medical device repair and maintenance."

Not everyone agrees that the car parts incubator is the best solution for infant deaths. Skeptics cite a 2005 series of articles in the British journal The Lancet listing proven interventions — including outreach visits

during pregnancy, skilled care at delivery and emergency treatment afterward — that could eliminate up to 72 percent of neonatal deaths worldwide.

"Even if we just do what we know now, we could save roughly two-thirds of the infants who are dying," said Dr. Stephen Wall, a senior research adviser at Save the Children, an independent nonprofit organization.

In his work in resource-poor countries, Dr. Wall has strongly promoted a strategy called kangaroo mother care, in which an infant is placed on the mother's chest immediately and continuously after birth, ensuring warm skin-to-skin contact and breast-feeding.

The method has been documented to raise survival in low-birth-weight babies who are medically stable, and Dr. Wall says global health practitioners should promote the practice more strongly before endorsing a new device. He notes that most babies in the developing world are born not in hospitals but at home.

"For now," he said, "there's an urgent need to provide simple solutions that can be used by families, information that can be shared through community health workers, women's groups or other community mechanisms."

But others view the issue differently. "Mothers who are sick and can't handle their kid, and mothers who can't nurse, typically don't take to kangaroo care," said Dr. Malkin, at Duke. Nor do mothers who have to return to work to support their families, or whose cultures practice carrying infants on the back rather than the chest.

And by itself, the kangaroo method is not enough to help the smallest or sickest babies. Although low-birth-weight infants make up only 14 percent of babies born, they account for 60 percent to 80 percent of neonatal deaths."The bottom line is yes, we need more simple technologies in hospitals for the complicated cases," said Dr. Renée Van de Weerdt, chief of maternal, newborn and child health at Unicef. "At the same time, we need to accelerate efforts to get skin-to-skin care more widely used for the noncomplicated cases."

The car parts incubator has received $150,000 in initial financing from Cimit. The project team is looking for foundation support to develop a working prototype. Because it does not rely on original products or processes, the incubator will most likely not be patented, though Massachusetts General Hospital (Dr. Olson's home institution) and Design That Matters will share intellectual property rights. Meanwhile, the team is refining its business model and solidifying business partnerships abroad. "The technology is the least difficult part of the problem," Mr. Prestero said. "Manufacturing, financing, distribution, regulatory approval: those are major barriers. There aren't many examples of a successfully scaled product to serve the poor."

If international health care bodies like the World Health Organization and the United Nations Population Fund endorse the incubator, he said, it could speed developing countries' adoption of the device, even without approval of the Food and Drug Administration in the United States. Dr. Olson says his determination to create a cheap, reliable incubator — and medical training to go with it — was reinforced on a trip this year to Cut Nyak Dhien Hospital, a one-story concrete building in the tsunami-stricken city of Meulaboh, Indonesia.

"When I walked in the incubator room," he said, "a whole family was sobbing around a crib." Their 7-day-old baby boy, who was born slightly underweight and suffering from infection, had just died, after lying for hours on a cold cot. With warmth and proper care, he would have survived.

Crowding the room were six donated high-tech incubators from the West. None of them worked.

http://www.nytimes.com/2008/12/16/health/16incubators.html?nl=8hlth&emc=hltha1

Studies Try to Tease Apart the Links Between Depression and Heart Disease

By NICHOLAS BAKALAR

People who are depressed are literally sick at heart: they have a significantly increased risk for cardiovascular disease, and no one knows exactly why. Now three new studies have tried to explain this, and they arrive at subtly different conclusions.

The first, led by Dr. Mary A. Whooley of the Veterans Affairs Medical Center in San Francisco, studied 1,017 patients with coronary artery disease for an average of more than four years. Although the study found an association of depression with heart disease, when researchers statistically corrected for other medical conditions, disease severity and physical inactivity, the association disappeared.

They concluded with a relatively straightforward explanation: depression leads to physical inactivity, and lack of exercise increases the risk for heart disease. The study appears in the Nov. 26 issue of The Journal of the American Medical Association.

A second study, published Tuesday in The Journal of the American College of Cardiology, provides a different perspective. It included more than 6,500 healthy men and women with an average age of 51. Researchers tested them for depressive symptoms and followed them for an average of more than seven years.

This study, too, found that behavioral issues like smoking and inactivity were the strongest factors in the increased risk for heart disease among people who are depressed or anxious, accounting for 65 percent of the difference in risk. But they also found that depressed people had higher rates of hypertension and higher levels of C-reactive protein, and that these two physiological factors together accounted for about 19 percent of the increased risk. Mark Hamer, a senior researcher at University College London, was the lead author.

While these two studies suggest that the mechanism by which depression exerts its effect is mostly or entirely through poor health behaviors, a third study, in the December issue of The Archives of General Psychiatry, found that something else might be even more important.

This paper, whose senior author was Dr. Brenda Penninx, a professor of psychiatry at VU University in Amsterdam, studied 2,088 well-functioning adults ages 70 to 79. It found no difference in physical activity between those who were depressed and those who were not.

But it did find that depressive symptoms were associated with an increase in visceral fat accumulation — the pot belly that is a known risk factor for cardiovascular illness. This suggests that there is a biological mechanism that links depression with physiological changes independent of how much a person exercises.

To further complicate matters, Dr. Penninx suggested that her physically healthy subjects might have a different kind of depression. “There is now quite a lot of evidence that among heart attack patients, the physical symptoms of depression are more prevalent,” she said, “which suggests that their depression is different from that seen in an otherwise healthy sample.”

For now, Dr. Hamer, of London, offered what might be the last word on the complicated relationship between depression and heart disease.

“It’s really quite difficult to understand,” he said.

http://www.nytimes.com/2008/12/16/health/research/16depr.html?nl=8hlth&emc=hltha2

Screening: Not All Blood Pressure Tests Are Equal

By NICHOLAS BAKALAR

For people with resistant hypertension — high blood pressure that does not respond to three or more drugs — a blood pressure reading taken in the doctor's office may be a procedure without a purpose.

Researchers report that only ambulatory blood pressure, readings taken with a portable device that measures pressure at regular intervals over 24 hours, can predict a future heart problem.

The study, published in the Nov. 24 issue of The Archives of Internal Medicine, followed 556 patients with resistant hypertension for an average of five years. All had had their blood pressure measured regularly in an office and had their pressure monitored using ambulatory devices. During the time, 19.6 percent either had a cardiovascular event or died.

After controlling for other risks and medications, the researchers found that office blood pressure readings failed to predict any of these events. A higher average ambulatory reading was a predictor of cardiac events and death.

Does this mean an office blood pressure reading is useless? "No," said Dr. Gil F. Salles, the lead author of the study and a professor of clinical medicine at the Federal University of Rio de Janeiro. The findings apply only to resistant hypertension.

http://www.nytimes.com/2008/12/16/health/research/16scre.html?nl=8hlth&emc=hltha2

Person, Patient, Statistic

By DANA JENNINGS

Juliette Cezzar

I have prostate cancer, but it sometimes seems as if I've been in a terrible car crash: I've smashed through the windshield, I'm bleeding in the road, and a cop steps over my body and says, "Hey, did you know that there were 41,000 traffic deaths last year?" A passer-by notes that "modern medicine is doing wonderful things with organ transplants" while another mutters, "Well, at least no one was killed."

This is the way prostate cancer often feels, as if my world had turned into a Philip K. Dick dystopia in which the cold intent of many people — especially my insurer and the other bureaucrats who populate the health-care-industrial-complex — was to translate me into an abstraction, to deny my damaged and tiresome flesh-and-bloodness.

My insurer did not want to hear that my radical open prostatectomy last July would demand a higher level of care because previous abdominal surgery had created a tortuous internal topography of scar tissue and adhesions. My insurer, despite the insight and strong protests of my doctors, kept insisting that any knife would do. Was Sweeney Todd available?

And some doctors I spoke with before my surgery — not my current team at the Cancer Institute of New Jersey — seemed to regard me as a rare pelt, a fascinating wrinkle in their volume business in prostates. Others, looking at me without really looking at me, defaulted to the reassuring role of professional pilot, treating the potential realities of impotence and incontinence as businesslike asides: "We'll be cruising at 30,000 feet today ... you might wear man-pads for years ... please note Niagara Falls as we fly over ... and you might not ever have sex again."

Nearly 200,000 cases of prostate cancer are diagnosed each year, and nearly 30,000 men die. This is serious, life-changing stuff: There's blood in your urine, a catheter snaked up your penis, scars stitch your gut, and you might be impotent and incontinent for a few months, a couple of years, or the rest of your life.

Prostate cancer — any cancer — is a crucible in which we patients are somehow, we hope, reborn. It's a rite of passage as resonant as any other — a graduation, a baptism, a wedding — and should be treated

that way. Some days, maybe because I'm still undergoing treatment, I don't want to hear about another stat, another study, another harebrained cure. How about a smile, a kind word and a hug?

Prostate cancer is an abstraction in the same way that global warming was an abstraction, until the world saw the photograph of that forlorn polar bear trapped on an ice floe. It should be the goal of each one of my brothers-in-disease to become that bear.

But it's difficult. The bewilderment, shame and fear often stun men into a passive and depressed silence. Nurses and doctors say that many men barely speak during treatment and office visits, letting their wives, partners or children do the talking. It's as if the dark biological knowledge they are bearing is too overwhelming for words.

They are quiet waiting-room wraiths, perfecting their thousand-yard stares. And if they speak, it's in murmurs, as if cancer required whispers. They don't understand that to keep from being reduced to a cipher, a mere "case," you need to be conscious and verbal.

As a patient, when you don't speak, when you try to take on the cool and detached manner of a doctor, all you become is "meat," quiet meat. And no one scratches you behind the ears and says, "Good boy" for being mute.

It's hard to avoid that sense of meat-ness. Each office visit reduces you right away to your weight/temp/B.P. And because I had surgery at a teaching hospital, I woke up each morning to the rustle and jostle of a gang of residents. Young crows with bright and clever eyes, they flapped into my room — almost like Keystone Kops in white coats — to take a poke at the old crow.

I don't want to be too tough on them, because they're only kids, and they have so much to learn in such a short time. But to most of them, I suspect, I was just a case, one of each morning's many medical exhibits.

I preferred the humane, morphine-woozy middle-of-the-night conversations with the aides who took care of me. The guy who talked about superhero movies after checking out the Iron Man figurine my sons had given me. And the guy who, as he gently drained my ileostomy pouch — not related to my cancer — told me how he'd had to wear a temporary pouch after he'd been shot when he was young and stupid.

It made me smile that the aides and nurses called my two round, plastic drains "grenades." And it was one of my grenades that made one resident understand that I was more than just another "prostate cancer post-op."I can't recall her name — most residents rushed through their names the same way they rushed through the halls — and she seemed new. She'd been told to remove my drain, my last grenade. The moment she touched it I knew that both of us were in deep trouble.

She needed to grab it firmly, then tug. Instead, she held it tentatively, as if it were a surly garter snake. Instead of pulling, she waggled it inside my body. It hurt, I believe, like being tortured: I got dizzy, nearly threw up and, yes, James Brown, I broke out in a cold sweat. When I told her I was going to pass out, she sheepishly went and got help. But I know she won't forget me. I became a real person in those cold-sweat moments, stopped being an abstraction. I became her polar bear on the ice floe.

Dana Jennings is an editor at The New York Times and the author, most recently, of "Sing Me Back Home: Love, Death and Country Music."

http://www.nytimes.com/2008/12/16/health/views/16case.html?nl=8hlth&emc=hltha8

A Crisis of Confidence for Masters of the Universe

By RICHARD A. FRIEDMAN, M.D.

Meltdown. Collapse. Depression. Panic. The words would seem to apply equally to the global financial crisis and the effect of that crisis on the human psyche.

Of course, it is too soon to gauge the true psychiatric consequences of the economic debacle; it will be some time before epidemiologists can tell us for certain whether depression and suicide are on the rise. But there's no question that the crisis is leaving its mark on individuals, especially men.

One patient, a hedge fund analyst, came to me recently in a state of great anxiety. "It's bad, but it might get a lot worse," I recall him saying. The anxiety was expected and appropriate: he had lost a great deal of his (and others') assets, and like the rest of us he had no idea where the bottom was. I would have been worried if he *hadn't* been anxious.

Over the course of several weeks, with the help of some anti-anxiety medication, his panic subsided as he realized that he would most likely survive economically.

But then something else emerged. He came in one day looking subdued and plopped down in the chair. "I'm over the anxiety, but now I feel like a loser." This from a supremely self-confident guy who was viewed by his colleagues as an unstoppable optimist.

He was not clinically depressed: his sleep, appetite, sex drive and ability to enjoy himself outside of work were unchanged. This was different.

The problem was that his sense of success and accomplishment was intimately tied to his financial status; he did not know how to feel competent or good about himself without this external measure of his value.

He wasn't the only one. Over the last few months, I have seen a group of patients, all men, who experienced a near collapse in their self-esteem, though none of them were clinically depressed.

Another patient summed it up: "I used to be a master-of-the-universe kind of guy, but this cut me down to size."

I have plenty of female patients who work in finance at high levels, but none of them has had this kind of psychological reaction. I can't pretend this is a scientific survey, but I wonder if men are more likely than women to respond this way. At the risk of trading in gender stereotypes, do men rely disproportionately more on their work for their self-esteem than women do? Or are they just more vulnerable to the inevitable narcissistic injury that comes with performing poorly or losing one's job?

A different patient was puzzled not by his anxiety about the market, but by his total lack of self-confidence. He had always had an easy intuitive feel for finance. But in the wake of the market collapse, he seriously questioned his knowledge and skill.

Each of these patients experienced a sudden loss of the sense of mastery in the face of the financial meltdown and could not gauge their success or failure without the only benchmark they knew: a financial profit.

The challenge of maintaining one's self-esteem without recognition or reward is daunting. Chances are that if you are impervious to self-doubt and go on feeling good about yourself in the face of failure, you have either won the temperamental sweepstakes or you have a real problem tolerating bad news.

Of course, the relationship between self-esteem and achievement can be circular. Some argue that that the best way to build self-esteem is to tell people at every turn how nice, smart and talented they are.

That is probably a bad idea if you think that self-esteem and recognition should be the result of accomplishment; you feel good about yourself, in part, because you have done something well. On the other hand, it is hard to imagine people taking the first step without first having some basic notion of self-confidence.

On Wall Street, though, a rising tide lifts many boats and vice versa, which means that there are many people who succeed — or fail — through no merit or fault of their own.

This observation might ease a sense of personal responsibility for the economic crisis, but it was of little comfort to my patients. I think this is because for many of them, the previously expanding market gave them a sense of power along with something as strong as a drug: thrill.

The human brain is acutely attuned to rewards like money, sex and drugs. It turns out that the way a reward is delivered has an enormous impact on its strength. Unpredictable rewards produce much larger signals in the brain's reward circuit than anticipated ones. Your reaction to situations that are either better or worse than expected is generally stronger to those you can predict.

In a sense, the stock market is like a vast gambling casino where the reward can be spectacular, but always unpredictable. For many, the lure of investing is the thrill of uncertain reward. Now that thrill is gone, replaced by anxiety and fear.

My patients lost more than money in the market. Beyond the rush and excitement, they lost their sense of competence and success. At least temporarily: I have no doubt that, like the economy, they will recover. But it's a reminder of just how fragile our self-confidence can be.

Richard A. Friedman is a professor of psychiatry at Weill Cornell Medical College.

http://www.nytimes.com/2008/12/16/health/views/16mind.html?nl=8hlth&emc=hltha8

CONVERSATION WITH RENEE A. REIJO PERA
Using Embryos to Put Fertility First

By CLAUDIA DREIFUS

As director of Stanford's Center for Human Embryonic Stem Cell Research and Education, Renee A. Reijo Pera, 49, a professor of obstetrics and gynecology, works at ground zero of the controversy over human embryonic stem cells. She uses human embryos to create new cells that will eventually be coaxed into becoming eggs and sperm. In other research, she has also identified one of the first genes associated with human infertility. The questions and answers below are edited from a two-hour conversation and a subsequent telephone interview.

Q. WHY ARE YOU TRYING TO CREATE HUMAN EGGS AND SPERM?

A. Because in doing so, we may find the answer to disorders like Down syndrome and some neurodegenerative diseases that develop in the egg, sperm or embryo. It's our hypothesis that if you don't treat your DNA right in the first day or two of life, you could end up with diseases and conditions. So by learning what nature does and repeating it in a Petri dish, we hope to find out what has gone wrong — and then, eventually, how to correct it.

Q. HOW FAR HAVE YOU GOTTEN IN THIS QUEST?

A. We're about halfway there, though I'm not sure if we've completed the easy or hard half. In a dish, we've gotten stem cells to make meiotic germ cells, the cells that give rise to eggs and sperm. What we haven't been able to do yet is to figure out which supplements should be fed to the cells to get them to become germ cells capable of making embryos. Optimistically, we are three to five years from being able to do that.

Q. IN SPEECHES, YOU SAY THAT STEM CELL RESEARCH SHOULD BE THOUGHT OF AS A WOMEN'S HEALTH ISSUE. WHY?

A. Because in my lab, we're using stem cell research to look for ways to make fertility treatments safer and more rational.

Considering all the heartbreak and expense of infertility treatments, this sort of research is something I believe women have a big stake in defending.

Right now, we don't fully know what a healthy embryo in a Petri dish looks like. Because of this, I.V.F. clinics often insert multiple embryos into women to try to increase the odds of a successful implantation. Patients frequently have multiple births or devastating miscarriages. Half the time, the embryos don't make it. If we could figure out what a healthy embryo looked like and what the best media was to grow it in, we'd cut down on that.

Q. WHEN GEORGE BUSH ISSUED HIS AUGUST 2001 PROHIBITION AGAINST FEDERAL FINANCING OF NEW STEM CELL RESEARCH, WHAT DID YOU THINK?

A. First, I was stunned that a president was talking about biological science at all! After I caught my breath on that, I was grateful he didn't order an outright ban on all research in this area.

As you may recall, his order banned federal funding for new stem cell lines, but permitted work on older colonies of stem cells, derived by embryos — "lines" — already in existence. Of those he permitted, there were supposed to be something like 60 or 70 lines, though reports are there are actually only about 20 lines one can work on. I believe there are really only 11 that grow well.

There's been bad news and good news. Surprisingly, because scientists were limited to working with these very few lines, we've learned a lot about this one small group of embryonic stem cells. We've learned a lot about the genetics of these lines, and we are able to make comparisons between them. This might not have happened if researchers had been using all kinds of different lines from all over the place. The bad news was that the available lines turned out to be, generally, of poor quality — many were grown in a medium that contained animal products. For studying human reproduction at the level we are, you wouldn't want to use them. The bottom line is: Although we have improved our methods to make embryonic stem cells, we're still limited to using these poor-quality stem cell lines, which are not valuable for learning about human embryonic development.

We hope in the future we'll be able to study newer lines made under less restrictive conditions. I hope there will be a change in policy.

Q. WELL, THEN, WHAT DO YOU USE IN YOUR LABORATORY NOW?

A. Our lab isn't federally funded. We get our money from the $3 billion California stem cell initiative. We make our own stem cells from embryos donated by I.V.F. families.

Q. DO YOU HAVE MORAL QUALMS ABOUT USING HUMAN EMBRYOS IN YOUR RESEARCH?

A. I can't say I do. And I've really searched myself about this. I grew up a deeply religious Christian — I'd go off into the woods and sing hymns. My sister is an Evangelical. I'm sure there have been moments in my life when I haven't been a model Christian, but my work on embryonic stem cells isn't one of them.

Think about it: we study embryos donated by couples who finished their I.V.F. treatments. They would be destroyed anyway. Nationally, the clinics discard about 400,000 unused embryos every year — and yet few people consider I.V.F. clinics "immoral." Stem cell researchers use about 10,000 of those about-to-be-discarded embryos. And in learning from them, we are getting information that we can get nowhere else, that will make mothers and babies healthier.

There are people who believe that we when use embryos for research at all, our society becomes hardened. I've searched myself on that and I don't think I'm hardened. I can honestly say I still get goose bumps when I see embryos develop. You hope you are humble enough to take in the information and not change your course.

If there was truly a substitute that was better for understanding human development than embryo research, that is what I'd do. But there isn't. That's where the data is. I think that it is not good to throw human embryos away — without studying them.

http://www.nytimes.com/2008/12/16/science/16conv.html?nl=8hlth&emc=hltha8

FRANZ WEST
Sculpture That Asks You to Set a Spell

By KEN JOHNSON

BALTIMORE — The Austrian artist Franz West is an interesting sculptor and, as a godfather of the lately popular grunge aesthetic, enormously influential. Over the last 20 years he has been a regular, much-lauded presence in big expositions like Documenta and the Venice Biennale. He may also be one of the world's most overrated artists. To view his well-produced, four-decade career survey at the Baltimore Museum of Art is to wonder why he should be "widely considered one of Europe's pre-eminent living artists," as the museum's director, Doreen Bolger, affirms in her foreword to the show's catalog.

The core of Mr. West's oeuvre includes eccentrically shaped, modestly scaled abstract sculptures with crusty surfaces. They are made of plaster, papier-mâché, wire, fabric and other ordinary materials. Some, called Adaptives, are meant to be picked up and handled by viewers.

Mr. West also creates deliberately crude and ugly collages combining images from fashion, pornography and news publications and brusquely applied paint. And since the mid-1980s he has been producing simple pieces of furniture that blur the lines among sculpture, relational aesthetics and functional design.

In the mid-1990s Mr. West began producing his most appealing works: large-scale, lumpy, bulbous and tubular sculptures made of aluminum patches welded together and painted in cheerfully bright colors. These comically ingratiating works look great outdoors — there are three on the museum's grounds — and they often include places to sit.

A new example of Mr. West's delightfully zany metal sculpture greets viewers at the start of the exhibition, organized by Darsie Alexander, the museum's senior curator of contemporary art. Called "The Ego and the Id," it consists of two configurations of rumpled, ribbon-like loops rising some 20 feet high. One is bright pink, the other neatly painted in blocks of green, yellow, blue and orange. Both have round stools projecting from the lower ends of the loops.

Mr. West's art has revolved around a familiar Modernist conceit: the willful violation of conventional good taste in the interest of liberating repressed, undeveloped psychic energies. Favoring the raw, primitive, messy, clumsy and ugly and rejecting formal and technical refinement, it is an approach often called anti-art. But it has a rich, deep pedigree including Picasso's "Demoiselles d'Avignon," the art brut of Jean Dubuffet and the early painted plaster works of Claes Oldenburg.

Contemporary artists influenced by Mr. West include Richard Prince, whose appalling collages of pornography and reproductions of de Kooning paintings resemble Mr. West's collages, and Rachel Harrison, creator of tastefully visceral sculptures and assemblages.

Ms. Harrison has made a down payment on her debt to Mr. West by writing, in collaboration with Eric Banks, an essay for the catalog. As a sideshow to Mr. West's exhibition the museum has also organized a small show revolving around a sculpture and close-up photographs of disgusting plates of food by Ms. Harrison and works on paper by Dieter Roth, the Swiss-German artist whose spectacularly messy art has influenced Mr. West.

Born in Vienna in 1947, Mr. West came of age in the 1960s when the Viennese Actionists were doing public performances involving masturbation, urination and bloodletting. Mr. West's first mature works, the Adaptives (Passstücke), were also meant to subvert traditional relations between viewers and artworks, but they did so in a far milder way.

The trouble with the Adaptives is that they are not much fun to play with. Near the start of the show is a set of gnarly plaster forms on steel rods that you are invited to pick up and take into an enclosure with a mirror. It is an underwhelming experience.

In the 1980s Mr. West began producing plaster and papier-mâché objects meant only to be looked at. Boulderlike forms are slathered in colors that are sweet, tart and altogether scrumptious. These works reveal him as a consummate aesthete — even if some are displayed on old suitcases and others, called Refreshers, have liquor bottles embedded in them.

Pieces that tend toward a browner chromatic range are like industrial artifacts from postapocalyptic archaeological sites. "The Thing Itself" (1987), a corroded, hornlike shape, has a nice swooping grace. In others, a clunky, eccentric solidity suggests some unknown mechanical or architectural function.

Mr. West's welded metal chairs and divans, some minimally padded and upholstered in raw linen, flout all the usual rules of good furniture design. Yet they are comfortable to sit on, and they grow on you visually too; they begin to seem decidedly elegant. So do his industrial-strength floor lamps — oversized metal constructions with big, barrel-like shades of clear plastic.

Mr. West's art and furniture ostensibly assert a democratic spirit. The "de-skilled" look of both conveys the idea that anyone can be an artist. And by conflating furniture and art, he conjures the fantasy of a holistic world of creative, all-embracing sociability.

All this makes Mr. West and his art enormously likable. But behind the populist mask is a canny hipster. This is not art for the masses, nor is it an art that seriously bucks the institutionalized art system. This is chicly stylish art — shallow but very cool.

"Franz West, To Build a House You Start With the Roof: Work, 1972-2008" continues through Jan. 4 at the Baltimore Museum of Art, Art Museum Drive at North Charles and 31st Streets; (443) 573-1700, artbma.org.

http://www.nytimes.com/2008/12/19/arts/design/19west.html?ref=design

'GOTHIC: DARK GLAMOUR'
Where Too Much Is Never Enough (and Black Is Still the New Black)

By KAREN ROSENBERG

"Gothic: Dark Glamour" at the Museum at F.I.T. is a fashion show with fangs. Its appeal is practically guaranteed, as modern-day vampire stories fill big screens ("Twilight") and small ("True Blood"), and the arbiters of chic decree that black is back.

Organized by Valerie Steele, the director of the Fashion Institute of Technology's museum, the show unfolds in a nightmarish mise-en-scène conceived by the British artist and set designer Simon Costin. The clothes have been installed in a labyrinth of haunted palaces, ruined castles and cemetery-gate enclosures. Naturally it all takes place in F.I.T.'s cryptlike basement galleries.

The gloom and doom can be overpowering, but Ms. Steele and Mr. Costin understand that too much is never enough for the goth devotee. And it's impossible to upstage the clothes, with their capes, corsetry and fetishistic hardware.

As uniformly macabre as it is, "Gothic: Dark Glamour" resonates with several groups. Fashionistas will relish the chance to see famous creations by Oliver Theyskens, Ann Demeulemeester and other avant-garde designers. Readers of Poe, Shelley and other Romantic literature will enjoy seeing gothic characters and settings come to life (or undeath). And the eager consumers of adolescent vampire fantasies, from "Buffy the Vampire Slayer" to "Twilight," will thrill to the clothes' sex-and-death subtext.

Contemporary art aficionados, on the other hand, may find the show old news. During the goth art trend, which peaked in the early 2000s, Chelsea was filled with werewolf heads, fake blood and coded references to murderous satanic subcultures. In sculptures by Banks Violette and David Altmejd and video installations by Sue de Beer, goth references conferred outsider status and expressed a morbid mindset that seemed appropriate in the aftermath of 9/11.

The word gothic, which originates with third-century Germanic warrior tribes, has come to signify a macabre, antimodern aesthetic, one that encompasses (among other genres) Medieval monasteries, decadent and Romantic novels, Hollywood horror movies and the Victorian steampunk subculture. At F.I.T. an antechamber to the main gallery displays fashions representative of three gothic muses: the victim, the widow and the vamp.

In the victim category are filmy gowns that could have been worn by the swooning subject of Henry Fuseli's 1871 painting "The Nightmare." (A reproduction is on view.) In the widow category is Victorian mourning dress: suffocatingly high-necked, monochromatic black ensembles. In the most spectacular category, that of the vamp, is a scarlet dress by Eiko Ishioka made for Francis Ford Coppola's film "Bram Stoker's Dracula." Its cascading bustle suggests spilled blood.

These archetypes reappear throughout the main gallery. Rodarte's red-stained chiffon gown, inspired by Japanese horror movies? Ethereal goth. A slim, bias-cut number by John Galliano for Christian Dior? Classic vamp.

Also in the show's first section is a fascinating curio cabinet of gothic accessories, among them a bat-shaped belt buckle, a brooch made from a pigeon's wing and a bottle of laudanum. Some objects date from the Victorian era, others from current collections; it can be difficult to tell which is which.

The labyrinth of the main gallery begins with a section called "Night," devoted to streamlined, elegant designs. Here a black leather jumper with a deep cowl neck by Ms. Demeulemeester, known as the Dark Queen of Belgian Fashion, offsets slinky dresses by Karl Lagerfeld and Giles Deacon.

The outfits in the "Ruined Castle" section evoke what the scholar Chris Baldick describes as "an impression of sickening descent into disintegration." Hussein Chalayan's shredded and deconstructed corsets stand out, as does a dress by Yeohlee with curved seams that take the form of Gothic arches.

In the background of "Laboratory," mannequin zombies press their faces against a latex scrim. An infamous hunchback dress by Rei Kawakubo and a leather prosthetic corset, which both create the illusion of deformities, are found here. Kei Kagami's torturous-looking shoes, inspired by a London cemetery, complete the show's creepiest section.

In "Batcave" outfits are displayed in glass cases fronted with two-way mirrors; the lights are on a timer, affording only brief glimpses of the clothes. Here you are introduced to niche goths like the graver, or goth raver; the cyber-goth; and the elegant gothic Lolita of the Harajuku district, a center of youth style in Tokyo. Many of these tribes coalesce around music scenes, a phenomenon detailed in Jennifer Park's catalog essay, "Melancholy and the Macabre: Gothic Rock and Fashion."

To her credit, Ms. Steele recognizes that the goth aesthetic encompasses much more than fashion. Yet she closes the exhibition with an emphasis on the philosophical alliance between fashion and death, quoting Coco Chanel's statement, "Fashion must die and die quickly, in order that it can begin to live." That explains the perennial parade of black clothes on the runway, but not the enduring, cross-cultural phenomenon that gave rise to Horace Walpole's novel "The Castle of Otranto" and Harajuku's gothic Lolitas.

A few other questions come to mind: why does the show focus almost exclusively on women's clothing, when the catalog devotes so much space to the elegant (and implicitly homosexual) figure of the vampire-dandy? Where did that aristocratic image (epitomized by Bela Lugosi's Dracula) come from, and why does it still have such a hold on the popular imagination? The current national mood begs for a deeper understanding of the relationship between luxury and death, handbags and coffins.

"Gothic: Dark Glamour" continues through Feb. 21 at the Museum at F.I.T., Seventh Avenue at 27th Street, Manhattan; (212) 217-4560, fitnyc.edu.

http://www.nytimes.com/2008/12/19/arts/design/19goth.html?ref=design

Italian Cultural Paradox: Love It, Live in It, Leave It to the Creaky Bureaucracy

By MICHAEL KIMMELMAN

ROME — "We are very, very, very old," said Antonio Paolucci, the director of the Vatican Museums, when asked one recent morning whether Italy, rather than moving around the deck chairs of its cultural policy, as it has done for ages, might someday actually consider real reform.

The question came up after a ruckus ensued when Prime Minister Silvio Berlusconi's culture minister, Sandro Bondi, floated the idea some days ago of putting much of the management of the country's 4,000 museums and their cultural heritage into the hands of one person. The person proposed to fill the post was Mario Resca, a businessman who used to run the McDonald's subsidiary in Italy, a pal, as everybody instantly remarked, of Mr. Berlusconi.

That plan was then drastically amended in light of fierce opposition from the Italian arts establishment, which includes Mr. Paolucci, who made clear he was a friend of Mr. Resca. It was nothing personal, he said. But when Pope Leo X, in 1515, wanted someone to look after collections at the Vatican he picked an artist, Raphael.

Mr. Paolucci gazed out the large, open picture window in his office, which perfectly framed the ancient dome of St. Peter's.

"É tutto," he said. (Roughly translated, "That says it all.")

Triumphant, as if there really were nothing more anyone could add, he fell silent.

This is Italy, after all. Everyone here believes change is necessary. But then sighs, because it's impossible too. Wholesale change anyway. It's Raphael or bust.

A half-dozen structural revamps of the culture ministry during the last decade haven't really done much except to shuffle around the burden of a creaky and defensive bureaucracy. The country is paralyzed by contradictions. Italians say they identify deeply with their cultural patrimony, but they actually don't visit their museums much. They talk about collective Italian artistic heritage but remain, at heart, profoundly divided by ancient regional differences never quite bridged by unification a century and a half ago, differences that fracture cultural policies.

And so the Berlusconi administration's proposal for a supermanager was ostensibly to cut through decades of red tape, inject an outsider's fresh views and, in straitened times, find new ways to earn more revenue from the country's unparalleled bounty of art and antiquities, especially considering that the ministry's budget is about to be slashed by more than 30 percent over the next three years.

But opponents, not altogether irrationally, stressed that culture demands expertise, not somebody who sold hamburgers, never mind if Mr. Resca is admired and successful. The ridiculous choice that presented itself between maintaining the status quo or enlisting the guy who ran McDonald's was somehow typically Italian. In a country where every bid for change is believed to hide some ulterior political motive, detractors suspected the supermanager idea was in fact merely a ploy to ransack national storerooms and grease the path for the prime minister's rich friends who want to hawk precious Italian art abroad

To Americanize the system, in other words. And perhaps in part it was. But Italians, whose cultural heritage policies have roots in the 1500s, still maintain a very different philosophy toward their belongings. They declare not just precious Roman artifacts and Caravaggios to be national patrimony but also every single Italian building, artwork and piece of furniture more than 50 years old.

That's right. Everything over 50 (with art, the artists at least have to be dead) is regulated by patrimony laws requiring Italians to declare what they own if they wish to export it. This means many people prefer to remain secretive about what they have, and if it's art, it therefore doesn't circulate. Whatever's buried in the ground automatically belongs to the state, even if the ground happens to be your backyard.

Beautiful concepts, in principle: collective values, shared heritage, cultural integrity over economy.

In practice, in a country where uncollected taxes are now estimated to top 280 billion euros (about $401 billion) — a reflection, among other things, of Italian doubts about, and lack of identification with, a centralized government — the system relies upon an increasingly aging and perennially underpaid ministry. It is practically unmanageable. It encourages dishonesty and illicit trade; it discourages innovation and outreach. It also stresses conservation — sometimes to a fault.

Only 15 years ago Italian museums agreed to keep their doors open past 2 p.m. A Roman friend was shocked last week to receive a flyer from the Palazzo Massimo, part of the National Museum of Rome, inviting her to "Discover the Massimo." American museums send out these sorts of promotions all the time. Not Italian ones.

In France or Britain, where people feel just as strongly about their cultural heritage, there are incentives for openly declaring one's art and property, including the right to sell outside the country, with the state preserving an option to buy what it deems national patrimony by matching the price at fair market value. At the same time the Louvre will soon start renting parts of its collection to Abu Dhabi, as the Museum of Fine Arts, Boston, has done to Japan. This is a dubious business that can easily lead to conflict, and has in the case of Boston, but also, if properly managed, a way to earn money and share a country's cultural riches. In turn it can be a boon to tourism and a diplomatic tool.

In America tax breaks encourage private contributions to public institutions. Italy is only just beginning to set up a limited system for tax breaks but under complicated circumstances that most Italians don't know about or find mysterious. Smuggling art and antiquities out of the country is a constant problem.

Italians seem almost to relish their own intransigence. Salvatore Settis heads the top advisory board at the culture ministry. "We walk on the streets of cities like Rome, and we may live and work in a palace with historical importance, so we interact with our cultural heritage all the time and therefore we may go into a museum or we may not," he said by way of explaining how it is that Italians prize their cultural past but don't bother to go to their museums to see it. "But another explanation," he added, "is that Italian museums are not attractive."

That's not altogether true. Some are glorious of course. But among the Top 10 most visited in the world, Italy has only the Vatican Museums, and the Vatican isn't even technically part of Italy. As Marisa Dalai Emiliani put it, "We don't think in those terms," meaning in terms of promotion and accessibility. She is president of the Ranuccio Bianchi Bandinelli Association, a cultural research institution.

"When Clement XII opened the Capitoline Museum in 1734, he had two aims," she said the other evening. "The goal was to teach scholars and artists on the one hand, and public enjoyment on the other. Over time even with all the changes we've had in recent years, there has been less of a sense of our museums as places for public enjoyment."

Michele Trimarchi, an economist here, shook his head in disgust. "We have a small but noisy cultural establishment, and there is a kind of religion of self-protection on its part," he said. "The large majority of Italians don't actually care about culture. Absolutely not.

"In the United States you have museums and opera companies that arrange for young people to come for free to encourage new audiences. Here that sort of promotion is blasphemous. Italian museums have no incentive to promote themselves. They are not centers of financial autonomy, because everything they make goes to the central government, so whatever they make will not be reflected in their own financial fortunes."

This is not altogether true either. But it is part of the problem. "And yes," Mr. Trimarchi added "we fail to realize that conservation and promotion are two sides of the same coin."

Which they are. In the end it's an odd failure in a country so dependent on culture for tourist dollars and, in commercial areas like design and fashion, so cutting-edge and adroit at salesmanship.

Back at the Vatican, Mr. Paolucci shrugged: "Culture is like our family. Every once in a while a politician comes along and suggests selling off what's in our storage rooms. But it's against our DNA to manage cultural patrimony from an economic perspective. Yes, Italy looks after its patrimony badly because we don't have the resources. So we wait for better times."

When asked whether he had any idea when they might come, he glanced at St. Peter's again and laughed. "I'm optimistic," he said. "Being here, it's my duty to be."

http://www.nytimes.com/2008/12/18/arts/design/18abroad.html?ref=design

Brooklyn Museum's Costume Treasures Going to the Met

By CAROL VOGEL

After three years of negotiations, the financially strained Brooklyn Museum has arranged to transfer its rich collection of American and European costumes and accessories to the Metropolitan Museum of Art so that it can be properly cared for and exhibited.

Although widely considered one of the best in the world, the Brooklyn costume collection has been out of public view for more than a decade. Under an agreement between the two museums that is to take effect in January, the Met will integrate the collection into its own Costume Institute. Still, it will formally retain a separate identity of sorts: it will be known as the Brooklyn Museum Costume Collection at the Metropolitan Museum of Art.

"Clearly this was a hard decision to make, since it is a highly important part of our history," said Arnold L. Lehman, the Brooklyn Museum's director.

But he said the cost of maintaining the costume collection, much less showing it, had been a major concern for him since he was hired as director in 1997.

"Costumes are the most fragile, the most difficult and the most labor-intensive objects that an institution can own," Mr. Lehman said. "Although we have sustained and grown the collection over the years, we do not have the existing resources to make the kind of use that we will be able to make now.

"This is not just a transfer but a partnership. We can draw upon it in a way we were never able to before."

Mr. Lehman said that under the deal the Brooklyn Museum would be able to include the collection in shows, and that both museums planned to present exhibitions in 2010 focusing on different portions of the combined collections.

"Museums in this day and age have to learn how to share better," he said. "This will be a new kind of partnership that has not existed in the past."

Formed in 1903, the Brooklyn trove includes some 23,500 objects, including a definitive collection of costumes and patterns by the British-born designer Charles James, a major force in New York fashion in

the 1940s and '50s, and one of the most comprehensive collections of American fashions dating from the mid-19th to the mid-20th century. (The museum also has Asian, African and Native American costumes, but these will stay in Brooklyn, Mr. Lehman said.)

The Met's costume collection, established in 1946, is rich in masterworks of haute couture, particularly European fashions with signature pieces from the mid-20th century forward.

"The collections seem to be made for each other," said Thomas P. Campbell, who takes over next month as the Met's director and has been supervising curator of the Met's encyclopedic Antonio Ratti Textile Center for more than a decade. "Its an incredibly exciting opportunity for both museums, and it now gives us the pre-eminent costume collection in the world."

In 2005 the Brooklyn Museum received a grant of nearly $4 million from the Andrew W. Mellon Foundation to catalog and photograph the collection. Mr. Lehman said that 12 to 15 people worked full time on the project.

"We moved the entire collection out of the museum to a storage facility in Brooklyn where everything was photographed and documented," he said. "Now we know exactly what we have."

Even before the Brooklyn Museum received the grant, Mr. Lehman had begun discussions with several organizations, including the Fashion Institute of Technology, which has had a long association with the Brooklyn collection and has used pieces from it for teaching.

Aware that the Brooklyn collection would greatly enrich its own holdings, Philippe de Montebello, the Met's director, and Harold Koda, the curator in charge of the Costume Institute, went to Brooklyn in 2005 to propose acquiring it.

The Brooklyn Museum's costumes have largely been out of sight since budget cuts prompted the museum to make the costume department part of its decorative arts department in 1991.

For years critics have complained that some of the costumes were being seriously neglected. In 1999, when boxes of costumes were moved into a temporary storage area on the museum's fourth floor, dresses were damaged by leaking air conditioners, a person familiar with the collection said.

Asked about the conservation of the collection, Kevin Stayton, the Brooklyn Museum's chief curator, said: "Every museum has emergency problems. We hadn't had a curator for a number of years, but the museum was taking care of it."

The Met's Costume Institute has a staff of about 20 and the financing to care for the collection.

The Brooklyn collection was largely assembled from the closets of grand ladies of Brooklyn and Manhattan. The first object to be donated, in 1903, was an 1892 cream crepe dress worn by Kate Mallory Williams at her graduation from Brooklyn Heights Seminary. It was given to the museum by her mother, Mrs. Charles Phelps Williams, a Brooklynite from a prominent shipping family.

"The collection started in bits," Mr. Stayton said. "But by World War I, when the United States fashion industry was dependent on Paris, it was decided that we would collect fashions so designers could study them." As the collection's reputation grew, donations streamed in from across the country.

The Metropolitan's collection began as a sampling of historic and regional costumes at the Neighborhood Playhouse School of the Theater. Feeling that the costumes were of significant historical and educational importance, the New York philanthropists Irene Lewisohn and her sister, Alice Lewisohn Crowley,

teamed up with the theatrical designers Lee Simonson and Aline Bernstein to create what they called the Museum of Costume Art. It lacked a home of its own and at one point was stored at Saks Fifth Avenue.

In 1939 the founders enlisted New York fashion industry figures to help them find a permanent site for the collection. In 1946 it became part of the Metropolitan Museum and was renamed the Costume Institute. The understanding, Mr. Koda said, was that this new department would be subsidized by the fashion industry. The fashion publicist Eleanor Lambert instituted the Party of the Year, an annual Met gala, to raise money for operating expenses. Today it is the most glamorous event on the New York fashion calendar.

The Brooklyn acquisition will undoubtedly boost the Costume Institute's profile. "By combining the two collections we will have an unrivaled timeline of fashion history," Mr. Koda said.

For years, the institute has borrowed important treasures from Brooklyn. In 1982, when the Costume Institute mounted an exhibition of 18th-century dress, the rarest shoes from the period came from Brooklyn, Mr. Koda said. And when Diana Vreeland, the legendary fashion editor turned museum impresario, organized "American Women of Style" at the Met in 1975, she also borrowed from Brooklyn.

Mr. Koda said his personal favorite in Brooklyn was Elsa Schiaparelli's Insect Necklace from 1938 — "iridescent metallic insects on a clear plastic base that created the effect of bugs teeming around the wearer's neck," as he put it.

He described it as the "perfect" counterpart to the Met's Schiaparelli Shoe Hat, from 1937-38, which he said looked like an upside-down shoe plunked on a woman's head. Both, he said, were collaborations with Salvador Dalí.

The Met is in the initial phase of planning a capital project to place both collections in more up-to-date storage rooms, Mr. Koda said. The two museums also plan to produce a book presenting highlights of the combined collections and to make them available online.

"We were interested in finding the best partner, and there is no question after an enormous amount of discussions that the Met is the best place," Mr. Lehman of the Brooklyn Museum said. "This is great for New Yorkers."

http://www.nytimes.com/2008/12/16/arts/design/16muse.html?ref=design

Making Artistic Connections at a Subway Station

By MELENA RYZIK

In the grays of winter, the last stop on any subway line can have a lonely, ominous feel. But when the new $530 million South Ferry station, the terminus of the No. 1 train, opens in January, it will have some added luminosity, thanks to a site-specific installation by the artists Doug and Mike Starn. Commissioned by the Arts for Transit program of the Metropolitan Transportation Authority, the installation, "See It Split, See It Change," includes curved floor-to-ceiling glass walls laced with silhouettes of trees, a marble mosaic of a vintage topographic map of Manhattan, and other imagery drawn from nearby Battery Park.

Although it is the first public artwork by the Starns, 47-year-old identical twins who work in Brooklyn, they view it as integral to a continuing project, "Structure of Thought," rooted in their preoccupation with time and natural bonds. "The tree series goes back about 10 years," Doug Starn said on a tour of the station last week. "It's about —— "

"It's about the conveyance of something," Mike Starn said. The brothers finish each other's sentences as a matter of course. "We saw the subway system as a conveyance, where connections are made."

"Tubes and things," his brother added.

The work at South Ferry, more than three years in the planning and execution, is among the largest Arts for Transit has ever undertaken. And at more than $1 million, it is the most expensive to date, said Sandra Bloodworth, the program's director, who said she hoped it would also be among the most durable.

"We believe in building it for it to be there forever, without any intervention by man," Ms. Bloodworth said. The South Ferry terminal, which is entirely new, was built beneath the existing 103-year-old South Ferry station and financed mostly by the federal government as part of a broader effort to rebuild Lower Manhattan after the Sept. 11 attacks. (The opening date has not yet been scheduled.)

When the Starns were first approached by the Arts for Transit program in fall 2004, they were busy with other projects and not particularly interested in participating, Doug said. But the brothers came up with a proposal at the last minute and won the commission the next year. Ms. Bloodworth said the Starns' proposal was chosen on the strength of its imagery, its melding of high technology and organic and urban history, and its sturdy materials.

Despite the high price tag, Doug said, "we lost a lot of money" in terms of the hours and energy spent. His brother added, "It's a labor of love."

The main part of the installation, the curved walls that hug the station, was made using a new and unusual fused-glass technique, like laser printing but with glass powder instead of ink. It gives the panels a layered quality: against a background of cream and celadon— the colors of a winter dawn — the black branches seem to echo one another. For inspiration, the brothers photographed trees in Battery Park; they said they didn't know what kind. "We just go out and shoot good-looking trees," Mike said.

The fused glass was the project's biggest challenge. Even the fabricator, Franz Mayer of Munich, a 160-year-old firm known for its expertise in architectural glass and mosaics, "didn't really know how to work with it," Mike said. "And we didn't know how to work with it. It was trial-and-error, and one year of testing." Still, they did not consider scaling back to a more traditional industrial technique. The tiny bubbles, striations and other imperfections in the finished panels are part of their charm, Doug said. "It feels more alive."

The 20-foot-wide topographic map of Manhattan is focused on the island's southern tip — it's like a downtown-to-uptown version of Saul Steinberg's famous New Yorker cartoon — and based on a 1640 map that the twins found. Theirs is overlaid with the contemporary street grid, with the grout making a fitting stand-in for pavement. Placed in the stairwell, it's meant to be the first thing commuters see when they come into the station, invoking the area's history as the first part of the city to be settled. (A portion of an 18th-century seawall uncovered during construction of the station hangs on the wall outside the turnstiles. It is not part of the Starns' installation.) Near the map is another glass panel with a large image of a decomposing leaf, in oranges and purples.

"We're working with the idea of the splitting and changing" of tree branches and of branches of the subway system, Mike said. "It's something that happens in time as well as space."

The Starns have been navigating these themes since the 1980s, when they became known for exhibiting taped and torn photographs. The scale and the substance of "See It Split, See It Change" have influenced their other projects. "We've always worked in fragile materials before this," Mike said. "It's always about the change it will experience."

Now, in a newly acquired studio in Beacon, N.Y., they are building an "endless tower" sculpture, like a Slinky you can climb in, out of 2,000 bamboo poles. (They have a unified artistic vision, but the Starns don't always get along when they're creating. "When you do something, you argue with yourself," Mike, the more talkative of the two, said. "We do that.")

Although their main studio, in Red Hook, Brooklyn, is visible from outside South Ferry station, neither Starn expects to make much use of the terminal once it opens. They said they thought about other commuters when they conceived the project.

"We did want to make something that could be entertaining day in, day out," Mike said. "It's simple and it's complicated at the same time."

http://www.nytimes.com/2008/12/15/arts/design/15ferr.html?ref=design

Beaked Whales' Tusks Evolved Through Sexual Selection Process

Skull with modified teeth. (Credit: Image courtesy of Oregon State University)

ScienceDaily (Dec. 18, 2008) — For years, scientists have wondered why only males of the rarely seen family of beaked whales have "tusks," since they are squid-eaters and in many of the species, these elaborately modified teeth seem to actually interfere with feeding.

A newly published study help explain the evolutionary origin of these distinctive "tusks" in beaked whales, a rather mysterious family of whales that live in the deep oceans. Although the tusks are known to be used in competition between males, another purpose seems to be to attract female beaked whales – and to avoid mistakes in choosing a mate.

The study, by researchers in Oregon, New Zealand and Australia, is being published this month in the journal Systematic Biology. It describes one of the first examples of "sexual selection" implicated in the radiation of a group of mammals outside ungulates (deer, elk and antelope).

"Beaked whales are among the least known, least understood and, frankly, most bizarre whales in the ocean," said Scott Baker, associate director of the Marine Mammal Institute at Oregon State University and a co-author of the article. "Because they live in the deep, they are rarely seen alive and many are described only from specimens found stranded dead on the beach. They are the only cetacean species with tusks and scientists have long wondered why, since their diet primarily is squid and the females are essentially toothless.

"It turns out that tusks are largely an ornamental trait that became a driver in species separation," Baker added. "The tusks help females identify males within their species, which could otherwise be difficult as these species are quite similar to each other in shape and coloration."

Lead author of the study was Merel Dalebout, a post-doctoral fellow from the University of New South Wales in Australia and a former Ph.D. student of Baker. The third author is Debbie Steel, also a researcher from the Marine Mammal Institute, located at OSU's Hatfield Marine Science Center in Newport, Ore.

Many animal species develop traits that allow the males to compete with each other physically, such as antlers used for sparring by adult bull elk. Some of these have other purposes, such as the tusks of walruses that can be used for foraging as well as fighting. And some species display ornamental traits to attract mates – the coloration of the peacock, or the songs of birds.

The beaked whale is unusual in that its tusks have no obvious functional purpose other than to distinguish it from similar-looking species of beaked whales.

"In closely related species we usually see some character trait displacement or divergence, which is an important requirement to avoid mistakes in the choice of potential mates," Baker said. "Crosses between different species can result in hybrid offspring with reduced viability or reproductive success, such as the sterile mule. In nature we expect that mechanisms have evolved to insure species recognition.

"But mistakes happen," Baker added. "Blue whales and fin whales are known to hybridize in the wild, and there is a documented case in captivity of a hybrid offspring between a false killer whale and a bottlenose dolphin."

Baker says speciation occurs in many terrestrial species through geographic isolation, such as separation by canyons, major river systems, or islands. In the ocean, however, these geographical barriers are largely absent. Different species of beaked whales occupy the same trophic level and can look remarkably similar – to the point where scientists can only differentiate them through DNA testing.

"Interestingly," he said, "the species of beaked whales that are in the same ocean regions – even 'sister' species – are the most different in the shape of the tusks. Those that are closely related genetically but live in different oceans are the most alike."

Adapted from materials provided by Oregon State University.

http://www.sciencedaily.com/releases/2008/12/081216205707.htm

Why Did The London Millennium Bridge 'Wobble'?

The London Millenium Bridge seen from the south bank of the Thames. (Credit: Photo by Adrian Pingstone, courtesy of University of Bristol)

ScienceDaily (Dec. 18, 2008) — On its opening day, the London Millennium Bridge experienced unexpected swaying due to the large number of people crossing it. A new study finally explains the Millennium Bridge 'wobble' by looking at how humans stay balanced while walking.

The same pedestrian-structure interaction has also been identified on several other bridges, including Bristol's famous Clifton Suspension Bridge. The phenomenon is not related to the structural form of the bridge, but rather the behaviour of the pedestrians. The paper by civil engineers at the University of Bristol, published in the Royal Society journal Proceedings of the Royal Society A, examines the basic way humans maintain balance.

Balance is achieved by changing the position of foot placement for each step, based only on the final displacement and speed of the centre of mass from the previous step.

The same balance strategy as for normal walking on a stationary surface was applied to walking on a laterally swaying bridge.

Without altering their pacing frequency, averaged over a large number of cycles, the pedestrian can effectively act as a negative damper to the bridge motion, which may be at different frequency. Hence the pedestrian can inadvertently feed energy into bridge oscillations.

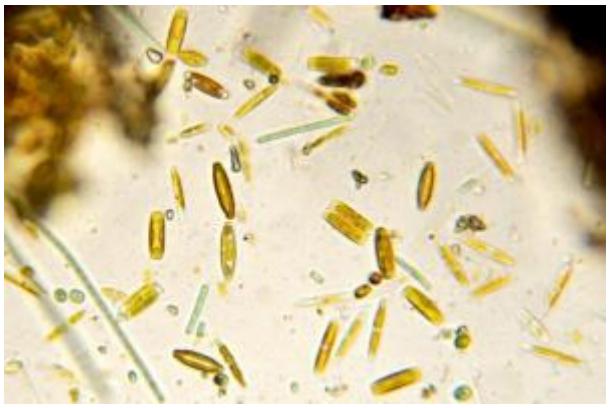
Dr John Macdonald, Senior Lecturer in Civil Engineering, said: "It is clear that the motion of the bridge affects the force from the pedestrian, rather than the pedestrian simply applying an external force."

It has generally been thought the Millennium Bridge 'wobble' was due to pedestrians synchronizing their footsteps with the bridge motion. However, this is not supported by measurements of the phenomenon on other bridges.The researchers found, to their surprise, that pedestrians walking randomly, keeping balance as normal can cause large bridge sway. This finally seems to explain the initiation of the Millennium Bridge 'wobble' and gives new insight for designing bridges to avoid vibration problems.

Adapted from materials provided by University of Bristol.

http://www.sciencedaily.com/releases/2008/12/081216201406.htm

Ocean Acidification Could Have Broad Effects On Marine Ecosystems



Diatoms, a type of phytoplankton. Many phytoplankton -- microscopic algae that form the base of the marine food web -- build calcium carbonate shells to protect themselves from microscopic predators called ciliate protozoa. A disruption of the ability of phytoplankton to build their shells could have ripple effects throughout the marine food web. (Credit: iStockphoto/Nancy Nehring)

ScienceDaily (Dec. 18, 2008) — Concern about increasing ocean acidification has often focused on its potential effects on coral reefs, but broader disruptions of biological processes in the oceans may be more significant, according to Donald Potts, a professor of ecology and evolutionary biology at the University of California, Santa Cruz, and an expert in coral reef ecology and marine biodiversity.

Potts will give an invited talk on "Geobiological Responses to Ocean Acidification" at the Fall Meeting of the American Geophysical Union (AGU) in San Francisco on Wednesday, December 17.

Ocean acidification is one of the side effects of the rising concentration of carbon dioxide in Earth's atmosphere due to the burning of fossil fuels. The oceans can absorb enormous amounts of carbon dioxide from the atmosphere, but as the gas dissolves it makes the water more acidic. Increasing acidity can make life difficult for corals and other marine organisms that build shells and skeletons out of calcium carbonate.

Scientists fear that acidification will slow the growth of these organisms and cause calcium carbonate structures to dissolve. Potts agrees that dissolving shells will certainly be a problem for many marine organisms, but he thinks the disruptions will run much deeper.

"It's not just a question of coral reefs, and it's not just a question of calcification," he said. "What we are potentially looking at are disruptions of developmental processes and of populations and communities on many scales."

The term "acidification" refers to a slight lowering of the pH of ocean water, pushing it closer to the acidic end of the scale, although it is still slightly alkaline. A small decrease in pH affects the chemical equilibrium of ocean water, reducing the availability of carbonate ions needed by a wide range of organisms to build and maintain structures of calcium carbonate.

Many phytoplankton--microscopic algae that form the base of the marine food web--build calcium carbonate shells to protect themselves from microscopic predators called ciliate protozoa. A disruption of the ability of phytoplankton to build their shells could have ripple effects throughout the marine food web, Potts said.

"It's going to change the dominant organism in the food chain, and there's a very real danger that it may short-circuit the food chains," he said. In other words, ciliate protozoa gorging on unprotected phytoplankton may flourish at the expense of other organisms higher up the food chain.

But calcification of shells is not the only biological process affected by acidification, Potts added. "All biochemical physiological reactions are potentially going to change," he said. Developing organisms are most likely to be affected, due to their low range of environmental tolerances, but it is unclear what the ecological ramifications will be.

Ocean acidification may not affect all parts of the oceans equally. Within 100 kilometers (62 miles) of shore, the pH of ocean water is more variable than in the rest of the ocean. Fresh water and wind from the land can carry chemicals that alter the pH of near-shore water, making it either more acidic or more alkaline. There may be organisms in this region that are already starting to adapt to changes in ocean acidity, Potts said.

"We should be thinking in terms of triage," he said. "We want to be predicting where are the organisms that are most likely to survive or survive the longest, and this is where we should be concentrating our conservation and management efforts, given finite resources."

Adapted from materials provided by University of California - Santa Cruz, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2008/12/081217190334.htm

Work With Fungus Uncovering Keys To DNA Methylation

Postdoctoral researcher Keyur K. Adhvaryu, left, and Eric Selker, biology professor, of the University of Oregon. (Credit: Photo by Jim Barlow)

ScienceDaily (Dec. 18, 2008) — Researchers in a University of Oregon lab have shed more light on the mechanism that regulates DNA methylation, a fundamental biological process in which a methyl group is attached to DNA, the genetic material in cells of living organisms.

DNA methylation is essential for normal growth and development in plants and animals. It has been implicated in long-term memory, and irregularities in its process are associated with diseases such as cancer.

In the UO's Institute of Molecular Biology, Eric U. Selker and members of his laboratory use a quickly reproducing and easy-to-manipulate fungus, Neurospora crassa, to explore the control of DNA methylation. Neurospora is considered the simplest model organism for such research.

Reporting in the Dec. 15 issue of the journal Genes & Development, Selker and Keyur K. Adhvaryu, a postdoctoral researcher in the Selker lab, document that the enzyme protein phosphatase PP1 is necessary for normal methylation of DNA.

In the nucleus of eukaryotic cells, DNA is wrapped around histone proteins to form chromatin, and one histone, H3, turns out to be critical for DNA methylation. "It was long thought that histones were simply structural proteins, but we are learning that these proteins are also informational," Selker said.

This was demonstrated in the journal Nature in 2001 by Selker and his former postdoctoral research associate Hisashi Tamaru. They found that a protein required for DNA methylation, DIM-5, is an enzyme that adds a methyl group onto lysine 9 of histone H3. "This was the first solid indication that chromatin is important for DNA methylation," Selker said.

The new paper by Adhvaryu and Selker shows that PP1 is important to remove phosphates attached to serine 10 of H3, the site immediately adjacent to the site that DIM-5 needs to methylate, leading to DNA methylation.

In an accompanying article in the same issue of Genes & Development, Wolfgang Fischle, a biochemist at the Max-Planck Institute for Biophysical Chemistry, praises the findings of Selker and Adhvaryu. He

writes that there appears to be extensive "crosstalk" involved in the chemical modifications that occur on histones to influence other enzymes that interact with chromatin "Adhvaryu and Selker provide novel insights into an intricate regulatory network involving histone phosphorylation, histone methylation and DNA methylation," he noted.

"DNA methylation seems to be a luxury item in Neurospora, which means we can manipulate it as we wish, making mutants that don't do it and thereby identify important players," Selker said. "We are identifying how DNA methylation is controlled and what it does in this organism. Our assumption is that a lot of what we find in Neurospora will be applicable to other systems."

In this case, Selker said, Keyur demonstrated very nicely, in a couple different ways, that protein phosphatase PP1 is required for normal DNA methylation. "DNA methylation is involved in a silencing of invasive DNA as well as a variety of normal genes, including those on the inactive X chromosome, those subjected to imprinting, and well as tumor suppressor genes," he said, adding that methylation of the latter class of genes can lead to cancer.

The research was funded by a grant from the National Institutes of Health to Selker and in part by an American Heart Association fellowship to Adhvaryu.

Adapted from materials provided by University of Oregon.

http://www.sciencedaily.com/releases/2008/12/081215091009.htm

Answers To Huge Wind-farm Problems Are Blowin' In The Wind

ScienceDaily (Dec. 17, 2008) — While harnessing more energy from the wind could help satisfy growing demands for electricity and reduce emissions of global-warming gases, turbulence from proposed wind farms could adversely affect the growth of crops in the surrounding countryside.

Solutions to this, and other problems presented by wind farms – containing huge wind turbines, each standing taller than a 60-story building and having blades more than 300 feet long – can be found blowin' in the wind, a University of Illinois researcher says.

"By identifying better siting criteria, determining the optimum spacing between turbines, and designing more efficient rotors, we can minimize the harmful impacts of large wind farms," said Somnath Baidya Roy, a professor of atmospheric sciences at the U. of I. "Through careful planning and testing, we can avoid some of the worst pitfalls altogether."

In recent years, wind-power technology has progressed from small, isolated windmills to large wind farms that contain vast arrays of giant turbines plugged into existing power-distribution networks. A wind farm in northwest Iowa, for example, has more than 600 wind turbines, and provides power to more than 140,000 homes.

"If wind is to be a major player in global electrical production, however, we have to think in terms of even larger scales– of say, thousands of turbines per wind farm," Baidya Roy said. "Such a wind farm could replace ten coal-fired power plants, but with so many turbines, turbulence could generate huge problems."

By disrupting airflow to nearby turbines, turbulence can significantly reduce the efficiency of a wind farm. But turbulence produced by turbine rotors also can have a strong impact on local ground temperature and moisture content.

"Turbulence creates stronger mixing of heat and moisture, which causes the land surface to become warmer and drier," Baidya Roy said. "This change in local hydrometeorological conditions can affect the growth of crops within the wind farm."

One way to reduce the impact of turbulence is to better integrate the wind-energy generation process into the natural kinetic energy cycle.

In this cycle, solar energy heats Earth's surface and is converted into the kinetic energy of a moving air mass. Some of the wind's kinetic energy is lost as friction, as it passes over and around obstructions such as trees, houses and mountains. At a wind farm, some of the wind's kinetic energy is harvested and changed into mechanical energy by turning a turbine, and then into electrical energy that flows into power lines.

The first step in reducing the effects of turbulence on local hydrometeorological conditions is to identify regions around the world where wind energy is high and frictional dissipation also is high, Baidya Roy said. "Building wind farms in regions where there is already a lot of kinetic energy dissipation would help to minimize the intrusion to the natural kinetic energy cycle."

Although the tops of mountain ranges are regions with high winds and high surface friction, constructing wind farms on summits would be impractical or economically unfeasible. Researchers must therefore search for regions better suited for integration with the kinetic energy cycle.

Using the IRA25 dataset, a comprehensive collection of 25 years of data from surface meteorological stations, radiosondes and satellites, Baidya Roy is mapping the wind's frictional dissipation around the world. He is able to estimate how much wind is available at selected sites, and how much of the wind's kinetic energy is dissipated as friction at the surface.

His results show that eastern and central Africa, western Australia, eastern China, southern Argentina and Chile, northern Amazonia, the northeastern United States, and Greenland are ideal locations for siting low-impact wind farms. In these regions, a wind farm with 100 large wind turbines spaced about 1 kilometer apart can produce more than 10 megawatts of electricity.

In related work, Baidya Roy also is studying ways to reduce the effects of rotor-generated turbulence on nearby wind turbines. As wind passes through a turbine, some of the energy creates a disruption much like that created by a moving boat. This disruption can affect the efficiency of a wind farm.

Using models, Baidya Roy is simulating the effects of different turbine spacing and patterns, and different rotor designs, on turbulence. The simulations show that reducing rotor-generated turbulence not only reduces the hydrometeorological impacts, but also increases power production by harnessing energy that was otherwise lost to turbulence.

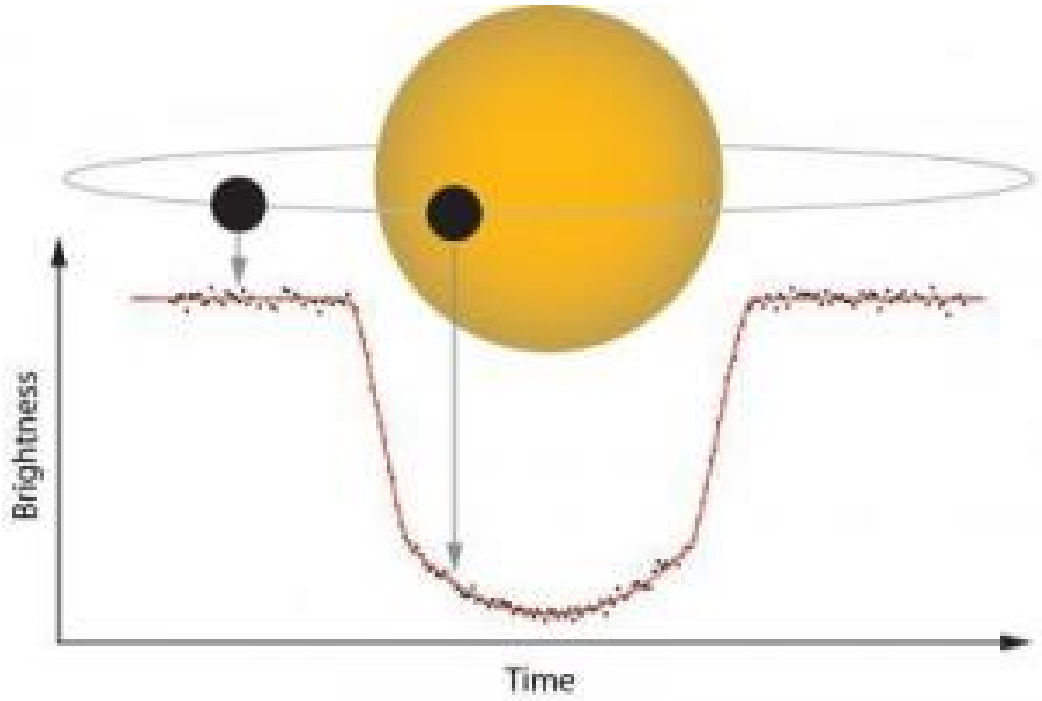
"These studies suggest that while large wind farms can affect local hydrometeorology, there are smart engineering solutions that can significantly reduce those impacts."

Baidya Roy will describe his work and present early findings at the American Geophysical Union meeting in San Francisco, Dec. 15-19.

Adapted from materials provided by University of Illinois at Urbana-Champaign.

http://www.sciencedaily.com/releases/2008/12/081216104307.htm

Astronomers Use Ultra-sensitive Camera To Measure Size Of Planet Orbiting Star



When the planet WASP-10b crosses the disk of its star, WASP-10, the brightness of the star decreases, allowing scientists to measure the precise size of the planet. (Credit: Institute for Astronomy, University of Hawaii at Manoa)

ScienceDaily (Dec. 17, 2008) — A team of astronomers led by John Johnson of the University of Hawaii's Institute for Astronomy has used a new technique to measure the precise size of a planet around a distant star. They used a camera so sensitive that it could detect the passage of a moth in front of a lit window from a distance of 1,000 miles.

The camera, mounted on the UH 2.2-meter telescope on Mauna Kea, measures the small decrease in brightness that occurs when a planet passes in front of its star along the line-of-sight from Earth. These "planet transits" allow researchers to measure the diameters of worlds outside our solar system.

"While we know of more than 330 planets orbiting other stars in our Milky Way galaxy, we can measure the physical sizes of only the few that line up just right to transit," explains Johnson. The team studied a planet called WASP-10b, which was thought to have an unusually large diameter. They were able to measure its diameter with much higher precision than before, leading to the finding that it is one of the densest planets known, rather than one of the most bloated. The planet orbits the star WASP-10, which is about 300 light-years from Earth.

IfA astronomer John Tonry designed the camera, known as OPTIC (Orthogonal Parallel Transfer Imaging Camera), and it was built at the IfA. It uses a new type of detector, an orthogonal transfer array, the same type used in the Pan-STARRS 1.4 Gigapixel Camera, the largest digital camera in the world. These detectors are similar to the CCDs (charge-coupled devices) commonly used in scientific and consumer digital cameras, but they are more stable and can collect more light, which leads to higher precision.

"This new detector design is really going to change the way we study planets. It's the killer app for planet transits," said team member Joshua Winn of MIT. The precision of the camera is high enough to detect transits of much smaller planets than previously possible. It measures light to a precision of one part in

2,000. For the first time, scientists are approaching the precision needed to measure transits of Earth-size planets.

Bigger planets block more of the star's surface and cause a deeper brightness dip. The diameter of WASP-10b is only 6 percent larger than that of Jupiter, even though WASP-10b is three times more massive. Correspondingly, its density is about three times higher than Jupiter's. Because their interiors become partially degenerate, Jovian planets have a nearly constant radius across a wide range of masses.

The photometric precision is three to four times higher than that of typical CCDs and two to three times higher than the best CCDs, and comparable to the most recent results from the Hubble Space Telescope for stars of the same brightness.

Journal reference:

1. . **Title: A Smaller Radius for the Transiting Exoplanet WASP-10b**. *Astrophysical Journal Letters*, (in press) [link]

Adapted from materials provided by University of Hawaii at Manoa, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2008/12/081211112223.htm

Biggest Breach Of Earth's Solar Storm Shield Discovered

NASA's THEMIS mission has overturned a longstanding belief about the interaction between solar particles and Earth's magnetic field. (Credit: NASA)

ScienceDaily (Dec. 17, 2008) — Earth's magnetic field, which shields our planet from particles streaming outward from the Sun, often develops two holes that allow the largest leaks, according to researchers sponsored by NASA and the National Science Foundation.

"The discovery overturns a long-standing belief about how and when most of the solar particles penetrate Earth's magnetic field, and could be used to predict when solar storms will be severe. Based on these results, we expect more severe storms during the upcoming solar cycle," said Vassilis Angelopoulos of the University of California, Los Angeles, Principal Investigator for NASA's THEMIS mission (Time History of Events and Macroscale Interactions during Substorms). THEMIS was used to discover the size of the leak.

Earth's magnetic field acts as a shield against the bombardment of particles continuously streaming from the sun. Because the solar particles (ions and electrons) are electrically charged, they feel magnetic forces and most are deflected by our planet's magnetic field. However, our magnetic field is a leaky shield and the number of particles breaching this shield depends on the orientation of the sun's magnetic field. It had been thought that when the sun's magnetic field is aligned with that of the Earth, the door is shut and that few if any solar particles enter Earth's magnetic shield. The door was thought to open up when the solar magnetic field direction points opposite to Earth's field, leading to more solar particles inside the shield.

Surprisingly, recent observations by the THEMIS spacecraft fleet demonstrate that the opposite is true. "Twenty times more solar particles cross the Earth's leaky magnetic shield when the sun's magnetic field is aligned with that of the Earth compared to when the two magnetic fields are oppositely directed," said

Marit Oieroset of the University of California, Berkeley, lead author of one of two papers on this research, published May 2008 in Geophysical Research Letters.

Researchers have long suspected that this "closed door" entry mechanism might exist, but didn't know how important it was. "It's as if people knew there was a crack in a levy, but they did not know how much flooding it caused," said Oieroset.

Previous spacecraft could only sample a small part of this enormous layer of solar particles inside the Earth's magnetic shield, but the five spacecraft in the THEMIS fleet spanned the entire rapidly-growing layer to give definitive measurements.

While the THEMIS researchers discovered the size of the leak, they didn't know its location(s). This was discovered by Wenhui Li of the University of New Hampshire, Durham, N.H., and his team. They used a computer simulation to discover where two holes frequently develop in Earth's magnetic field, one at high latitude over the Northern hemisphere, and one at high latitude over the Southern hemisphere. The holes form over the daylit side of Earth, on the side of the magnetic shield facing the sun.

The simulation also showed how the leaks develop. As solar particles flow out from the sun, they carry solar magnetic fields past our planet. Li's team realized that the solar magnetic field drapes against Earth's field as it passes by. Even though the two fields point in the same direction at equatorial latitudes, they point in opposite directions at high latitudes, When compression forces the opposite fields together, they link up with each other in a process called magnetic reconnection.

This process tears the two holes in Earth's magnetic field and appends the section of the solar field between the two holes to Earth's field, carrying the solar particles on this section into the magnetosphere, according to Li's team. "We've found if the door is closed, the sun tears down a wall. The crack is huge – about four times wider than Earth and more then seven Earth diameters long," said Li, whose paper will be published in an upcoming article of the Journal of Geophysical Research.

Solar particles by themselves don't cause severe space weather, but they get energized when the solar magnetic field becomes oppositely-directed to Earth's and reconnects in a different way. The energized particles then cause magnetic storms that can overload power lines with excess current, causing widespread blackouts. The particles also can cause radiation storms that present hazards to spacecraft in high orbits and astronauts passing through the storms on the way to the moon or other destinations in the solar system.

"The more particles, the more severe the storm," said Joachim "Jimmy" Raeder of the University of New Hampshire, a co-author of Li's paper. "If the solar field has been aligned with the Earth's for a while, we now know Earth's field is heavily loaded with solar particles and primed for a strong storm. This discovery gives us a basic predictive capability for the severity of solar storms, similar to a hurricane forecaster's realization that warmer oceans set the stage for more intense hurricanes. In fact, we expect stronger storms in the upcoming solar cycle. The sun's magnetic field changes direction every cycle, and due to its new orientation in the upcoming cycle, we expect the clouds of particles ejected from the sun will have a field which is at first aligned with Earth, then becomes opposite as the cloud passes by."

Adapted from materials provided by NASA/Goddard Space Flight Center.

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