Infoteca's E-Journal

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Cyberbullies hit primary schools

Cyberbullying is a growing problem in primary schools, according to the Anti-Bullying Alliance.

In a small study carried out by the group in south east England, one in five children questioned said they had been bullied online or by phone.

And many of the 227 10 and 11-year olds questioned said they used social networking sites, even though users are meant to be over 13.

Campaigners say parents must learn how to help children protect themselves.

The Anti-Bullying Alliance (ABA), which is a charity bringing together 60 organisations, also released the findings of a survey of parents on cyberbullying at the start of 'Anti-bullying week'.

'Unsupervised access'

It defines cyberbullying as deliberately upsetting someone using information technology, especially the internet or telephone.

The survey suggests 89% of parents thought cyberbullying was just as serious as other types of bullying.

About half (54%) of those questioned said they had not talked to their children about how to protect themselves from cyberbullying.

" **Cyberbullying is affecting younger age groups as more children get mobile phones and have computer access** "
Christopher Cloke, ABA

Almost a quarter (23%) said they would allow their child of 10 or under to go on the internet unsupervised at home; 38% said they had or would allow children of that age to have a mobile phone.

And one in 10 of the parents surveyed said they had or would allow their child of eight or under to have a mobile phone.

The research involved 1,163 people in England who have children aged between eight and 14. It was conducted by BMRB in October 2009.

The chairman of the ABA , Christopher Cloke, said: "Parents and schools need to be aware that cyberbullying is affecting younger age groups as more children get mobile phones and have computer access.

"Nationally we know that around 22% of secondary school pupils have suffered cyberbullying, but until now we did not know younger age groups were also seriously affected.

"It is crucial that we ensure they know how to stay safe online, and that their parents know how to help them. Clearly more research is needed on this emerging issue."

The group believes some people do not take this form of bullying seriously because it is indirect and often anonymous, but they say it can be harmful, leaving children feeling that they cannot escape.

One child told campaigners: "I felt that no one understood what I was going through. I didn't know who was sending me these messages.

"I felt powerless and didn't know what to do."

The group tells children:

• Don't give out personal details such as your mobile number, address or email online

• Regularly check and clean your friends lists on social networking sites

• Keep evidence - callers and mailers can be traced

• Find the "report abuse" or "block sender" options on your favourite websites

• Remember that sites you create and emails you send can be traced back to you

• Protect your password to keep your files and information safe

• If you are being bullied in any way you must tell someone who can help - a teacher, parent/carer, friend, sister/brother or other relative

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/uk_news/education/8359780.stm

Published: 2009/11/16 00:23:14 GMT

Potential Treatment for Huntington's Disease

Normal synaptic activity in nerve cells protects the brain from the misfolded proteins associated with Huntington's disease, researchers have discovered. (Credit: iStockphoto/Sebastian Kaulitzki)

ScienceDaily (Nov. 16, 2009) — Investigators at Burnham Institute for Medical Research (Burnham), the University of British Columbia's Centre for Molecular Medicine and Therapeutics and the University of California, San Diego have found that normal synaptic activity in nerve cells (the electrical activity in the brain that allows nerve cells to communicate with one another) protects the brain from the misfolded proteins associated with Huntington's disease. In contrast, excessive extrasynaptic activity (aberrant electrical activity in the brain, usually not associated with communication between nerve cells) enhances the misfolded proteins' deadly effects.

Researchers also found that the drug Memantine, which is approved to treat Alzheimer's disease, successfully treated Huntington's disease in a mouse model by preserving normal synaptic electrical activity and suppressing excessive extrasynaptic electrical activity. The research was published in the journal *Nature Medicine* on November 15.

Huntington's disease is a hereditary condition caused by a mutated huntingtin gene that creates a misfolded, and therefore dysfunctional, protein. The new research shows that normal synaptic receptor activity makes nerve cells more resistant to the mutant proteins. However, excessive extrasynaptic activity contributed to increased nerve cell death. The research team found that low doses of Memantine reduce extrasynaptic activity without impairing protective synaptic activity. The work was led by Stuart A. Lipton, M.D., Ph.D., director of the Del E. Webb Center for Neuroscience, Aging and Stem Cell Research at Burnham and professor in the department of Neurosciences and attending neurologist at the University of California, San Diego and Michael R. Hayden, M.D., Ph.D., University Killam professor in the department of Medical Genetics at UBC and director of the Centre for Molecular Medicine and Therapeutics at the Child & Family Research Institute.

"Chronic neurodegenerative diseases like Huntington's, Alzheimer's and Parkinson's are all related to protein misfolding," said Dr. Lipton. "We show here, for the first time, that electrical activity controls protein folding, and if you have a drug that can adjust the electrical activity to the correct levels, you can protect against misfolding. Also, this verifies that appropriate electrical activity is protective, supporting

the 'use it or lose it theory' of brain activity at the molecular level. For example, this finding may explain why epidemiologists have found that 'using' your brain by performing crossword puzzles and other games can stave off cognitive decline in diseases like Alzheimer's."

In the new study, researchers initially tested nerve cell cultures transfected with mutant Huntingtin protein and found that reducing excessive NMDA-type glutamate receptor activity with Memantine and other antagonists protected the nerve cells (glutamate receptors are the main trigger of excitatory electrical activity in the brain but in excess can cause nerve cell death, a process called excitotoxicity). They also found that normal synaptic activity was protective. Subsequently, they treated Huntington's disease model mice with both high and low doses of Memantine and found that the low doses were protective by blocking pathological extrasynaptic activity, while high-dose Memantine encouraged disease progression because it also blocked the protective synaptic NMDA receptor activity.

"For a long time it's been known that excitotoxicity is an early marker of Huntington's disease," said Dr. Hayden. "However, now we have dissected the mechanism by which this happens, particularly focusing on NMDA receptors outside the synapse. This creates novel therapeutic opportunities to modulate these receptors with potential protective effects on nerve cells."

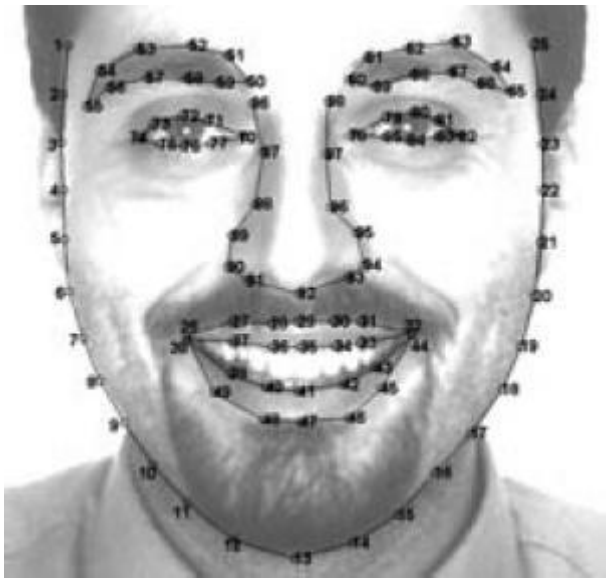
A small human clinical trial of Memantine for Huntington's disease has also recently shown positive effects. Larger, international clinical trials are now being planned.

Dr. Lipton is the named inventor on worldwide patents for the use of Memantine (marketed in the USA under the name Namenda®) in neurodegenerative disorders, including Alzheimer's and Huntington's disease. He is credited with the groundbreaking discovery more than ten years ago of how Memantine works in the brain and for spearheading early human clinical trials with the drug.

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

http://www.sciencedaily.com/releases/2009/11/091115134134.htm

Facial Biometrics System Capable of Creating a Facial 'DNA'



A new facial biometrics system that is able to recognize the facial "DNA" of every individual by determining his/her most noteworthy facial traits. (Credit: Image courtesy of Universidad Carlos III de Madrid - Oficina de Información Científica)

ScienceDaily (Nov. 16, 2009) — Research into techniques of facial biometrics, carried out by scientists at Universidad Carlos III de Madrid (UC3M), has resulted in a system that is able to recognize the facial "DNA" of every individual by determining his/her most noteworthy facial traits, with a of 95% rate of precision.

Recognition techniques based on facial features, known as facial biometrics, is usually based on the search for those traits which make one face different from another. The research carried out by this team, in contrast, approaches the issue from a slightly different point of view.

"The difference between our work and the majority of the others that are found in this field is the idea of individualized models," explains one of the study's authors, mathematician David Delgado Gomez from the UC3M Statistics Department. "Our objective," he continued, "is to create a model for each person which highlights the most distinguishing features of each face, as a sort of facial 'DNA'."

The researchers had this idea when they were imagining the situation of a crowded room where someone comes in asking for one of them. "Our way to describe a person is through some traits that the others don't have, such as the tall woman with blue eyes, or the bald guy with a beard. We try to apply this idea to our algorithm," remarked Professor Delgado, who has been carrying out this research with Federico Sukno, Kaushik Pavani and Alejandro Frangi from the CISTIB Group of *Universidad Pompeu Fabra* of Barcelona, and Bjarne Ersboll and Jens Fagertun from the mathematical modelling group of Technical University of Denmark, which has recently published an article entitled "Similarity-based Fisherfaces," with some of their research results appearing in the scientific journal *Pattern Recognition Letters.*

Basic elements

A facial biometrics system is normally made up of three components. First, a camera is necessary to record an image; secondly, a software program is needed which determines if there is a face in that image, locating among other things, the facial geometry (the placement of the eyes, nose, mouth, etc.); and thirdly, a system that is capable of classifying all those elements to differentiate between them and those

of other persons. The most complicated part, according to the researchers was combining the facial geometry and facial texture.

"With only the geometric information, very low classifications are obtained, which is why we combine this information with that of facial texture to obtain a more robust model, and a statistical way of combining them occurred to us, which offered very good results.," Delgado pointed out. The researchers have shown that when this system is used in a controlled environment, it can achieve a 95% rate of precision.

The main complication occurring when using this type of systems is the lighting, which can change the color of the face. Another challenge is the passage of time, because as a person ages, his/her face undergoes changes as it becomes heavier, thinner, or more wrinkled, which can then fool the classifiers. On the other hand, the researchers add, it does have a significant advantage when compared to other biometric systems: it doesn't need direct interaction with a person as do fingerprinting or iris recognition, for example.

Adapted from materials provided by Universidad Carlos III de Madrid - Oficina de Información Científica, via AlphaGalileo.

http://www.sciencedaily.com/releases/2009/11/091111121358.htm

Inappropriate Sepsis Therapy Leads to Fivefold Reduction in Survival

ScienceDaily (Nov. 16, 2009) — Patients experiencing septic shock who receive inappropriate therapy may have a fivefold reduction in survival, shows a new study. Researchers from the University of Manitoba, Winnipeg, MB, Canada, retrospectively reviewed the cases of 5,715 patients with septic shock to determine the appropriateness of initial antimicrobial therapy, clinical infection site, and relevant pathogens.

Results showed that inappropriate initial antimicrobial therapy occurred in 20 percent of patients, and the overall survival was 43.7 percent. Survival after appropriate and inappropriate initial therapy was 52 percent and 10.3 percent, respectively.

Furthermore, the decrease in survival with inappropriate initial therapy ranged from 2.3-fold for pneumococcal infection to 17.6-fold with primary bacteremia. Researchers conclude that efforts to increase the frequency of appropriateness of initial antimicrobial therapy must be central to efforts to reduce mortality from septic shock.

The article is published in the November issue of *CHEST*, the peer-reviewed journal of the American College of Chest Physicians.

Adapted from materials provided by American College of Chest Physicians, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2009/11/091105084846.htm

Shape Perception in Brain Develops by Itself, Study of African Tribe Suggests

Tests with westerners and African nomads suggest that brain has an innate sense of geometry; incidental result: baby likely can do without the ubiquitous shape sorter. (Credit: iStockphoto/Peter Polák)

ScienceDaily (Nov. 16, 2009) — Despite minimal exposure to the regular geometric objects found in developed countries, African tribal people perceive shapes as well as westerners, according to a new study.

The findings, recently published online in *Psychological Science,* suggested that the brain's ability to understand shapes develops without the influence of immersion in simple, manufactured objects.

"In terms of perceiving the world … either genetics or the natural world will give you the right type of experiences," said lead author Irving Biederman, an expert on perception who holds a named chair in neuroscience at the University of Southern California's College of Letters, Arts and Sciences.

Biederman and his team specifically measured subjects' sensitivity to "non-accidental" properties of objects, such as whether they have straight or curved edges.

A theory of shape recognition developed by Biederman holds that the brain is more sensitive to non-accidental properties -- which stay the same as an object rotates in space -- than to metric properties, such as degree of curvature, that do appear to vary with orientation.

In one experiment, subjects were asked to identify which of two geometric objects was an exact match to a sample object. The one that didn't match differed either in a non-accidental or metric property.

The researchers found that Western college students and members of the semi-nomadic Himba tribe of northwestern Namibia, a rural area bordering Angola, both showed greater sensitivity to non-accidental properties.

The findings have an incidental implication: Parents can probably toss the beloved shape sorter on the large heap of educational toys toddlers do not really need.

Shape sorters may have other potential benefits such as fine motor training. And some children simply enjoy them. But Biederman questioned the main advertised benefit of the toys.

"Your kids will grow up being able to see shapes just fine without specific training," he said.

Most members of the Himba have never seen a computer or television, do not use a phone and have only handmade tools, Biederman said.

The Himba also lack words for many shapes, including squares, circles and triangles.

Nevertheless, Himba and university student volunteers responded virtually identically to variations in shape in sorting experiments on a laptop computer.

"The bottom line is that the Himba differ not at all from individuals living in what is, arguably, the most artifactual of environments [Los Angeles]," the authors stated.

"The experiment offers, to our knowledge, the most rigorous assessment of the effects of exposure to modern artifacts on the representation of shape."

The research team went deep into tribal territory to find nomadic groups that would have had almost no contact with manufactured objects. Each six-day excursion in a four-wheel drive vehicle took the research team a full day's drive or more from Opuwo, the last township on the edge of Himba lands.

Biederman's collaborators were USC graduate students Xiaomin Yue and Mark Lescroart along with Jules Davidoff of the University of London. The National Science Foundation funded the research.

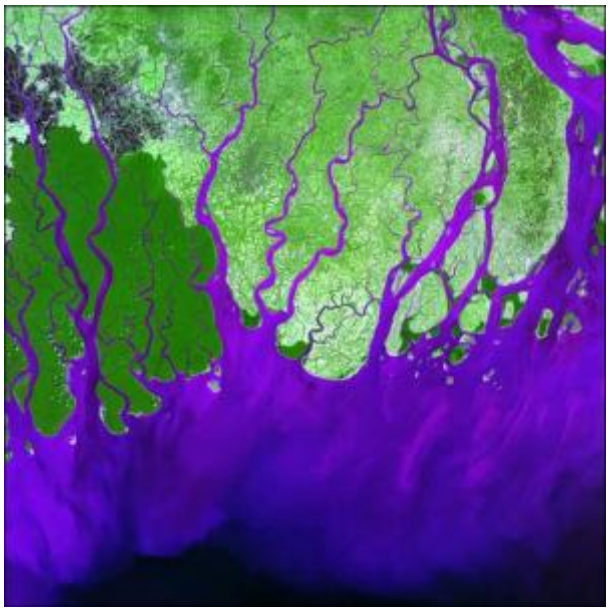
Adapted from materials provided by University of Southern California, via EurekAlert!, a service of AAAS.

Journal References:

1. Irving Biederman, Xiaomin Yue, Jules Davidoff. **Representation of Shape in Individuals From a Culture With Minimal Exposure to Regular, Simple Artifacts: Sensitivity to Nonaccidental Versus Metric Properties (p)**. *Psychological Science*, Published Online: Oct 30 2009 DOI: 10.1111/j.1467-9280.2009.02465.x
2. Lescroart et al. **A cross-cultural study of the representation of shape: Sensitivity to generalized cone dimensions**. *Visual Cognition*, 2008; 1 DOI: 10.1080/13506280802507806

http://www.sciencedaily.com/releases/2009/11/091114080602.htm

New Insight Into Predicting Cholera Epidemics in the Bengal Delta



The Ganges River forms an extensive delta where it empties into the Bay of Bengal. (Credit: Image provided by the USGS EROS Data Center Satellite Systems Branch)

ScienceDaily (Nov. 16, 2009) — Cholera, an acute diarrheal disease caused by the bacterium Vibrio cholerae, has reemerged as a global killer. Outbreaks typically occur once a year in Africa and Latin America. But in Bangladesh the epidemics occur twice a year -- in the spring and again in the fall.

Scientists have tried, without much success, to determine the cause of these unique dual outbreaks -- and advance early detection and prevention efforts -- by analyzing such variables as precipitation, water temperature, fecal contamination and coastal salinity. Now, researchers from Tufts University, led by Professor of Civil and Environmental Engineering Shafiqul Islam, have proposed a link between cholera and fluctuating water levels in the region's three principal rivers -- the Ganges, Brahmaputra and Meghna.

"What we are establishing is a way to predict cholera outbreaks two to three months in advance," says Islam, who also holds an appointment as professor of water and diplomacy at The Fletcher School at Tufts. "It's not a microbiological explanation. The key is the river discharge and regional climate."

The Tufts researchers' findings were reported in the latest issue of *Geophysical Research Letters*, published October 10, 2009.

Understanding cholera's environmental catalysts

Vibrio cholerae lives and thrives among phytoplankton and zooplankton in brackish estuaries where rivers come into contact with the sea. The Bengal Delta, which scientists have considered the native land of cholera, is fed by three rivers.

Almost all of the rainfall in the region occurs during the four-month monsoon season between June and September. Water levels in the river system rise, causing floods that cover 20 percent of the land in an average year. Water levels then fall rapidly, though low-lying, depressed areas remain submerged for weeks.

The Tufts team tracked the month-by-month incidence of cholera using data from the International Center for Diarrhoeal Disease Research, a treatment center that recorded incidences of cholera for the biggest population center of Bangladesh from 1980 to 2000.

The Tufts team correlated these cholera incidence statistics with an analysis of water discharges from the three rivers. Their findings suggested two distinctive epidemic patterns that are associated with the seasonal cycles of low river flows and floods.

A spring outbreak occurs in March, during the period of low river flow in Bangladesh. The low river flow allows seawater from the Bay of Bengal to move inland, transporting bacteria-carrying plankton.

A second epidemic occurs in September and October, after monsoon rains have raised water levels. Here, a different dynamic takes place. Floodwaters have mixed water from sewers, reservoirs and rivers. As the floods recede, contamination is left behind..

Predicting cholera before it happens

Islam and his team linked the incidence of cholera cases to the level of water flow in the rivers. In order to confirm their findings, the researchers looked for a consistent pattern. They analyzed the incidence of cholera in five years of severely low river flow from 1980 to 2000 and compared it with five years of average and below average river flow. The same analysis was done for extreme, average and below average floods to study the fall epidemic.

The researchers found a relationship between the magnitude of cholera outbreaks and the severity of the region's seasonal low river flow and floods. "The more severe the low river flow, the larger the spring epidemic," says Islam. "The same thing is true with flooding during the fall." Islam says that the findings will contribute to the development of systems to anticipate and predict cholera outbreaks based on the hydroclimate of the region.

This research was funded in part by the National Science Foundation and a National Institutes of Health Fellowship. Researchers included engineering doctoral students Ali S. Akanda and Antarpreet S. Jutla.

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

Journal Reference:

1. Akanda, A. S., A. S. Jutla, and S. Islam. **Dual peak cholera transmission in Bengal Delta: A hydroclimatological explanation**. *Geophysical Research Letters*, 2009; 36 (19): L19401 DOI: 10.1029/2009GL039312

http://www.sciencedaily.com/releases/2009/11/091104101555.htm

Smart Solution: Researchers Use Smartphones to Improve Health of Elderly Diabetics in China

Researchers designed interactive games to empower patients to manage their diabetes. (Credit: Image courtesy of Saint Louis University)

ScienceDaily (Nov. 16, 2009) — Cellular phones -- once a luxury used strictly for talking -- have taken on many new roles in recent years. Now researchers at Saint Louis University and Old Dominion University in Virginia say smartphones can be used to help elderly diabetics manage their health and learn more about their condition.

A team of researchers from business, engineering, medicine and public health, as well as practitioners and researchers in China, designed the smartphone technology, which includes interactive games and easy-to-use logging features, especially for elderly Chinese diabetics. They will present their research on Oct. 29 in Washington, D.C. at the mHealth Summit, a public-private partnership of the Foundation for the National Institutes of Health.

Initial studies of the interactive diabetes self-management system, called the Chinese Aged Diabetic Assistant (CADA), are promising, researchers found. The system enables diabetics to track their blood glucose, weight, diet, exercise, mood and blood pressure -- valuable information that will assist their doctors in providing the best care possible.

"We know that patients with chronic illnesses who are actively involved in their health care have better outcomes, yet this can be a challenging task. Mobile technologies can empower elderly people to better understand diabetes, track their health indicators more closely and follow a healthier lifestyle," said

Maggie Jiao Ma, Ph.D., assistant professor at SLU's Parks College of Engineering, Aviation and Technology.

About the research

Diabetes is a serious problem in China affecting more than 40 million men and women. For the aging Chinese population, diabetes is a costly, chronic condition and a major cause of disability. Especially in rural areas of China where diabetics have less access to health care, there are many misconceptions about the disease and proper treatment.

Ma and Cindy LeRouge, Ph.D., associate professor of decision sciences and information technology management at SLU, traveled to China in 2008 for several weeks to learn more about the problem and how they could best use technology to improve the health of elderly diabetics.

"This project did not start out as a gaming project," LeRouge said. "But we did a lot of groundwork -- from looking at the health care infrastructure in China to conducting focus groups with older diabetics and interviewing various providers -- and found that gaming was a persuasive way to engage patients in managing their personal health."

The games vary in purpose. For example, researchers created a "food pyramid" type game, which encourages gamers to eat a balanced diet, limit high-sugar foods and watch their daily intake of fat and salt. Applications including a trivia game and a tile matching game, in which gamers connect the necessary components for a healthy lifestyle, were popular educational choices among the test group.

While games engage and motivate the patients, smartphones makes the technology convenient.

First, smartphones are mobile, meaning patients can use them at any time or any place. They can be used as small, inexpensive computers even if no network infrastructure is in place. If connections are in place, smartphones make it easy for patients to share health information with their providers, care givers and others within personal network. Also, because many users are already mobile phone owners, including some smartphone users, adapting the technology is feasible for patients, providers and hospitals.

Smartphone technology may even offer a solution to better managing health care costs for chronic conditions, says Mark Gaynor, Ph.D., associate professor of public health at the School of Public Health.

"The only way to cut the cost of caring for people with chronic conditions is to enable the patients to self manage their health. In order to do that, though, self-management must be reasonable and easy to do. Smart phone technology makes it easy for patients to track important health information."

Endless opportunities

There are almost endless opportunities for using smartphone technology in health care, researchers say.

"Imagine walking into a McDonalds and having your cell phone recognize your location and make healthy menu recommendations -- all this and more is possible with smartphone technology," Gaynor said.

Researchers say smartphones can make tracking one's health easier and more convenient. In the future, CADA users will be able to share information with their providers and receive important health reminders. They are also working on Bluetooth-enabled devices, such as a scale that communicates with the phone to record and track daily measurements and a blood sugar monitor that automatically records daily readings on the phone.

The novel project was funded with a $100,000 seed grant from Microsoft External Research. Early next year, in China the team of researchers will test a prototype CADA device, which is created using Microsoft Visual Studio® 2008 development tools.

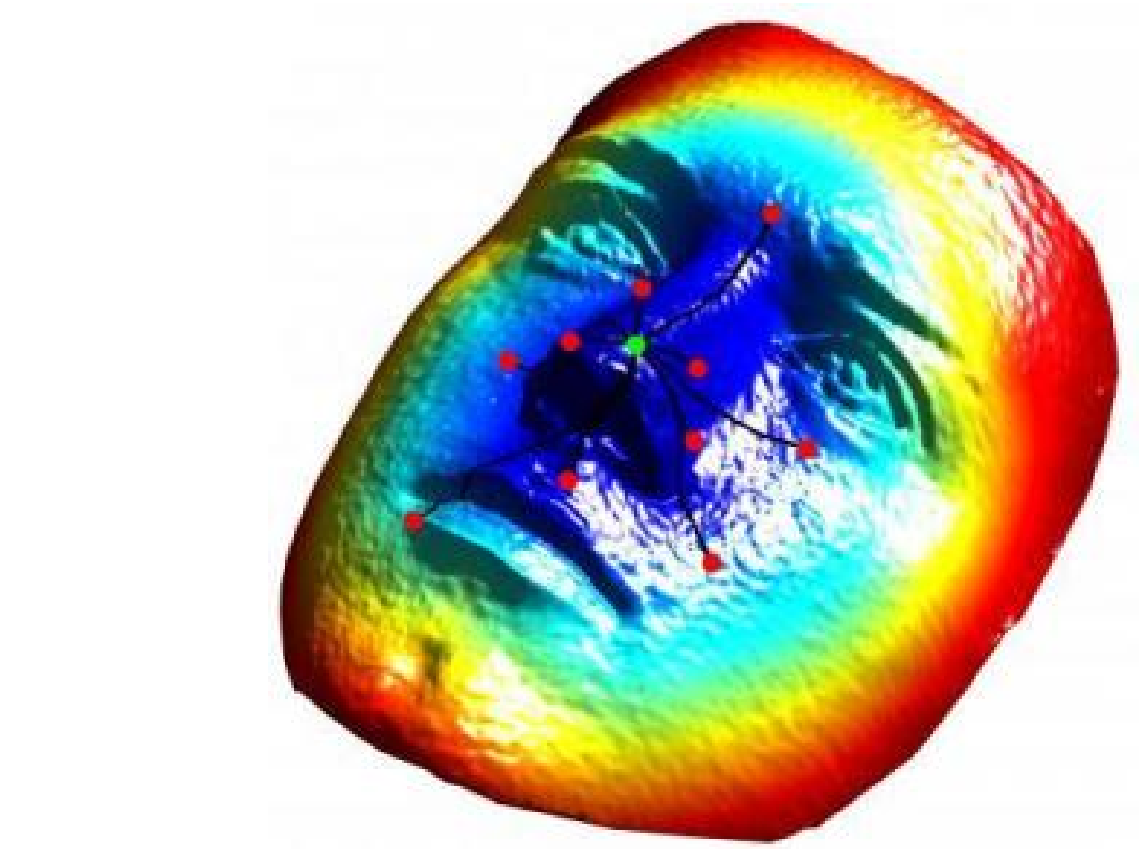
Core research team members include Cindy LeRouge, Ph.D., associate professor of decision sciences and information technology management at SLU School of Medicine; Maggie Jiao Ma, Ph.D., assistant professor at SLU's Parks College of Engineering, Aviation and Technology; Joseph Flaherty, M.D., associate professor of geriatrics at SLU and Gianluca De Leo, Ph.D., assistant professor of medical lab & radiation sciences at Old Dominion University. Mark Gaynor, Ph.D., associate professor of public health at the School of Public Health, Fred Navarro, a health psychologist with the Path Institute Corporate, and physicians at Peking University First Hospital and Sichuan University affiliated West China Hospital also collaborated on the project.

Adapted from materials provided by Saint Louis University.

Saint Louis University (2009, November 16). Smart solution: Researchers use smartphones to improve health of elderly diabetics in China. *ScienceDaily*. Retrieved November 16, 2009, from

http://www.sciencedaily.com /releases/2009/10/091029162022.htm

Improving Security With Face Recognition Technology



This photo shows how to determine discriminative anatomical point pairings using Adaboost for 3-D face recognition. (Credit: University of Miami)

ScienceDaily (Nov. 15, 2009) — A number of U.S. states now use facial recognition technology when issuing drivers licenses. Similar methods are also used to grant access to buildings and to verify the identities of international travelers. Historically, obtaining accurate results with this type of technology has been a time intensive activity. Now, a researcher from the University of Miami College of Engineering and his collaborators have developed ways to make the technology more efficient while improving accuracy.

Mohamed Abdel-Mottaleb, professor and chair in the UM Department of Electrical and Computer Engineering has developed state-of-the-art systems capable of photographing an image of someone's face and ear and comparing it against pre-stored images of the same person, with 95-100 percent accuracy.

Abdel-Mottaleb presented his findings at the 2009 IEEE International Conference on Image Processing in Cairo, Egypt on Saturday, November 7 -- Tuesday, November 10. He describes his research as "satisfying, especially when you know that what you're doing has real-world applications that will benefit people and enhance personal security."

The systems the researchers have designed can use 3-D facial images, or combine 2-D images of the face with 3-D models of the ear, which they construct from a sequence of video frames, to identify people by unique facial features and ear shapes.

In the first method, the researchers use 3-D facial images with over 95 percent recognition rate, in the lab setting. Conventional shape matching methods commonly used in 3-D face recognition are time

consuming. Abdel-Mottaleb uses a method that effectively increases computational efficiency while maintaining an acceptable recognition rate. He reduces the number of vertices (distinguishable landmarks of each face) considered when matching 3-D facial data, by automatically selecting the most discriminative facial regions. These automatically selected landmarks were found to be primarily within the regions of the nose, eye brows, mouth, and chin.

The second method called "Multi-Modal Ear and Face Modeling and Recognition" obtains a set of facial landmarks from frontal facial images and combines this data with a 3-D ear recognition component-- a much more difficult identification process given the technique's sensitivity to lighting conditions.

Fusing the scores of these two modalities, the researchers achieved an identification rate of 100 percent in the lab. "No single approach can give you 100 percent accuracy," Abdel-Mottaleb says. "One way to increase the accuracy is to use different biometrics and then combine them."

These high-tech identification tools help fight crime, and enforce border security. In the future, the researchers hope to expand their techniques to faces demonstrating facial expressions and to recognize faces using only profile images.

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

http://www.sciencedaily.com/releases/2009/11/091110090858.htm

Runners: Train Less and Be Faster

ScienceDaily (Nov. 15, 2009) — In a recent scientific study just published in the *Journal of Applied Physiology*, Bangsbo and co-workers demonstrate that by reducing the volume of training by 25% and introducing the so-called speed endurance training (6-12 30-s sprint runs 3-4 times a week), endurance trained runners can improve not only short-term but also long-term performance.

Thus, the runners improved their 10-km time by 1 min from 37.3 to 36.3 min after just 6-9 weeks of changed training. Six of the participating 12 runners obtained a new personal record on the 10-km, despite having been training for more than 4 years. The most impressive achievement was the one runner who lowered the time with more than 2 minutes from 37.5 til 35.4 min. In addition, performance in a 30-s sprint test and an intense exhaustive run (about 2 minutes) was improved by 7% and 36%, respectively. In agreement, the authors have previously shown that an 85% reduction in training volume can improve short-term performance (see right column).

In association with the improved performance the amount of muscle Na+/K+ pumps was elevated and the rate of accumulation of potassium during exercise was lowered, and it is speculated that this may play a significant role for the increased performance.

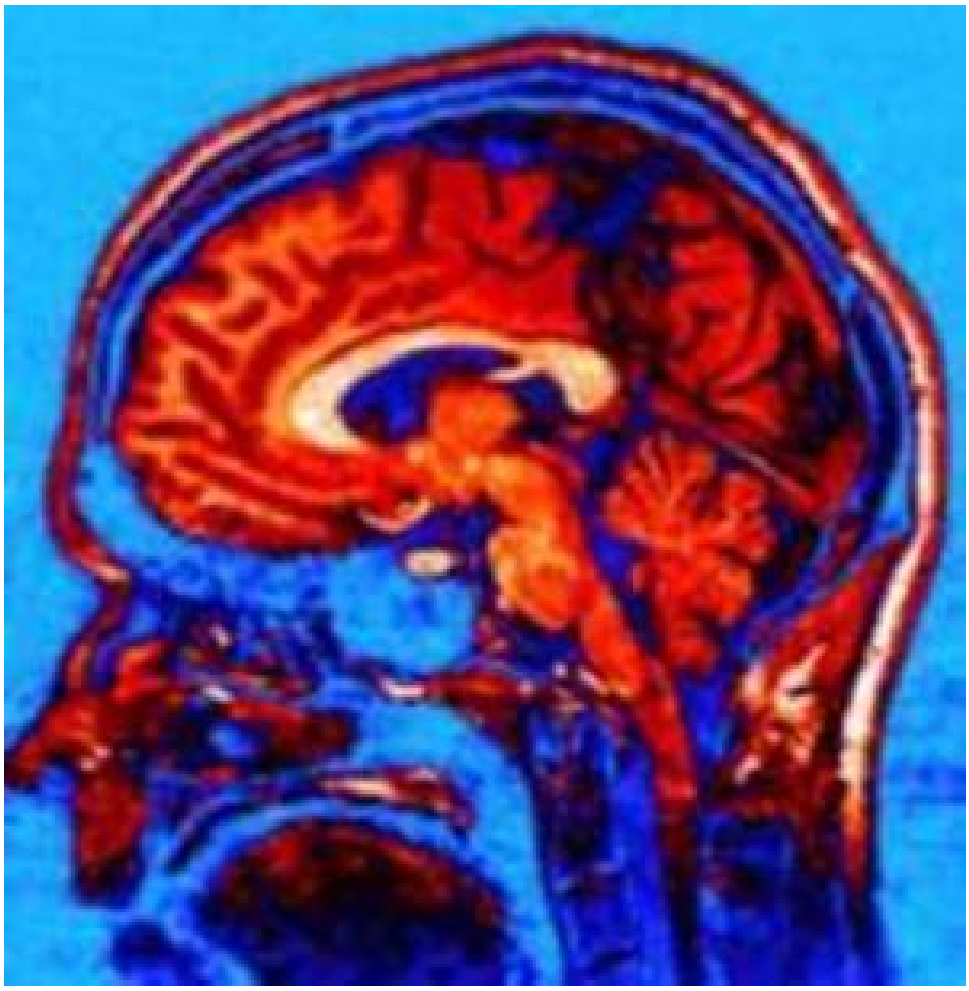
Adapted from materials provided by University of Copenhagen.

Journal Reference:

1. Bangsbo J, Gunnarsson TP, Wendell J, Nybo L, Thomassen M. **Reduced volume and increased training intensity elevate muscle Na /K pump {alpha}2-subunit expression as well as short- and long-term work capacity in humans**. *Journal of Applied Physiology*, Oct 1, 2009

http://www.sciencedaily.com/releases/2009/11/091111122026.htm

Dopamine Enhances Expectation of Pleasure in Humans



Brain scan using MRI. (Credit: Image courtesy of University College London)

ScienceDaily (Nov. 15, 2009) — Enhancing the effects of the brain chemical dopamine influences how people make life choices by affecting expectations of pleasure, according to new research from the UCL Institute of Neurology.

The study, published in *Current Biology*, confirms an important role for dopamine in how human expectations are formed and how people make complex decisions. It also contributes to an understanding of how pleasure expectation can go awry, for example in drug addiction.

Dopamine is a neurotransmitter produced in several areas of the brain that is found in a wide variety of animals. Its role in reward learning and reward-seeking behaviour is well established by animal studies -- however, in humans its role is much less understood.

Lead author Dr Tali Sharot, Wellcome Trust Centre for Neuroimaging at UCL, said: "Humans make much more complex decisions than other animals -- such as which job to take, where to go on holiday, whether to start a family -- and we wanted to understand the role of dopamine in making these types of decisions. Our results indicate that when we consider alternative options when making real-life decisions, dopamine has a role in signalling the expected pleasure from those possible future events. We then use that signal to make our choices."

The research team, which included Dr Tamara Shiner and Professor Ray Dolan, examined estimated pleasure of future events before and after the administration of a drug called L-DOPA which is known to enhance dopamine function in the brain and is commonly used to treat patients with Parkinson's disease. The 61 study participants were asked to rate their expectations of happiness if they were to holiday at each of 80 destinations, from Thailand to Greece. They were then given L-DOPA or a placebo and asked to imagine holidaying in those destinations.

The following day participants had to pick between a series of paired destinations that they had initially assigned with equal ratings, one member of the pair was imagined under L-DOPA the day before and the other under placebo. Finally, they rated the full set of 80 destinations again.

Ratings for particular destinations increased after they were imagined under L-DOPA's influence. That increase also affected the participants' selections the following day. Dr Sharot added: "We had reason to believe that dopamine would enhance expectations of pleasure in humans, but were surprised at the strength of this effect. The enhancement lasted at least 24 hours and was evident in almost 80 per cent of the subjects."

The study builds on earlier work by Dr Sharot and colleagues, which used brain imaging as participants imagined holiday destinations. An area of the brain called the striatum tracked expectations and the scientists found that they could take that signal and predict what the participants would choose. The authors believed this was dopamine at work and set up this study to further explore its role.

Adapted from materials provided by University College London.

Journal Reference:

1. Sharot et al. **Dopamine Enhances Expectation of Pleasure in Humans**. *Current Biology*, 2009; DOI: 10.1016/j.cub.2009.10.025

http://www.sciencedaily.com/releases/2009/11/091112121603.htm

Cave Study Links Climate Change to California Droughts

Photo of a slabbed (cut in half stalagmite) speleothem from a Californian cave (McLean's Cave) developed in the central Sierra Nevada foothills. (Credit: Isabel Montañez / Dept. of Geology, University of California, Davis)

ScienceDaily (Nov. 15, 2009) — California experienced centuries-long droughts in the past 20,000 years that coincided with the thawing of ice caps in the Arctic, according to a new study by UC Davis doctoral student Jessica Oster and geology professor Isabel Montañez.

The finding, which comes from analyzing stalagmites from Moaning Cavern in the central Sierra Nevada, was published online Nov. 5 in the journal *Earth and Planetary Science Letters*.

The sometimes spectacular mineral formations in caves such as Moaning Cavern and Black Chasm build up over centuries as water drips from the cave roof. Those drops of water pick up trace chemicals in their path through air, soil and rocks, and deposit the chemicals in the stalagmite.

"They're like tree rings made out of rock," Montañez said. "These are the only climate records of this type for California for this period when past global warming was occurring."

At the end of the last ice age about 15,000 years ago, climate records from Greenland show a warm period called the Bolling-Allerod period. Oster and Montanez's results show that at the same time, California became much drier. Episodes of relative cooling in the Arctic records, including the Younger Dryas period 13,000 years ago, were accompanied by wetter periods in California.

The researchers don't know exactly what connects Arctic temperatures to precipitation over California. However, climate models developed by others suggest that when Arctic sea ice disappears, the jet stream -- high-altitude winds with a profound influence on climate -- shifts north, moving precipitation away from California.

"If there is a connection to Arctic sea ice then there are big implications for us in California," Montañez said. Arctic sea ice has declined by about 3 percent a year over the past three decades, and some forecasts predict an ice-free Arctic ocean as soon as 2020.

Oster's analysis of the past is rooted in a thorough understanding of the cave in the present. Working with the cave owners, she has measured drip rates, collected air, water, soil and vegetation samples, and studied what happens to the cave through wet and dry seasons to determine how stalagmites are affected by changing conditions.

Oster collected stalagmites and cut tiny samples from them for analysis. The ratio of uranium to its breakdown product, thorium, allowed her to date the layers within the stalagmite. Isotopes of oxygen, carbon and strontium and levels of metals in the cave minerals all vary as the climate gets wetter or drier.

"Most respond to precipitation in some way," Oster said. For example, carbon isotopes reflect the amount of vegetation on the ground over the cave. Other minerals tend to decrease when rainfall is high and water moves through the aquifer more rapidly.

Oxygen-18 isotopes vary with both temperature and rainfall. Measuring the other mineral compositions provides more certainty that the changes primarily track relative rainfall.

The stalagmite records allowed Oster and Montañez to follow relative changes in precipitation in the western Sierra Nevada with a resolution of less than a century.

"We can't quantify precipitation, but we can see a relative shift from wetter to drier conditions with each episode of warming in the northern polar region," Montañez said.

Other authors on the paper are Warren Sharp, a geochronologist at the Berkeley Geochronology Center, and Kari Cooper, associate professor of geology at UC Davis. The research was funded by the National Science Foundation.

Adapted from materials provided by University of California - Davis.

Journal Reference:

1. Jessica L. Oster, Isabel P. Montañez, Warren D. Sharp, Kari M. Cooper. **Late Pleistocene California droughts during deglaciation and Arctic warming**. *Earth and Planetary Science Letters*, 2009; DOI: 10.1016/j.epsl.2009.10.003

http://www.sciencedaily.com/releases/2009/11/091110171741.htm

Green Heating and Cooling Technology Turns Carbon from Eco-Villain to Hero

Professor Bob Critoph, University of Warwick. (Credit: Image courtesy of University of Warwick)

ScienceDaily (Nov. 14, 2009) — Carbon is usually typecast as a villain in terms of the environment but researchers at the University of Warwick have devised a novel way to miniaturise a technology that will make carbon a key material in some extremely green heating products for our homes and in air conditioning equipment for our cars.

Most domestic heating and automotive air conditioning requires a lot of energy. Domestic space heating and hot water account for 25% of energy consumption in the UK. Across the EU, vehicle air conditioning uses about 5% of the vehicle fuel consumed annually, and within the UK it is responsible for over 2 million tonnes of CO_2 emissions.

To combat global warming, new technologies to reduce these emissions are vital. Researchers at the University of Warwick have been working on practical solutions for many years and are now developing new energy saving technologies.

In houses, the best condensing boilers are about 90% efficient. There are electric heat pumps on the market that use electricity to extract heat from the outside air or the ground to heat homes more efficiently, but the electricity used still incurs large CO_2 emissions at the power station. Researchers have long been aware of a much more energy efficient way to drive heat pumps (or air conditioners) using adsorption technology. This uses heat from a gas flame or engine waste heat to power a closed system containing only active carbon and refrigerant. When the carbon is at room temperature it adsorbs the refrigerant and when heated the refrigerant is driven out. A process which alternately heats and cools the carbon can be used to extract heat from the outside air and put it into radiators or hot water tanks. In the

case of air conditioning it extracts the heat from the inside of the car. The major snag has been that adsorption technology to date would need to be roughly 300 litres in volume for a car air conditioner and larger for a heat pump to heat your house. Clearly that is not going to fit into a car and the volume of unit required for domestic heating probably couldn't fit under your stairs at home either…

However University of Warwick researchers have made a breakthrough in adsorption systems design that dramatically shrinks these devices making them small and light enough for use in both domestic heating and automotive air conditioning. They have devised and filed a patent on a clever new arrangement that distributes thin (typically 0.7mm thick) sheets of metal throughout the active carbon in the heat exchanger. Each of these sheets contains more than a hundred tiny water channels (typically 0.3mm in diameter) designed to make the heat transfer much more efficient. This has enabled the Warwick team to create adsorption based equipment that is up to 20 times smaller than was previously possible.

The researchers expect that their new adsorption technology can create domestic heat pumps that will produce a 30% or more reduction in domestic fuel bills (and CO_2 emissions) compared to even the best condensing boiler. In car air conditioning systems their new system can exploit waste heat from the engine, converting it into useful cooling. Because no (or very little) mechanical power is then taken from the engine it will reduce both fuel consumption and CO_2 emissions by nearly 5%. The research team also anticipate that in new vehicle models the system can be integrated with little or no extra cost.

The University of Warwick engineers have had significant interest in the new technology from a range of companies, and they have already entered a technical partnership with a major global vehicle manufacturer to develop and demonstrate the technology. There has also been considerable interest from the domestic heating and hot water market

This significant commercial interest has led to a new spin-out company, Sorption Energy Ltd, being set up by Warwick Ventures, the university's technology transfer office, and H2O Venture Partners. Initially the company will use the new patent pending technology to focus on two high value markets: greener heating and hot water systems for houses and air conditioning for cars.

Lead researcher on the new technology, University of Warwick's Professor Bob Critoph said:

"My team has been working on these developments for several years, supported by grants from EPSRC and the EU totalling over £2.5million. The technology is now ready for commercialisation and we are very excited by the opportunities which are developing. It is particularly pleasing that the technology will significantly help reduce CO_2 emissions."

Dr David Auty, Chief Executive of Sorption Energy said: "This is exciting stuff. The technology has been proven in the University's laboratories at the sizes needed for vehicles and domestic systems, and there are several other large markets. The ability to provide products which make significant reductions in both energy consumption and CO_2 emissions at a similar price to existing products will make Sorption Energy very attractive to customers, and is very satisfying for the team."

"The UK is the global market leader in gas boilers. There are 21 million gas boilers in the UK with 1.7million installed each year, mainly replacements, and around 11 million units sold annually worldwide. For domestic housing the retrofit market is the primary interest: 80% of the housing for 2050 has already been built. This presents both a massive opportunity both for emission reduction and for UK industry."

http://www.sciencedaily.com/releases/2009/11/091111111257.htm

Thinking of a Loved One Can Reduce Your Pain

The mere thought of your loved one can reduce your pain, psychologists report. (Credit: iStockphoto/Jacob Wackerhausen)

ScienceDaily (Nov. 14, 2009) — Can the mere thought of your loved one reduce your pain? Yes, according to a new study by UCLA psychologists that underscores the importance of social relationships and staying socially connected.

The study, which asked whether simply looking at a photograph of your significant other can reduce pain, involved 25 women, mostly UCLA students, who had boyfriends with whom they had been in a good relationship for more than six months.

The women received moderately painful heat stimuli to their forearms while they went through a number of different conditions. In one set of conditions, they viewed photographs of their boyfriend, a stranger and a chair.

"When the women were just looking at pictures of their partner, they actually reported less pain to the heat stimuli than when they were looking at pictures of an object or pictures of a stranger," said study co-author Naomi Eisenberger, assistant professor of psychology and director of UCLA's Social and Affective Neuroscience Laboratory. "Thus, the mere reminder of one's partner through a simple photograph was capable of reducing pain."

"This changes our notion of how social support influences people," she added. "Typically, we think that in order for social support to make us feel good, it has to be the kind of support that is very responsive to our emotional needs. Here, however, we are seeing that just a photo of one's significant other can have the same effect."

In another set of conditions, each woman held the hand of her boyfriend, the hand of a male stranger and a squeeze ball. The study found that when women were holding their boyfriends' hands, they reported less physical pain than when they were holding a stranger's hand or a ball while receiving the same amount of heat stimulation.

"This study demonstrates how much of an impact our social ties can have on our experience and fits with other work emphasizing the importance of social support for physical and mental health," Eisenberger said.

One practical piece of advice the authors give is that the next time you are going through a stressful or painful experience, if you cannot bring a loved one with you, a photo may do.

The study appears in the November 2009 issue of the journal *Psychological Science*.

Co-authors are Sarah Master, who earned her Ph.D. in psychology from UCLA; Shelley E. Taylor, UCLA distinguished professor of psychology; Bruce Naliboff, a clinical professor of psychiatry and biobehavioral sciences at the Semel Institute for Neuroscience and Human Behavior at UCLA; David Shirinyan, a postdoctoral scholar at the Semel Institute; and Matthew D. Lieberman, UCLA professor of psychology.

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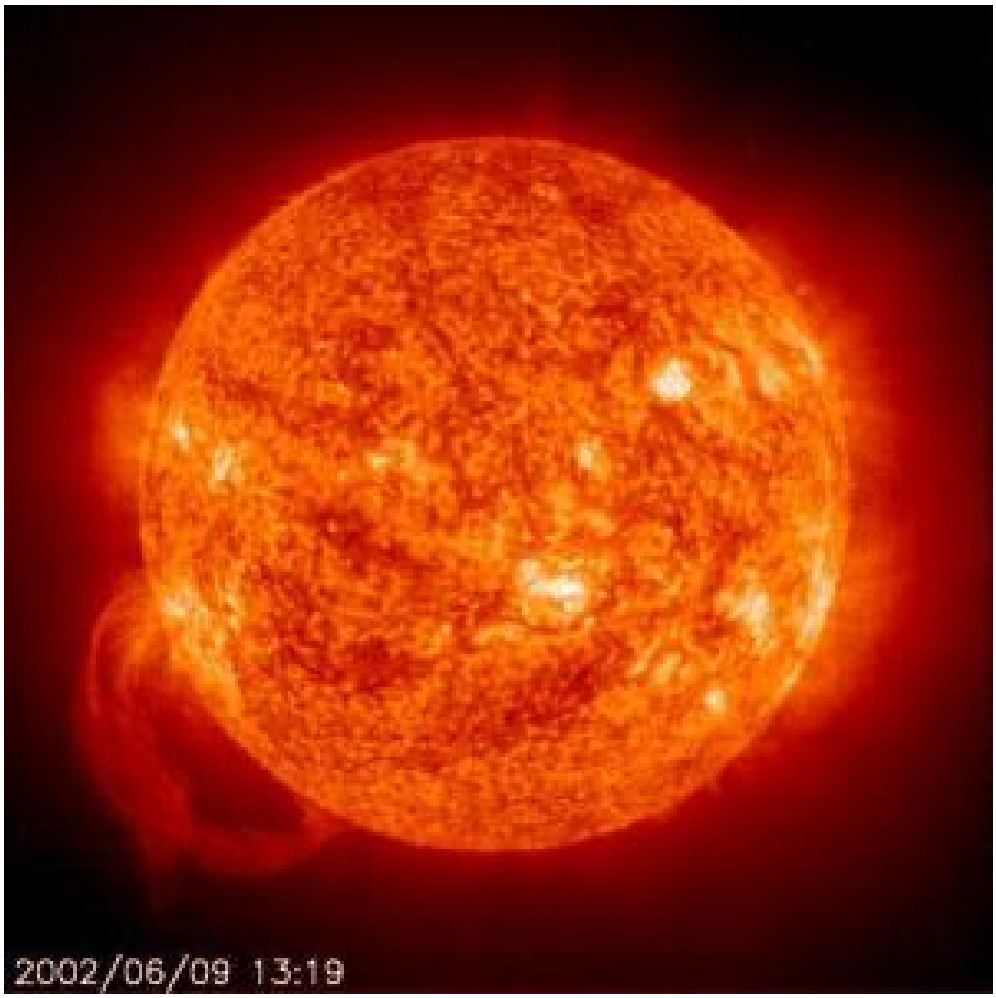
Story Source:

Adapted from materials provided by University of California - Los Angeles.

http://www.sciencedaily.com/releases/2009/11/091113151037.htm

Lightning Strike in Africa Helps Take Pulse of Sun



Sunspots, which rotate around the sun's surface, tell us a great deal about our own planet. (Credit: NASA)

ScienceDaily (Nov. 14, 2009) — Sunspots, which rotate around the Sun's surface, tell us a great deal about our own planet. Scientists rely on them, for instance, to measure the Sun's rotation or to prepare long-range forecasts of Earth's health.

But there are some years, like this one, where it's not possible to see Sunspots clearly. When we're at this "solar minimum," very few, if any, Sunspots are visible from Earth. That poses a problem for scientists in a new scientific field called "Space Weather," which studies the interaction between the Sun and Earth's environment.

Thanks to a serendipitous discovery by Tel Aviv University's Prof. Colin Price, head of TAU's Department of Geophysics and Planetary Science, and his graduate student Yuval Reuveni, science now has a more definitive and reliable tool for measuring the Sun's rotation when Sunspots aren't visible -- and even when they are. The research, published in the *Journal of Geophysical Research -- Space Physics*, could have important implications for understanding the interactions between the Sun and Earth. Best of all, it's based on observations of common, garden-variety lightning strikes here on Earth.

Waxing and waning, every 27 days

Using Very Low Frequency (VLF) wire antennas that resemble clotheslines, Prof. Price and his team monitored distant lightning strikes from a field station in Israel's Negev Desert. Observing lightning signals from Africa, they noticed a strange phenomenon in the lightning strike data -- a phenomenon that slowly appeared and disappeared every 27 days, the length of a single full rotation of the Sun.

"Even though Africa is thousands of miles from Israel, lightning signals there bounce off Earth's ionosphere -- the envelope surrounding Earth -- as they move from Africa to Israel," Prof. Price explains. "We noticed that this bouncing was modulated by the Sun, changing throughout its 27-day cycle. The variability of the lightning activity occurring in sync with the Sun's rotation suggested that the Sun somehow regulates the lightning pattern."

He describes it as akin to hearing music or voices from across a lake: depending on the humidity, temperature and wind, sometimes they're crystal clear and sometimes they're inaudible. He discovered a similar anomaly in the lightning data due to the changes in Earth's ionosphere -- signals waxed and waned on a 27-day cycle. Prof. Price was able to show that this variability in the data was not due to changes in the lightning activity itself, but to changes in Earth's ionosphere, suspiciously in tandem with the Sun's rotation.

Taking the pulse of the Sun

The discovery describes a phenomenon not clearly understood by scientists. Prof. Price, an acclaimed climate change scientist, believes it may help scientists formulate new questions about the Sun's effect on our climate. "This is such a basic parameter and not much is known about it," says Prof. Price. "We know that Earth rotates once every 24 hours, and the moon once every 27.3 days. But we haven't been able to precisely measure the rotation rate of the Sun, which is a ball of gas rather than a solid object; 27 days is only an approximation. Our findings provide a more accurate way of knowing the real rotation rate, and how it changes over time," he says.

Prof. Price cannot yet say how this finding will impact life on Earth. "It's an interesting field to explore," he says, "because nothing has been done to investigate the links between changing weather patterns and the rotation of the Sun.

"Short-term changes in solar activity can also impact satellite performance, navigational accuracy, the health of astronauts, and even electrical power grid failures here on Earth. Many scientists claim that the Sun's variability is linked to changes in climate and weather patterns, so the small changes we observed every 27 days could also be related to small variations in weather patterns.

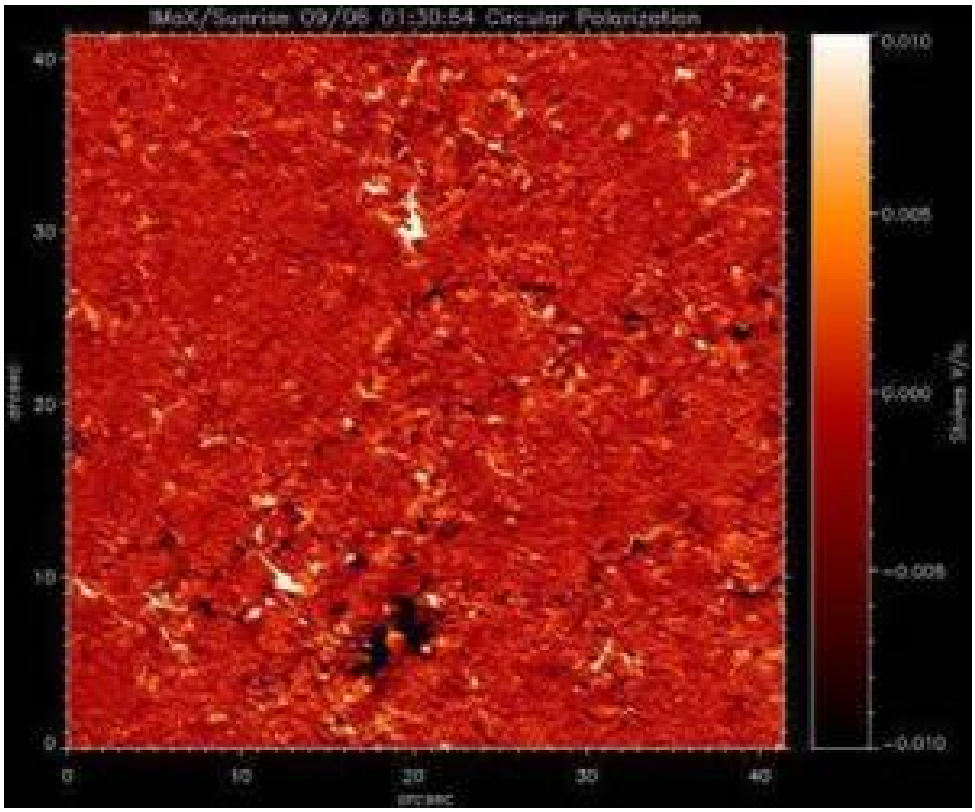
"Our data may help researchers examine short-term connections between weather, climate, and Sun cycles. With this tool, we now have a good system for measuring the pulse of the Sun."

Story Source:

Adapted from materials provided by Tel Aviv University.

http://www.sciencedaily.com/releases/2009/11/091111142518.htm

Bubbling Ball of Gas: SUNRISE Telescope Delivers Spectacular Pictures of Sun's Surface



The IMaX instrument not only depicts the solar surface, it also makes magnetic fields visible; these appear as black or white structures in the polarised light. SUNRISE enables tiny magnetic fields on the surface of the Sun to be measured at a level of detail never before achieved. (Credit: Image: MPS/IMAX consortium)

ScienceDaily (Nov. 14, 2009) — The Sun is a bubbling mass. Packages of gas rise and sink, lending the sun its grainy surface structure, its granulation. Dark spots appear and disappear, clouds of matter dart up -- and behind the whole thing are the magnetic fields, the engines of it all. The SUNRISE balloon-borne telescope, a collaborative project between the Max Planck Institute for Solar System Research in Katlenburg-Lindau and partners in Germany, Spain and the USA, has now delivered images that show the complex interplay on the solar surface to a level of detail never before achieved.

The largest solar telescope ever to have left Earth was launched from the ESRANGE Space Centre in Kiruna, northern Sweden, on June 8, 2009. The total equipment weighed in at more than six tons on launch. Carried by a gigantic helium balloon with a capacity of a million cubic metres and a diameter of around 130 metres, SUNRISE reached a cruising altitude of 37 kilometres above the Earth's surface.

The observation conditions in this layer of the atmosphere, known as the stratosphere, are similar to those in outer space: for one thing, the images are no longer affected by air turbulence; and for another, the camera can also zoom in on the Sun in ultraviolet light, which would otherwise be absorbed by the ozone layer. After separating from the balloon, SUNRISE parachuted safely down to Earth on June 14th, landing on Somerset Island, a large island in Canada's Nunavut Territory situated in the Northwest Passage, the seaway through the Arctic Ocean between the Atlantic and the Pacific.

The work of analysing the total of 1.8 terabytes of observation data recorded by the telescope during its five-day flight has only just begun. Yet the first findings already give a promising indication that the mission will bring our understanding of the Sun and its activity a great leap forward. What is particularly

interesting is the connection between the strength of the magnetic field and the brightness of tiny magnetic structures. Since the magnetic field varies in an eleven-year cycle of activity, the increased presence of these foundational elements brings a rise in overall solar brightness -- resulting in greater heat input to the Earth.

The variations in solar radiation are particularly pronounced in ultraviolet light. This light does not reach the surface of the Earth; the ozone layer absorbs and is warmed by it. During its flight through the stratosphere, SUNRISE carried out the first ever study of the bright magnetic structures on the solar surface in this important spectral range with a wavelength of between 200 and 400 nanometres (millionths of a millimetre).

"Thanks to its excellent optical quality, the SUFI instrument was able to depict the very small magnetic structures with high intensity contrast, while the IMaX instrument simultaneously recorded the magnetic field and the flow velocity of the hot gas in these structures and their environment," says Dr. Achim Gandorfer, project scientist for SUNRISE at the Max Planck Institute for Solar System Research.

Previously, the observed physical processes could only be simulated with complex computer models. "Thanks to SUNRISE, these models can now be placed on a solid experimental basis," explains Prof. Manfred Schüssler, solar scientist at the MPS and co-founder of the mission.

In addition to the Max Planck Institute for Solar System Research, numerous other research facilities are also involved in the SUNRISE mission: the Kiepenheuer Institute for Solar Physics in Freiburg, the High Altitude Observatory in Boulder (Colorado), the Instituto de Astrofisica de Canarias on Tenerife, the Lockheed-Martin Solar and Astrophysics Laboratory in Palo Alto (California), NASA's Columbia Scientific Ballooning Facility and the ESRANGE Space Centre. The project is funded by the Federal Ministry of Economics through the German Aerospace Centre (DLR).

Story Source:

Adapted from materials provided by Max-Planck-Gesellschaft.

http://www.sciencedaily.com/releases/2009/11/091111123608.htm

The First, Tentative Steps

By: Erik Hayden

With carbon trading poised to become the next big U.S. business market and regional programs testing the waters for a comprehensive national cap-and-trade system, it's worth noting that carbon emission trading follows a well-worn path of making a market in pollution.

Within the last two decades, numerous cap-and-trade programs have emerged as nonprofits; local governments and businesses ranging from utilities to farms have collaborated to reduce pollutants discharged into water, air or natural environments while lowering the costs across-the-board for being cleaner.

Cap-and-trade programs have two parts, starting with a "cap" on the amount of a pollutant allowed in a given area or by a given polluter. Individual polluters (coal mines, power plants, etc.) receive credits allowing them to discharge a set amount of the pollutant, and those who can cut down their discharge are allowed to sell, or "trade," their unused credits to someone finding it harder to be green. In some plans, third parties can fire up their own mitigation measures and start minting their own credits, which grow in value as the cap gets lower.

In theory, the cap-and-trade system provides a functional and flexible framework where these market-based solutions (the buying and selling of allowance credits) can be used reduce overall pollution while giving companies (or land managers) financial incentives to develop environmentally sound practices.

While the majority of trading efforts focus on carbon and water-quality, other materials such as selenium, nitrogen, phosphorous and even temperature have been turned into credits that can be bought or sold by participants in state or local programs.

So, as the American Clean Energy and Security Act winds its way through Congress, here is a glimpse of a few smaller projects that highlight the versatility, and potential, of cap-and-trade.

Grassroots Efforts

Among the largest and oldest cap-and-trade systems implemented in the United States is the Environmental Protection Agency's acid rain program, begun after the Clean Air Act of 1990 to push utilities into sending less sulfur dioxide out of their smokestacks. By 2008, it was credited with lowering annual SO2 emissions by 56 percent compared to 1980 levels.

But cap and trade isn't only about smokestacks and tailpipes. One California economic incentive program arose after the buildup of a naturally occurring element in farm runoff water was linked to deformed waterfowl.

The project began in the San Joaquin Valley in 1996 after the Regional Water Quality Board imposed a limit on amounts of selenium — a necessary trace element in the body but dangerous in larger doses — in irrigation water drainage basins. It was helmed by the Grassland Area Farmers, a collection of local irrigation and drainage districts that collaborated to reduce the selenium discharges.

The project first imposed a cap on the total amount of selenium that could be discharged in the basin and then allocated the load among the patchwork of districts. Districts unable to meet the reduction requirement could choose to buy credits from other districts that could. After several years, according to Bureau of Reclamation statistics, selenium discharges in the Grassland Drainage Basin fell by 61 percent.

However, the credit exchange program was little used and has since been replaced by a plan that places a cap on selenium levels and manages the reduction of the discharge by region rather than district.

But expanding a project area doesn't mean a cap-and-trade program must go dark. A new program to swap nitrogen and phosphorus discharge rights was established to handle the basin of the Ohio River, which overlays Pennsylvania, West Virginia, Ohio and Indiana, and then feeds into the Mississippi River.

Three of the basin states — Pennsylvania, West Virginia and Ohio — have nitrogen/phosphorus trading programs, as does the Miami River watershed, but each ends at an arbitrary dotted line. The U.S. Environmental Protection Agency tasked the Electric Power Research Institute, in collaboration with power companies, regulators, farmers and others in the basin, to break ground on a "first-of-its-kind" interstate trading program that might serve as a model.

Excess nitrogen and phosphorus — commonly found in fertilizer, septic tank and wastewater discharges — can hurt land and river animals, and cause algal blooms that suck oxygen out of the water and can even change its taste and odor. Coal-fired power plants, in particular, discharge large amounts of these nutrients-turned-pollutants into the watershed.

Under the EPRI project, anyone in the region with a permit to discharge nutrients may buy or sell allowance credits. Farmers performing restoration acts — such as using less fertilizer, changing their till practices or installing a buffer strip between their farm and the point it reaches the water — will be able to parlay these actions into allowance credits that can be sold to utilities.

The project's backers believe that this system will reduce the amount of nitrogen and phosphorous discharges in the basin while lowering costs by using market-based trading between utilities. According to Jessica Fox, senior scientist for EPRI's Water and Ecosystems Program, credit trading is tentatively scheduled to begin within one to two years.

Temperature Credits on the Tualatin River

Cap-and-trade needn't be limited to tangible pollutants; nearly anything can be transformed into an allowance credit. Take, for instance, Oregon's "shade-a-lator", which calculates thermal load reductions and quantifies river water temperature into a tradable credit.

Rising water temperatures, due to industrial activity, were hindering the recovery of salmon in the state's rivers. So in 2004, the Oregon Department of Environmental Quality, together with the Clean Water Services organization, drafted new rules allowing municipalities or utilities to purchase temperature credits rather than buying barely adequate water-chillers to cool the water they discharge into the Tualatin River.

Now, industry can buy temperature credits from the farmers, ranchers and foresters who are actively cooling the riverbank area through projects like planting shade trees along the river.

The program has been a success for the Tualatin River, so much that The Willamette Partnership, a nonprofit organization, is drafting similar temperature credit protocols for the greater Oregon area.

"There are very few incentives [or requirements] for farmers, foresters and ranchers to restore streamside vegetation. And it's expensive to do so," explained David Primozich, executive director of the Willamette Partnership. The purchase of a temperature credit by a pollution-producing entity, Primovich explained, allows the riverside land managers to be both environmentally conscious and turn a profit.

While these highlighted programs showcase the versatility of the small-scale cap-and-trade systems, they are by no means the most exotic or comprehensive.

In the United Kingdom, credits can be traded to reduce the flow of biodegradable municipal waste in landfills. The Center for Conservation Solutions is working with partners to develop a habitat credit trading bank to protect the gopher tortoise.

Looking Forward

Cap-and-trade has clear benefits: It sets firm goals for pollution reduction (divided equally among participating entities). It provides these entities with the alternative of buying or swapping credits rather than simply requiring them to meet a certain pollutant reduction level — which is often cheaper than requiring immediate retrofits or closures.

Perhaps the most important benefit under many cap-and-trade programs is that the cash raised for the right to pollute (whether through buying a credit or paying a fine) often goes directly into solving the problem (creating incentives for land-use managers to practice restoration acts). While cap and trade doesn't guarantee transformative climate change regulations, it at least provides a rudimentary structure to begin to enact change.

But there are criticisms, often generated by looking at blemishes in Europe's existing carbon-trading program. Plus, cap-and-trade systems give pollutant-producing entities no real incentive to change their existing business plan — they only hassle them into spending money to pay for others to reduce pollution.

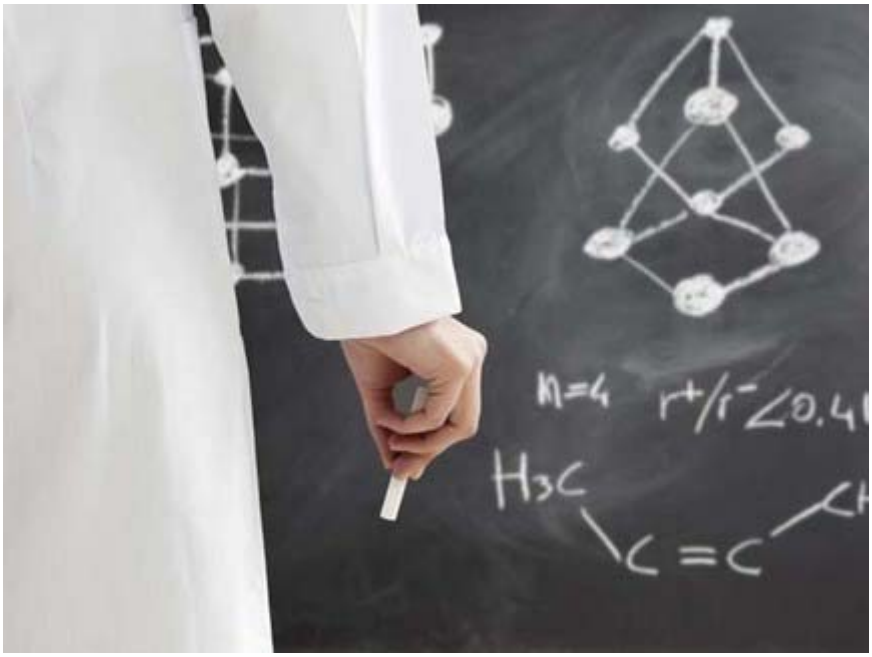
And while these smaller programs highlighted have displayed the potential benefits of cap-and-trade, taking these models and imposing them on a national or global scale is problematic. If the U.S. Congress does pass the first comprehensive cap-and-trade bill, hundreds of industries tied to the carbon market will be affected. Just quantifying the impact of every single carbon-producing entity (to generate credits) could provoke lawsuits, encourage fraud and even unintentionally spawn a black market for trading.

Despite these fears, the cap-and-trade seems to be the best stop-gap measure until future technology, or truly comprehensive regulation, can significantly reduce man's output of greenhouse gases. Reform has to begin somewhere, right?

http://www.miller-mccune.com/science_environment/the-first-tentative-steps-1565?utm_source=Newsletter83&utm_medium=email&utm_content=1117&utm_campaign=newsletters

Scientists Need to Get Out More

By: Tom Jacobs



Fifty years ago, on May 7, 1959, British novelist C.P. Snow made his famous "two cultures" speech, in which he warned that the sciences and the humanities were increasingly separated by "a gulf of mutual incomprehension." In the academic world, that gulf has arguably shrunk somewhat in the past half-century, as neurologists collaborate with psychologists to help understand the workings of the mind and engineers collaborate with artists to form new modes of creative expression.

But another, even wider gulf has developed, this time between science and the rest of society. Polls routinely reveal high levels of scientific illiteracy among both Americans and Europeans. We love the gadgets that science and technology produce, but have no basic knowledge of how they work — and we're not especially interested in finding out.

This willful ignorance has practical consequences. When scientific discoveries conflict with either our religious beliefs or personal prerogatives (as when climatologists point out that our lifestyles are straining the limits of our planet's resources), we find them easy to ignore or dismiss. Our minds have not been molded to respect the scientific process nor to take the warnings of its practitioners seriously.

Two new books approach this dilemma from different perspectives. In *Unscientific America: How Scientific Illiteracy Threatens Our Future* (Basic Books; $24), Chris Mooney and Sheril Kirshenbaum provide a detailed diagnosis of the problem and how it developed over the decades. In *Am I Making Myself Clear?* (Harvard University Press; $19.95), Cornelia Dean offers practical advice to researchers who are interested in making things better.

While the two volumes inevitably contain some overlapping material, they are, in the end, complementary. Mooney and Kirshenbaum present a call to action, urging scientists to emerge from their laboratories and make their voices heard in the public debate. Dean gives detailed suggestions as to how they can accomplish this important goal.

Mooney, a writer and editor (he is author of the best-selling *The Republican War on Science*), and Kirshenbaum, a marine scientist at Duke University, co-write a science and society blog at discovermagazine.com. Their tone isn't so much peeved as perplexed.

"Americans built the bomb, reached the moon, decoded the genome and created the Internet," they note. "And yet today, the country is also home to a populace that, to an alarming extent, ignores scientific advances or outright rejects scientific principles."

Dean, a veteran science writer and former editor at *The New York Times*, similarly bemoans the average person's misunderstanding of the scientific method. "Given examples, we generalize," she writes. "Given effects, we infer causes. Instead of viewing correlation for what it is — an opportunity to hypothesize about causation — we assume it proves causation. And for us, vivid anecdotes mean more than piles of data."

All the authors place part of the blame on the crumbling journalism establishment. They decry the decline of science coverage as newspapers downsize and point out that the journalistic conceit of "balance" is not useful in this arena. Giving equal time to someone who speaks for 99 percent of scientists and a skeptic with few adherents presents the false impression of an ongoing debate, even when an issue (such as climate change) has long been settled. Worse, it enables risk-averse political leaders to avoid making tough choices.

"Media coverage tends to be episodic and event-driven, always in search of the dramatic and the new," Moony and Kirshenbaum write. Rather than relate to readers the incremental nature of scientific research, they note, "journalists more often pounce on some 'hot' result, even if it contradicts the last hot result, or is soon overturned by a subsequent study."

This type of breathless journalism leaves readers with a sense of confusion and unease, rather than the accurate impression that science is ever-evolving and self-correcting.

But Mooney and Kirshenbaum place the bulk of the blame on the scientific establishment itself, which, they complain, "has become self-isolating." Instead of great communicators like the late Carl Sagan, whose palpable enthusiasm for space exploration inspired countless adolescents in the 1980s, today's most prominent scientists are off-putting agitators such as evolutionary biologist Richard Dawkins, who likened religious belief to "a virus of the mind" in a 1991 essay.

"We need a new caste of savvy scientists who can act as 'framers' of policy issues," they write. "These scientists would understand the varied socioeconomic and political pressures that impinge upon the legislative process and know how to integrate accurate scientific information with a range of achievable and realistic policy options to facilitate the process of decision-making."

Dean couldn't agree more. "As a society, we need to adopt a broader view of what it means for researchers to fulfill their obligations to society," she writes. "In my view, it is not enough for them to make findings and report them in the scholarly literature. As citizens in a democracy, they must engage, and not just when their funding is at stake." (Nice zinger there at the end.)

Her small but meaty book is a primer on how to do just that. It includes detailed advice on dealing with journalists, publicists, television and radio producers, editorial page editors, book publishers and elected officials. "If you agree to be interviewed, imagine you are approaching your own field from a position of ignorance," she advises. If you're giving a presentation to a group of non-scientists, remember to "interact with your audience, not your slides."

One can only hope that researchers — and the academic administrators who decide what the scientists of tomorrow need to know — read these concise, sharply written volumes and take their message to heart. The process of reconnecting science and society cannot start soon enough. Presuming the climatologists

are correct, our planet and the species that live on it are in a lot of trouble if we don't start taking science seriously soon.

But psychological research suggests we shouldn't get our hopes up about the prospects of such a shift. Human beings, after all, long for safety and reassurance, which science seldom provides. As Malcolm Gladwell noted at a 2008 *New Yorker* conference, "We have this sense that progress, broadly speaking, has the effect of reducing uncertainty. But the opposite is true."

Getting both journalists and the public to make peace with uncertainty — a condition scientists not only accept, but find exhilarating — will require a major transformation of thinking. As long as we're craving the comfort of conclusive answers — or, worse, looking to get our prejudices confirmed — scientists, who by instinct and training go wherever the evidence leads them, will always be looked upon with suspicion, if not hostility. In today's society, the greatest gulf may be the one separating those who are terrified of the unknown and those who embrace it.

http://www.miller-mccune.com/science_environment/scientists-need-to-get-out-more-1599?utm_source=Newsletter83&utm_medium=email&utm_content=1117&utm_campaign=newsletters

The Low-Tech Reality of Identity Theft

By: Lewis Beale

The U.S. Census Bureau estimates a little more than one-third of households will refuse to mail out their census forms next year because of fear that sharing personal data could make them susceptible to identity theft.

This is no idle concern — almost 10 million people were victims of identity theft in 2008, a 22 percent rise from the year before. And despite the popular image of some Serbian teenager with superior computing skills hacking into a major mainframe and stealing thousands of pieces of sensitive personal data, then using them to buy flat panel TVs and Blackberries, the majority of identity theft — a whopping 43 percent — comes from such low-tech means as stolen wallets and documents. Only about 1-in-10 thefts are computer-originated.

Those final two figures, in fact, tend to confirm the findings of "Understanding Identity Theft: Offenders' Accounts of Their Lives and Crimes," a study published earlier this year in *Criminal Justice Review*. Conducted by Lynne M. Vieraitis of the University of Texas at Dallas, and Heith Copes of the University of Alabama at Birmingham, the study is based on interviews with 59 identity thieves incarcerated in federal prisons. The goal of the study was to determine the demographic characteristics of these criminals and how they commit their crimes.

"One of the things we found most surprising is it seems to be very democratic in terms of who's committing [identity crimes]," says Vieraitis. "There are people who are more like street offenders and those closer to the white-collar-type fraudster."

"What motivates all these offenders is money," adds Copes, "and that's where you see the distinction between street life and those living a middle-class lifestyle. The street-life types, these are the hardcore offenders. They live this life of the party, drugs, going out — this hedonistic lifestyle. And they use the money to support that lifestyle. It's a cash-intensive lifestyle. It encourages them to commit more crime, and the cycle continues. The middle class is trying to portray a middle-class lifestyle; they're trying to pay off houses and cars they can't afford."

In either case, the means of obtaining the information needed to pull off their crimes is decidedly low tech — as low tech as, in some cases, Dumpster diving. But the most common method of getting information is to buy it from someone, generally a person who works for a mortgage company, bank, car dealership or state agencies like law enforcement and the Department of Motor Vehicles.

"The most common method was getting it through legitimate access," says Copes. "Either that person worked at the place that had that information or they paid the person to get it. They use what's known as 'larceny sense' — a lot of them could just recognize people they could buy off."

Other methods included stealing mail from apartment houses or businesses like insurance companies — even stealing trash cans from banks. One thief put ads in newspapers seeking employees for a new company, had jobseekers fill out applications that included Social Security numbers, then used those to create false identities.

In all cases, offenders parlayed stolen IDs into cash by applying for credit cards (the most common method), opening bank accounts and depositing counterfeit checks, withdrawing money from existing accounts, applying for loans and public assistance.

One thief would apply for credit cards at places like Lowes or Home Depot, receive instant credit in a specific amount and then max out the card immediately. This felon would even take orders from people beforehand and discovered that gift cards were especially popular: "Gift cards were like money on the streets," she told the researchers. "People were buying them off me like hotcakes."

Yet if all this suggests identity thieves are necessarily smarter than the average felon — you know, like that brilliantly twisted teen Serb hacker — forget it.

"You don't have to have a high IQ," says Copes. "One of the skills is just good social skills. You may pose as someone and pull all their money out of an account, so you need to be able to interact with people, know which teller to talk to and know when a conversation is not going the right way."

So if identity theft isn't primarily a trade for brainiacs, how come it's the sophisticated computer types who seem to define the crime?

"The media has put out this image that it's Russian organized crime or groups using computers hacking into databases," says Vieraitis. "Those are the ones we hear about. I think it makes for a better story. Maybe we just don't focus enough resources on the mundane identity theft. I also think banks and credit card companies have gotten better at helping people out. And most of it is credit card fraud."

"It is a relatively unsophisticated type of crime," Copes adds.

http://www.miller-mccune.com/legal_affairs/the-low-tech-reality-of-identity-theft-1587?utm_source=Newsletter83&utm_medium=email&utm_content=1117&utm_campaign=newsletters

Missing the Gain But Joining the Pain

By: Sam Kornell

A few weeks from now representatives of all of the world's major governments will meet in the capital of Denmark to attempt to hammer out a successor to the Kyoto Treaty, which regulated greenhouse gas emissions. The conference promises to be immensely complex, and many experts are pessimistic about its prospects.

But underlying every vexing political and economic consideration is a problem so obvious it's easy to overlook. Humans don't like being treated unfairly and react injudiciously to being cheated — traits destined to be severely tested by the crucible of climate change.

Since the industrial revolution, profits from the exploitation of fossil energy — coal, oil and natural gas — have not been equally distributed. America, Europe and Japan got rich off of oil and coal; now China, India and much of the rest of the developing world are attempting to do the same thing. If they succeed, climate scientists say, it will mean environmental catastrophe.

This progression has created a situation in which any solution to climate change is, to a greater or lesser extent, going to be unfair — a fact many negotiators openly acknowledge. The Danish environmental minister hosting the Copenhagen conference, Connie Hedegaard, has reportedly been "extraordinarily blunt" in insisting that China, India and the rest of the developing world shoulder a large share of the climate load.

Hedegaard recently told *The New York Times*, "I get it. If I were a developing country I would say, 'Why should I do this?' They are feeling the consequences of climate change first and foremost. And they didn't create the situation."

But, she said, "it's just an arithmetic fact that if China and India continue at the current rate they'll use up the whole global carbon space in a very short time." China and other emerging nations, Hedegaard concluded, "must accept [responsibility] even if it isn't fair."

How likely is such acceptance? In 2003, researchers working for the primatologist Frans de Waal at Emory University conducted an experiment to see how monkeys reacted to unfair treatment. First, they taught a group of capuchin monkeys to trade pebbles for slices of cucumber. Then, one day they gave one of the monkeys a grape in exchange for his pebble. The other monkeys were incensed, and an uproar ensued.

"They would literally take the cucumber from me and then drop it on the ground or throw it on the ground, or when I offered it to them they would simply turn around and refuse to accept it," Sarah Brosnan, one of the researchers, told *LiveScience*.

Humans are no different than monkeys in their aversion to inequity, real or perceived. "Fairness is extremely to important people," said Alan Fiske, a professor of anthropology at UCLA. "They'll make huge sacrifices, pay high costs, go to a lot of trouble to make sure they're treated fairly. Fair is an ambiguous word, but there's no question that people have very strong emotions about the distribution of positive and negative things. It's enormously important. People will sacrifice their lives for fairness."

Fiske's last point is haunting. Experts agree that the developing world is particularly vulnerable to rising temperatures. China, for example, has a long history of devastating agricultural droughts. It's no surprise that, as John Kerry said during a recent Senate hearing on climate change, "The Chinese are petrified by what is happening in the context of global climate change."

Will China, India and other developing nations be willing to accept unfair treatment, knowing that if they don't — if they refuse to act on climate change out of a sense injustice — they will face serious consequences? Can they overcome what cognitive psychologists call our "inequity aversion"?

The answer once again appears unpromising. In 1982, German sociologists developed an experiment that has since become the textbook example of the human sensitivity to fairness. Seeking to understand the psychological underpinnings of negotiation, they constructed a game in which a two people must split a sum of money. One of them — the "proposer" is given $10, some portion of which he must give to the "responder." If the responder accepts the proposer's offer they both get to keep the money; if he rejects they both get nothing.

The researchers found that the responders in the study regularly acted against their own self-interest. If the proposer offered any sum less than $4, they refused and both subjects were left empty handed. "Fairness" was more important to the responder than free cash.

The Ultimatum Game, as the experiment came to be called, has since been conducted around the world, with similar results everywhere. It suggests, among other things, that people are deeply averse to accepting unfair treatment, or what they perceive to be unfair treatment, even if it's in their own self-interest to do so. This phenomenon is often highly visible when countries conduct multilateral negotiations.

"Time after time we find that international environmental agreements don't get formed and become effective unless there's some general sense among the participants that the arrangement is equitable," said Oran Young, a professor of international governance and environmental institutions at the University of California, Santa Barbara.

"So you've got to come up with an agreement that, at least in a very general sense, people think of as a fair deal," he continued. "Otherwise, you're not likely to get an agreement, and if you do, it's not likely to get implemented in an effective way."

At the moment, prospects for a deal widely perceived as "fair" hinge, in large part, on the willingness of the U.S. Congress to acknowledge, in climate negotiations, that it holds a larger share of the world's carbon debt than do economic competitors like China.

There is a precedent for such an recognition: In 1992, when the original Kyoto Protocol was signed, then-President George H.W. Bush acknowledged America and Europe's special responsibility to combat climate change, noting that they "must go further" than other nations and offer detailed "programs and measures they will undertake to limit greenhouse gas emissions."

And yet as The New York Times reported recently, the likelihood that Congress will follow the elder Bush's lead appears unlikely. The Times framed the discussion thusly: "Poor countries say industrial powers, which have spent a century or more benefiting from fossil fuels while adding billions of tons of heat-trapping greenhouse gases to the atmosphere, owe them financial assistance in dealing with rising seas or shifting rains and a stable climate, which they say can be achieved only if rich countries commit to deep prompt cuts in their emissions.

"On the other side," the *Times* continued, "established industrialized powers are finding it hard to build substantial public support for programs that would send tens of billions of dollars a year abroad. In the United States, the Senate - where preserving American jobs and reviving the economy are paramount — presents a particularly strong obstacle."

Sensitivity to fairness can sound abstract and ambiguous — not to mention soft-edged — in the context of immensely complex multilateral negotiations about re-tooling the global carbon economy. And yet, as basic primate psychology shows, its centrality to the global climate crisis can't be overlooked. "These questions about equity and fairness are very close to the heart of the issue," said Young. "They have to be taken seriously."

http://www.miller-mccune.com/politics/missing-the-gain-but-joining-the-pain-1609?utm_source=Newsletter83&utm_medium=email&utm_content=1117&utm_campaign=newsletters

The Primitive Science of Restoration

By: Melinda Burns

In the northern Channel Islands off California, a cat-sized native fox is making a dramatic comeback, thanks to a 10-year, $22 million multifaceted program to save it from extinction.

The last of the resident golden eagles, a nonnative species that was snacking on foxes like kids in a candy store, was removed in 2006 and transported to the far-off northern Sierra Nevada. Also, fish-eating bald eagles, a territorial sort that was once native to the islands, were reintroduced to help chase off its red-meat-eating cousins.

It's just one piece of a Herculean effort by the National Park Service and The Nature Conservancy to turn back the clock, untangle scrambled ecosystems and restore some of the wildness that was lost when the islands — often called California's Galápagos — were settled by European ranchers in the mid-19th century. For the first time in 160 years, the rats, sheep, pigs, horses and cattle are gone, and the birds and plants are rebounding. The project is also another excellent example of just how hard it can be to re-establish some baseline condition from the past.

Today, there are nearly 1,000 foxes on Santa Cruz Island, more than 300 island foxes on San Miguel Island and 400 on Santa Rosa Island. That's way up from fewer than 90 foxes on all three islands in 1999, though not yet as high as the roughly 2,600 foxes there were 1993.

"The populations in the wild are doing great," said Tim Coonan, the park biologist. "They increased at a fantastic rate."

Yet, mysteriously, even with all the golden eagles gone, eagles still prey on a few island foxes. Since 2006, when the last golden eagle was removed, biologists have found 14 foxes killed by eagles — seven each on Santa Rosa and Santa Cruz, including at least one this year.

It's not enough mortality to threaten the now stable fox populations, but it's enough to make scientists scratch their heads. Are the culprits a few golden eagles on rare trips to the island, or are bald eagles now eating foxes? Bald eagle feathers have been found in two fox carcasses on Santa Rosa.

Unwanted Consequences

Mark Rauzon, a professor of geography at Laney College in Oakland, Calif., and a consultant with 30 years' experience in island restoration in the tropical Pacific Ocean, likens the field to surgery in its early, primitive years, when the science was crude at best.

"We're doing island surgery," Rauzon said. "It's 'do as little harm as you possibly can,' with the ultimate goal of adding more ecosystem health. It's impossible to know how it's going to go. We can't really restore to anything that was in the past. We're taking the responsibility of being practitioners for a new regime."

In 2004, Rauzon oversaw the eradication of nearly 300 wild cats on Wake Atoll, a U.S. possession and military base in the North Pacific where, by his estimate, the cats were killing or injuring 30,000 native seabirds per year. At the time, Rauzon said, the military did not have the funding for another eradication program, this one to get rid of the rats.

"People say, 'You shouldn't have started this then,' " Rauzon said. "But if we hadn't done it, nothing would have changed. You have to strike."

Since 2004, colonies of shearwaters, terns, tropicbirds, frigatebirds and boobies have returned to pre-World War II levels on the 6.5-square-kilometer atoll, Rauzon said. Without the cats, however, the rats have become a conspicuous nuisance, and the base is reviewing a plan to get rid of them.

"It's important to finish what you start," Rauzon said. "If you don't, everything would have died in vain."

On the now inappropriately named Rat Island in the Alaska Maritime National Wildlife Refuge, the U.S. Fish and Wildlife Service spent $3 million last fall to poison the rats and bring back the seabirds. Sure enough, some colonies of seabirds have started breeding on the island again. But officials can't explain why they found so many poisoned birds on survey this spring — 227 birds in all, including 41 bald eagles.

Brad Keitt, director of conservation for Island Conservation, a Santa Cruz, Calif.-based nonprofit organization that has carried out eradications on 40 islands, including Rat Island, said the long-term benefits always outweigh the short-term setbacks.

"Islands are at the epicenter of the extinction crisis," Keitt said. "If we don't do anything, a death will occur every time a bird flies to one of these islands. Either the adult gets eaten or the egg it's laying gets eaten. We can stop the chain of destruction."

On Macquarie Island, halfway between Australia and New Zealand, the Parks and Wildlife Service of Tasmania came under fire earlier this year for failing to eradicate the island's population of rabbits when it got rid of the cats in the 1990s. Researchers said that in the absence of cats, the rabbits bred out of control, stripping much of the vegetation that the seabirds used for cover.

In response, other researchers said the seabird populations on Macquerie had benefited from the cat eradication, and that anyway, the technology had not existed in the 1990s for large-scale rabbit removal. Also, they said, the rabbit population is presently in decline, suggesting that other factors besides cat removal were affecting the numbers.

Next year, Tasmania will embark on a program to poison, fumigate and shoot 130,000 rabbits on Macquarie and kill off 36,000 rats and 103,000 mice.

Because of the experience at Macquarie, scientists expect there will be a strong push at the next world conference on island restoration, set for New Zealand in February, to learn more about how to conduct eradications of multiple nonnative species and predict the outcomes.

Eagles and Foxes, Redux

Bald eagles, once native to the Channel Islands, were wiped out by egg collectors, hunters and DDT by 1960. Today, between 30 and 35 of the birds make their home on the island and can be observed in their nests live on the Web.

During the debate over how to bring back the fox population, Paul Collins — curator of vertebrate zoology at the Santa Barbara Museum of Natural History and the co-author of a new study on the island fox recovery program — predicted that bald eagles, once reintroduced, might occasionally eat a fox. Now, he believes his prediction may have come true.

"There's a good chance that we're having predation from bald eagles," he said. "They may be feeding on dead carcasses they find. Or they may be chasing them down and catching them. It's not something we didn't expect."

Others say there's no way bald eagles, a species native to the islands and known to eat mostly fish, could be preying on foxes. It's much more likely, they say, that the guilty party is a transient golden eagle flying out from the mainland. Bald eagles are known scavengers, which could explain the presence of their feathers on fox carcasses.

"There's absolutely no evidence that bald eagles take island foxes," Coonan said. "We absolutely don't believe bald eagles are responsible for any of that."

Back in 1999, scientists had to sort out a much thornier problem in the northern Channel Islands. The success of the fox recovery hinged on deciding which invasive species to get rid of first. The fox population was crashing. Golden eagle predation and not disease was determined to be responsible. There were only 15 foxes each on Santa Rosa and San Miguel, and only 60 on Santa Cruz, and the park began trapping them as fast as possible to breed them in captivity.

The golden eagles had been attracted to the islands by thousands of wild pigs on Santa Cruz, another invasive species. But which should be removed first?

Some said the pigs should go first so that the eagles would leave and save the expense of capturing them live. Others reasoned that if the pigs went first, the eagles would simply eat more foxes — and this hypothesis prevailed.

There were calls to shoot the birds, but that would have been both a public relations disaster and physically difficult. Ultimately, it took six years to capture and relocate 32 increasingly savvy adult eagles. The last elusive birds had to be followed around by helicopters until they got tired and flopped on the ground, where they could be covered with nets.

At the same time, bald eagles were introduced to the islands in hopes that they would not allow golden eagles into their territory. Then, toward the end of the golden eagle removal, the park and the conservancy began killing 4,800 pigs.

Collins and his co-authors, Gary Roemer, an associate professor of wildlife and conservation ecology at New Mexico State University, and Brian Latta, executive director of The Bird Group, a nonprofit organization based in Santa Cruz, Calif., titled their recent study, "Does the Order of Invasive Species Removal Matter? The Case of the Eagle and the Pig."

Based on an examination of the contents of golden eagle nests, they found that the pair of eagles that had escaped capture the longest tripled its consumption of foxes after the pigs were gone. It was positive proof of the early hypothesis for removing the eagles first.

"It's been a jigsaw puzzle, but one that was workable," Collins said. "You could actually figure out how the pieces fit together."

As for the handful of foxes still being eaten by eagles, Peter Sharpe, a wildlife biologist with the Institute for Wildlife Studies, said golden eagles might be flying out to the islands during the annual deer and elk hunts on Santa Rosa. On Santa Catalina Island to the south, bald eagles have been coexisting with foxes for more than 25 years with no signs of predation, Sharpe said.

Lotus Vermeer, director of the Santa Cruz Island Preserve for The Nature Conservancy, said that bald eagles "harass the heck out of golden eagles" and were affording better protection to foxes. No golden eagles have established a nest on Santa Cruz since 2006, and none have been seen there for at least a year, Vermeer said.

"Bald eagles have been a very effective deterrent to golden eagles on the islands," she said.

But that doesn't mean that a bald eagle would never kill a fox, Collins said. The historical record shows that egg collectors found pieces of foxes in bald eagle nests on the islands at the turn of the century, he said. In addition, Collins said he found six fox bones — out of 10,000 bones — in a 60-year-old bald eagle nest on San Miguel. Mammals may comprise 14 percent of the bald eagle diet, he said. Video taken on Catalina shows them bringing live wild piglets and goat kids to feed their young in the nest.

Roemer said, "Reintroduction of bald eagles was a good idea, but maybe it would have been more efficacious to do it last. When you're faced with these complex issues and interactions between invasive and native species, you have to consider all the potential outcomes."

http://www.miller-mccune.com/science_environment/the-primitive-science-of-restoration-1610?utm_source=Newsletter83&utm_medium=email&utm_content=1117&utm_campaign=newsletters

Meditation 'eases heart disease'

Heart disease patients who practise Transcendental Meditation have reduced death rates, US researchers have said.

At a meeting of the American Heart Association they said they had randomly assigned 201 African Americans to meditate or to make lifestyle changes.

After nine years, the meditation group had a 47% reduction in deaths, heart attacks and strokes.

The research was carried out by the Medical College in Wisconsin with the Maharishi University in Iowa.

It was funded by a £2.3m grant from the National Institute of Health and the National Heart, Lung and Blood Institute.

'Significant benefits'

The African American men and women had an average age of 59 years and a narrowing of the arteries in their hearts.

TRANSCENDENTAL MEDITATION
- Introduced in India in 1955 by Maharishi Mahesh Yogi
- In the 60s the Beatles popularised it by travelling to India to learn the technique from the Maharishi
- The Maharishi Foundation says TM is a programme for the development of consciousness
- Courses are only available through the foundation
- They cost from £190 for students to £590 for people with incomes over £40,000

The meditation group were asked to practise for 20 minutes twice a day.

The lifestyle change group received education classes in traditional risk factors, including dietary modification and exercise.

Over 9 years, there were 20 events (heart attacks, strokes or death) in the meditation group and 31 in the health education group.

Dr Robert Schneider, lead author and director of the Centre for Natural Medicine and Prevention at the Maharishi University in Iowa said:

"At the end of the 9 years, 80% of the meditation group were still practising at least once a day.

"But there was very little change in the health education group.

"Their lifestyle was much the same in terms of diet and exercise - it's a very difficult thing to make those changes."

As well as the reductions in death, heart attacks and strokes in the meditating group, their average blood pressure was significantly lower (5mm Hg), and there was a significant reduction in psychological stress in some participants.

Dr Schneider said other studies had shown the benefits of Transcendental Meditation on blood pressure and stress, irrespective of ethnicity.

"This is the first controlled clinical trial to show that long-term practise of this particular stress reduction programme reduces the incidence of clinical cardiovascular events, that is heart attacks, strokes and mortality," he said.

Dr Schneider said that the effect of Transcendental Meditation in the trial was like adding a class of newly discovered drugs for the prevention of heart disease.

He said: "In this case, the new medications are derived from the body's own internal pharmacy stimulated by the Transcendental Meditation practice."

Ingrid Collins, a consultant educational psychologist at the London Medical Centre, said: "I'm not at all surprised that a change of behaviour like this can have enormous benefits both emotionally and physically.

"Physical and emotional energy is on a continuum and whatever happens to us physically can affect our emotions and vice versa."

British Heart Foundation Cardiac Nurse Ellen Mason said: "This is a fascinating area and the results were impressive.

"However, in order to fully assess the difference transcendental meditation could have on heart patient's lives, we need to see research confirming it in a far bigger study and with other ethnic groups."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8363302.stm

Published: 2009/11/17 00:18:43 GMT

Ketamine drug use 'harms memory'

Frequent use of ketamine - a drug popular with clubbers - is being linked with memory problems, researchers say.

The University College London team carried out a range of memory and psychological tests on 120 people.

They found frequent users performed poorly on skills such as recalling names, conversations and patterns.

Previous studies said the drug might cause kidney and bladder damage. The London team and charity Drugscope said users should be aware of the risks.

Ketamine - or Special K as it has been dubbed - acts as a stimulant and induces hallucinations.

It has been increasing in popularity, particularly as an alternative to ecstasy among clubbers, as the price has fallen over recent years.

" **We need to ensure that users are informed of the potentially negative consequences of heavy ketamine use** "
Dr Celia Morgan, University College London

A gram now costs about £20 - half the price of cocaine.

In response, the drug was made illegal three years ago - it is currently graded class C - although it still remains legal for use as an anaesthetic and a horse tranquiliser.

The study split the participants into five groups - those using the drug each day, recreational users who took the drug once or twice a month, former users, those who used other drugs and people who did not take any drugs.

All of the people took part in a series of memory tests as well as completing questionnaires and were then followed up a year later, the Addiction journal reported.

Researchers found the frequent users group performed significantly worse on the memory tests - in some they made twice as many errors.

The study also showed performance worsened over the course of the year.

There was no significant difference between the other groups.

However, all groups of ketamine users showed evidence of unusual beliefs or mild delusions, such as conspiracy theories, the psychological questionnaires showed.

Addiction

The study also raised concerns about the addictiveness of the drug - hair sampling from the recreational group showed drug use had doubled over the year.

Lead researcher Dr Celia Morgan said: "Ketamine use is increasing faster than any other drug in the UK, particularly among young people, and has now become a mainstream club drug.

"However, many young people who use this drug may be largely unaware of its damaging properties and its potential for addiction.

"We need to ensure that users are informed of the potentially negative consequences of heavy ketamine use."

Martin Barnes, chief executive of Drugscope, said the charity had already raised concerns about the drug and the study provided "further evidence" of the risk of using it.

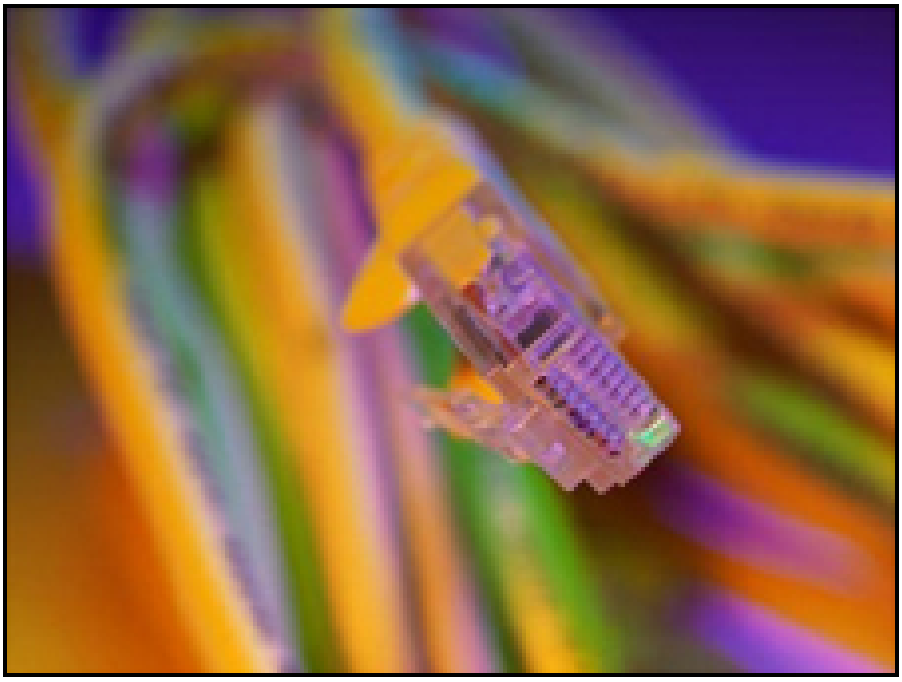
"It is important that people are aware of the harms associated with the drug and that treatment services are equipped to provide necessary support. "

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8362575.stm

Published: 2009/11/17 00:19:03 GMT

Net gets set for alphabet changes

Users of scripts other than that in which English is written will soon have web addresses in their own language.



The net regulator Icann has invited countries to ask for "internationalised domain names" in non-Latin characters.

Egypt and Saudi Arabia have announced their intentions to apply for the first Arabic domains.

Countries can also apply for domains in other scripts, such as Chinese. The first official international web addresses are expected in 2010.

"The IDN [International Domain Names] program will encompass close to one hundred thousand characters, opening up the internet to billions of potential users around the globe," said Peter Dengate Thrush, chairman of the Internet Corporation for Assigned Names and Numbers (Icann).

The regulator has described the introduction of IDNs as the "biggest change" to the net "since it was invented 40 years ago".

"Over half the internet users around the world don't use a Latin-based script as their native language," said Icann president Rod Beckstrom.

"IDNs are about making the internet more global and accessible for everyone."

He said Icann had "already received six applications from around the world for three different scripts.

These included a bid from Egypt's bid for .misr, meaning Egypt in Arabic, and one from Russia.

Plans for IDNs were approved at a meeting in June 2008. However, it has taken until now to make sure that the translation system needed to make it work functions correctly.

The changes have been made to the net's Domain Name System, which acts like a phone book, translating easily understood domain names such as bbc.co.uk into strings of computer readable numbers known as IP addresses.

The tweaks will allow this system to recognise and translate the non-Latin characters.

Some countries, such as China and Thailand, have already introduced workarounds that allow computer users to enter web addresses in their own language.

However, these were not internationally approved and do not necessarily work on all computers.

Icann has now invited registrations from countries to apply for internationalised country codes, such as .uk or .us.

It said that people will be able to apply for an entire web address at a later date through the body which wins the right to control a nation's internationalised country-code.

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/technology/8362195.stm

Published: 2009/11/16 11:26:14 GMT

China joins supercomputer elite

China has become one of a handful of nations to own one of the top five supercomputers in the world.

Its Tianhe-1 computer, housed at the National Super Computer Center in Tianjin was ranked fifth on the biannual Top 500 supercomputer list.

The machine packs more than 70,000 chips and can compute 563 trillion calculations per second (teraflops).

It is used for petroleum exploration and engineering tasks such as simulating aircraft designs.

However, the fastest machine is the US-owned Jaguar supercomputer, which now boasts a speed of 1.759 petaflops.

One petaflop is the equivalent of 1,000 trillion calculations per second.

The Cray computer has more than 220,000 chips and is owned by the Oak Ridge National Laboratory in Tennessee. It is used to conduct research in climate science, materials science and nuclear energy amongst other areas.

TOP FIVE SUPERCOMPUTERS

Jaguar, Oak Ridge National Laboratory, US. (1.759 petaflops; 224,162 processors)
Roadrunner, Los Alamos National Laboratory, US (1.042 petaflops; 122,400 processors)
Kraken XT5, University of Tennessee, US(831.7 teraflops; 98,928 processors)
Jugene, Forschungszentrum Juelich, Germany (835.5 teraflops; 294,912 processors)
Tianhe-1, National SuperComputer Center, China (563.1 teraflops; 71,680 processors)

Source: Top 500 Supercomputers

It has taken the top slot from another US machine, nicknamed Roadrunner.

The IBM computer is owned by the Department of Energy's Los Alamos National Laboratory in New Mexico and was the first machine to push through the petaflop barrier.

It is currently able to run at 1.042 petaflops and uses the powerful "cell" chip designed for the PlayStation 3.

It is used to monitor the US nuclear stockpile, as well as conduct research into astronomy, genomics and climate change.

The Top 500 list is dominated by machines in the US, which is home to 277 of ranked systems. It has eight of the top 10 machines.

Europe has 153 systems on the list, including the world's fourth most powerful machine. The IBM BlueGene/P supercomputer at the Forschungszentrum Juelich (FZJ) in Germany is the fastest machine outside the US and is able to run at more than 800 teraflops.

The UK has the largest number of European machines on the list, with 44 systems.

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/technology/8362825.stm

Published: 2009/11/16 15:04:26 GMT

Starvation 'wiped out' giant deer
By Matt Walker
Editor, Earth News

The giant deer, also known as the giant Irish deer or Irish elk, is one of the largest deer species that ever lived.

Yet why this giant animal, which had massive antlers spanning 3.6m, suddenly became extinct some 10,600 years ago has remained a mystery.

Now a study of its teeth is producing tantalising answers, suggesting the deer couldn't cope with climate change.

As conditions became colder and drier in Ireland at the time, fewer plants grew, gradually starving the deer.

The discovery is published in the journal *Palaeogeography, Palaeoclimatology, Palaeoecology* .

The giant deer (*Megaloceros giganteus*) has become famous over the past few centuries.

In the early 1800s, discoveries of its remains opened up the debate about whether animal species had previously become extinct, and whether new life-forms could be discovered in the fossil record.

It would be very difficult for young deer to cope with all these changes brought on by the Ice Age
Researcher Ms Kendra Chritz

Around this time, conflicting ideas as to why the animal went extinct began to emerge.

Initial ideas ranged from the Biblical flood described by Genesis, to the idea that humans had wiped them out.

However, the archaeological record suggests that people did not arrive in Ireland until after the last Ice Age, after most giant deer had disappeared.

There is also little evidence that the deer had any predators in Ireland.

A popular idea that also emerged was that the deer's huge antlers, spanning up to 3.6m, grew disproportionately large due to sexual selection.

Females became attracted to and mated with males with ever larger antlers, according to the idea, and eventually the antlers became so unwieldy that the deer became mired in clay soils, where they perished.

"Yet this is too simplistic an answer for why such a massive population of apparently thriving organisms could go extinct suddenly," says Ms Kendra Chritz, who conducted the study at the University College (UCD), Dublin, Ireland and the National Museum of Ireland while studying for an undergraduate degree at the University of Portland, in Oregon, US.

Supervised by Dr Julia Sigwart of Queen's University, Belfast and Dr Gareth Dyke of UCD, Ms Chritz and colleagues analysed the tooth enamel of seven fossilised male giant deer.

By studying levels of carbon and oxygen isotopes, and levels of cementum, a material that cements each tooth crown to the gums, the researchers could uncover the time of year each deer was born, their diet and how their lives and behaviour may have changed each year.

Stressed out

The ratios of isotopes revealed that the ecosystem in which the deer lived became stressed by drought.

As a result it changed from being covered in forest to being more open and tundra-like.

"There's an overall trend of general vegetation decline," says Ms Chritz.

The deer also appeared to be born in spring or early summer. But at the time of their extinction, temperatures dropped.

"Giant deer would probably have had a hard time coping with cooler mean annual temperature and a shortened growing season," says Ms Chritz.

That would be particularly bad news for young deer. Most young animals are born in spring precisely because temperatures are warmer and there is more food available.

"It would be very difficult for young deer to cope with all these changes brought on by the Ice Age, as well as support the energetic demands of their growing bodies," concludes Ms Chritz, who is now studying for her PhD in palaeoecology at the University of Utah in Salt Lake City, US.

Data from the cementum, which grows each year much like tree rings, indicates that the deer lived from 6.5 to 14 years old, and they possessed mature antlers by autumn, similar to other living deer species.

Last refuge

Though often called the Irish elk, *Megaloceros giganteus* is actually a deer species.

Though most abundant in Ireland, it was not confined to the island, with populations living across Europe and Western Asia from 400,000 to 10,600 years ago. The last Ice Age stretched from 100,000 years ago to 10,000 years ago, containing periods of greater and lesser glaciation. The deer rapidly disappeared across most of the range at the end of the last glacial transition, though giant deer remains have been uncovered in Siberia that date to around 7,000 years before present.

"That means that mainland giant deer had some sort of refugia from the Ice Age before they met their ultimate extinction; they were able to move to a better environment and survive later," says Ms Chritz.

But those giant deer in Ireland "had the misfortune to be trapped on an island with nowhere to go."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/earth/hi/earth_news/newsid_8362000/8362203.stm

Published: 2009/11/16 13:03:14 GMT

Culture's makers and watchers

- Nicolas Rothwell
- From: *The Australian*
    - November 16, 2009

UPON the work desk of one of Arnhem Land's most senior ritual leaders lies an old book, leather-bound, the text of its pages interspersed with photographs and detailed, fine-drawn diagrams. Those grainy images show the generation of his parents and grandparents: strange mementos, for the book is Art, Myth and Symbolism, a report from the American-Australian Scientific Expedition, last and most exhaustive of the great research probes made by Westerners into the remote Aboriginal realm.

It was just over half a century ago that the expedition's hand-picked group of experts descended on the tiny northern outposts of Yirrkala, Oenpelli and Umbakumba, recording, searching for rare species of plants and animals, plunging into the veiled complexities of indigenous culture and art. The team included an archeologist and an ornithologist, a medical officer and an expert on nutrition: even the cook doubled as an "honorary entomologist". No wonder the expedition's leader, the self-taught anthropologist and obsessive collector Charles Pearcy Mountford, could claim it was the first to cover so many interlocking fields. It proved a very troubled venture, but it had several long-term consequences: chief among them the dispatch of hundreds of majestic bark-paintings to southern museums and galleries, the public display of those works, and the slow growth, among connoisseurs, of an enthusiasm for Aboriginal art.

In today's Top End communities, Mountford's men and their odd research antics are still distantly remembered. But in the cities of the south, the expedition and its findings were as good as forgotten, until now.

This week, at the National Museum of Australia in Canberra, an ambitious symposium, almost rivalling the original enterprise in its international scale and scientific scope, is being held. Barks, Birds and Billabongs -- Exploring the Legacy of the 1948 American-Australian Scientific Expedition to Arnhem Land brings together linguists and ethnomusicologists, historians and art scholars.

Almost every Top End researcher and information-collector of distinction has been gathered in by the dynamic figure at the heart of the project, the National Museum's Margo Neale. There will be indigenous dancers, and the experts who work with them studying their songs and steps.

There will be critical explainers of the expedition's history, alongside one of its surviving participants, the botanist Raymond Louis Specht, then a young field-worker, now an emeritus professor at the University of Queensland. New angles on the journey and its background will be to the fore: researcher Martin Thomas, who has made the American-Australian Scientific Expedition his special field, will present his shadowed view of the expedition as a specimen of anxious Cold War co-operation between Washington and Canberra. Historian Philip Jones will describe the conflicts between Mountford and the anthropological establishment, which were sufficient to produce baroque faction and intrigue within the expedition team. The coverage of subjects is wide: fish, filmmaking, baskets, string figures, rock art and aesthetics; studies from economists and oceanists; a paper exploring Macassan influences on the beliefs of the Yolngu people of northeast Arnhem Land.

The symposium is the latest and largest in a decade-long series of landmark conferences re-examining the golden age of Australian anthropology, ethnographic art collection and science on the frontier. The result has been ashift in our understanding of the ways in which the nation approached indigenous art and culture in the recent past.

This is delicate terrain, for Aboriginal life has changed greatly in the years since the American-Australian Scientific Expedition. Those changes are part of the expedition's legacy: they also shift the meaning of its findings. Mountford's meticulous reports of beliefs and rituals, and the explanations of them given to him by old, long-dead men are now precious testaments. And the gaze of Western anthropologists is no longer just a simple gaze.

Someone is looking back. Barks, Birds and Billabongs makes heroic efforts to embrace indigenous perspectives, and has attracted a range of Top End participants, including well-known Yirrkala artist Wukun Wanambi, Thomas Amagula from Groote Eylandt and Wilfred Nawirridj from Oenpelli's Injalak Arts and Crafts.

During the symposium's planning phase, Martin Thomas took selected film and audio footage from the 1948 field-work camps back to the communities where they were made. Audiences appraised the old dance sequences. "People in Yirrkala, when explaining the motivations of those who were documented so long ago, interpreted the films and recordings as gifts, left by their forebears for future generations."

A poignant completion! And the resonances between early collecting research and today's Top End artistic explosion are strong. The film Ten Canoes was inspired by the ethnographic photographs made by Donald Thomson in the Arafura swamp region of central Arnhem Land. The flourishing art centres of the region are all, in a sense, Mountford's children, while the key event in north Australia's cultural calendar, the Garma Festival, which seeks to bring together Yolngu and Western forms of knowledge, is held, each August, not far from where the research team camped. Yirrkala was a kind of paradise in Mountford's eyes: "The mists of morning gave way to warm dry days. As we sat at meals we could look across the tumbling waters and watch the Aboriginal children at play, shooting the breakers in their small canoes, spearing fish, or drawing pictures in the glistening sands."

There has been a change in the intervening years, in atmospherics and in economics as well.

And here, abruptly, we arrive at the unposed question at this symposium's heart, and at the heart of all research and connoisseurial engagement with indigenous north Australia today. Modernity both exalts and threatens remote Aboriginal societies, yet there is no path of retreat back to some gilded pre-contact time. In fact, the academic penetration of the north is now at its height, our knowledge of the Yolngu, the clan groups round Oenpelli and the people of Groote Eylandt is incomparably greater than in Mountford's day, and Western co-operation with Aboriginal subjects is transformed.

In 1948, the American deputy leader Frank Setzler used protocols that allowed him to collect human bones from mortuary caves for dispatch to the Smithsonian: today there are repatriation programs, and almost all the American-Australian Scientific Expedition's skeletons have been quietly returned to their original resting-places. Mountford himself had a penchant for filming ceremonies without informed consent, and screening them without permission: actions unthinkable in today's context.

At the team's last campsite, the expedition's pioneer audio journalist, Colin Simpson, was excited by the new technology that allowed an Oenpelli didgeridoo player to monitor his own performances. Today, Yolngu technicians with the Mulka video recording project at Yirrkala make their own recordings, innovating on the basis of traditional song.

Barks, Birds and Billabongs is very much a gathering of like minds basking in the refulgent glow of cultural studies.

Yet there are aspects of the expedition, and the mounting involvement of mainstream Australian researchers in Arnhem Land, that do not fit into this neat schema well. The whole region had been locked up as a reserve in 1931, following a spate of massacres and clashes between early pastoralists and Aboriginal clans.

A handful of mission settlements were the sole mainstream emplacements. But after World War II, the Western presence in north Australia was vastly increased, commercial development of the region came into focus and, in this process, anthropology played its inevitable part. The scientific expedition members may well have been devoted to the cause of science and cultural investigation, but in their wake came economic progress, and it is very striking that each of the expedition base-camps turned, in the space of two and a half decades, into vast mines and processing plants: bauxite at Yirrkala, manganese on Groote Eylandt, uranium around Oenpelli. Towns were built on tribal land: Nhulunbuy, Alyangula, Jabiru.

One of north Australia's more radical observers, dramaturge Andrish Saint-Clare, draws out the pattern: "The expedition was the last grand hurrah of 19th-century scientific pioneering, but it was also about surveying, finding what was there, putting Australian anthropology on the world map. It was the pursuit of intellectual capital. Its members were trying to be civilised and thorough, but of course they didn't see their own arrogance: there was no sense of their own intrusion, or the observer's effects on what's observed. I don't think it would have occurred to anyone on the expedition that their mere presence was helping to open the door to a tide of massive, continuing resources exploitation."

That tide dominates the region now, but its onrush also precipitated the Yirrkala bark petition, royalties, land rights, and a new, committed phase in frontier anthropology.

Bark painters today, in both Oenpelli and Yirrkala, reflect constantly on their evolving artistic traditions, and refer back to the imagery on barks from the American-Australian Scientific Expedition days. Western researchers into the Yolngu cultures around Yirrkala, the Anindilyakwa on Groote, and the Kunwinjku groups of Oenpelli stress co-operation and two-way learning: today's grand academic investigations bear this stamp.

Indeed, the Australian Research Council has just funded a five year, $560,000 study of the American-Australian Scientific Expedition's legacy, and a separate $360,000 venture to link northeast Arnhem Land communities with museum collections of their own cultural material. In striking fashion, observer and observed join hands. It is a distinctive pattern, almost a co-dependency.

The Aboriginal societies of Arnhem Land are, today, among the most watched and studied people in the world: their culture, constantly enacted in public, has become their calling-card. At any given moment, a fair few Yolngu and Kunwinjku will be wandering the cities of Australia, explaining the intricacies of song-cycles, bark paintings or indigenous land management techniques.

Equally, art curators and cultural experts will be out in the field all through the soft dry-season months, examining the shifting adaptations of contemporary remote community life. This is what the frontier has become, in our

times: an exquisitely mediated, post-colonial zone. Who gains, and who loses, and how, in such transactions?

Researchers examining the societies of Arnhem Land regard cultural integrity as a marker of social strength, and yet their presence can serve to render it almost an artifice. The larger communities they work in are the heartlands of northern anthropology, yet they are also realms of sadness, awash with drugs and alcohol.

High art, dark times. As the cognoscenti gather in the nation's capital, it is far from clear what intellectual strategy can be found to resolve this paradox.

Barks, Birds and Billabongs is at the National Museum of Australia, 16-20 November.

http://www.theaustralian.com.au/news/arts/cultures-makers-and-watchers/story-e6frg8n6-1225797971186

Is Technology Dumbing Down Japanese?
By EMILY PARKER

When I first moved to Kyoto in 1999, I knew about 50 words of Japanese. My attempts to string together a few broken phrases were met with excessive praise, and I assumed everyone was being nice. “No,” I remember my friend Yuki saying. “People mean it. They really are impressed.”

She was referring to the widespread belief that Japanese, with its nuanced formal expressions and three different writing systems, is a uniquely complex language. How could a foreigner possibly learn it? Even Japanese people make mistakes. Former Prime Minister Taro Aso, whose Liberal Democratic Party’s more than half-century in power came to a crashing end this past August, might go down in history for having publicly misread Japanese kanji, or characters. He was hardly the first native speaker to bungle the language. “Many otherwise educated people have trouble writing a logical, grammatically correct sentence,” said Michaela Komine, an Australian who spent eight years working as a Japanese-English translator in Osaka.

Now the Japanese language is being transformed by blogs, e-mail and keitai shosetsu, or cellphone novels. Americans may fret over the ways digital communications encourage sloppy grammar and spelling, but in Japan these changes are much more wrenching. A vertically written language seems to be becoming increasingly horizontal. Novels are being written and read on little screens. People have gotten so used to typing on computers that they can no longer write characters by hand. And English words continue to infiltrate the language.

So what do these changes mean for a language long defined by indirect locutions and long, leisurely sentences that drift from the top of the page? Is Japanese getting simpler, easier or just worse?

On one side of the debate is Minae Mizumura, whose book “The Fall of Japanese in the Age of English” made a splash when it came out in Japan last year. Mizumura contends that the dominance of English, especially with the advent of the Internet, threatens to reduce all other national languages to mere “local” languages that are not taken seriously by scholars. The education system, she argues, doesn’t spend enough time teaching Japanese. “I cannot imagine a country with a highly functioning national language that devotes less time to teaching their own language than to teaching a foreign language,” she wrote in an e-mail message.

The simplification of Japanese really began during the country’s transition to democracy after World War II, according to Mizumura. While the American occupiers did not succeed in persuading Japan to change to the Roman alphabet, Mizumura said, the “pro-phonetic” camp gained momentum, and the Japanese Ministry of Education simplified characters and limited the number of kanji used in the media. As a result, “the older generation — even those who did not go to college — are much more comfortable reading and writing Japanese than the younger generation,” she said. “The Japanese population’s literacy

— that is, the capacity to read and enjoy books — slowly declined, and the written language itself accordingly became less rich."

But other authors embrace the language's evolution. As Haruki Murakami, Japan's best-known living novelist, wrote via e-mail, "My personal view on the Japanese language (or any language) is, If it wants to change, let it change. Any language is alive just like a human being, just like you or me. And if it's alive, it will change. Nobody can stop it." There is no such thing as simplification of language, he added. "It just changes for better or worse (and nobody can tell if it is better or worse)."

Some of the most dramatic transformations have been taking place on cellphones, where writers, often young women, type stories into their keypads and readers consume them on their screens. Sentences tend to be short, and love stories are popular. The phenomenon peaked in 2007, when five out of 10 of the year's best-selling books were written on cellphones. While their popularity seems to have dropped off, keitai shosetsu still elicit scorn from some Japanese who see them as trashy. Others just shrug them off: Murakami said that he has "no interest" in cellphone novels or any form that resembles them.

Natsuo Kirino, author of the novels "Out," "Grotesque" and "Real World," believes that cellphone novels have hardly killed off traditional literature. "I think there is a split in the reading styles among young people," she wrote in an e-mail message. "On one hand, there are those who love keitai novels — they feel comfortable with the flat and simple language and expressions. I also feel there are a lot of young people who are not satisfied with simplicity, who read complex and advanced novels, and even wish to write their own."

Nor does it seem that cellphone novels have permanently shortened attention spans. Murakami's latest novel, "1Q84," which weighs in at over 1,000 pages, had huge print runs when it came out in Japan this year.

Even as some see new technology as a threat to literacy, surveys suggest that Japanese are reading more than before. According to an article in the newspaper Sankei Shimbun, middle-school students read an average of four books a month in 2008, the most ever in the 30-year history of the survey. (The article did note that the reading material was not always sophisticated.) A separate national survey published last year in Yomiuri Shimbun found that 54 percent of people were reading more than one book a month, compared with 48 percent in the year before.

Japanese people also seem to be writing more. Motoyuki Shibata, who teaches literature and translation at the University of Tokyo, noticed that new technology makes his students more willing to write Japanese, even if it is on their computers or cellphones. "Some people say the tradition of letter writing has come back," Shibata says. Thanks to e-mail, he adds, "I get more messages and feedback from students than I used to 20 years ago."

People may also be using and recognizing more kanji. Instead of having to write every stroke from memory, people can type words phonetically into a computer and a list of characters to choose from pops up on the screen. (This wondrous phenomenon allows me to quickly dash off e-mail messages filled with complex characters. As a result, I am much more inclined to send messages to Japan.)

Critics may protest that Japanese is defined by its formal expressions, polite openers and roundabout way of getting to the point. In an age of cellphone novels and rapid text messaging, won't some of this be lost? Maybe. But Japanese might also become less intimidating, allowing a wider range of people to enjoy the pleasures of reading and writing.

Will technology cause Japanese to lose its reputation as a uniquely difficult language? That's possible, too. But it could be a good thing. Japan, a rapidly aging society, may well have to face an influx of immigration in the not too distant future. A more accessible language could accelerate the country's process of internationalization. Who knows, we might even one day find that, as Shibata put it, "this idea of Japanese being a very difficult, esoteric language may have been a myth all the time."

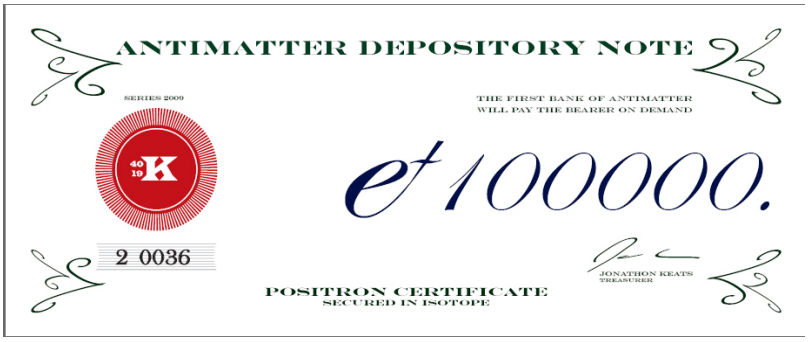
Emily Parker, a former editor on The Times's Op-Ed page, is writing a book about the Internet and democracy. She has written extensively on Japan and China for The Wall Street Journal.

http://www.nytimes.com/2009/11/08/books/review/EParker-t.html?_r=1

Laughing all the way to the anti-bank

Kat Austen, letters and comments editor

What is the least commodifiable substance in the universe? That must have been the question conceptual artist Jonathon Keats asked himself when he conceived of his newest endeavour, the First Bank of Antimatter, which opens tomorrow, 12 November, at the Modernism Gallery in San Francisco.



Keats's vision is of an economy where the collateral is antimatter - in his words "the physical opposite of anything made with atoms, from luxury condos to private jets".

The bank will issue anti-money to the public, backed by antimatter that will be produced from 65 kilograms of potassium chloride held in the bank's vault. Statistically, around 0.012 per cent of the potassium will be potassium-40, a radioactive isotope with a half-life of 1.3 billion years, which sometimes decays by releasing a positron - the antiparticle of an electron.

It's not the most efficient process, but Keats isn't worried.

"Like all banks, The First Bank of Antimatter will issue more currency than we have assets," he says. "There is some risk in this, of course: a danger of bank failure if everybody decides to cash in at once. However, given the challenges involved in holding and transporting antimatter, and the comparative convenience of paper money, I don't anticipate that this will be a problem."

Not to be confused with an anti-economy, which aims for a localisation of trade and a halt to the infinite growth philosophy of current economic models, Keats aims to build an anti-matter mirror economy that will, he hopes, skyrocket as our current economy collapses.

Because it's so rare, antimatter is the costliest substance on Earth – positrons are valued at around $25 billion per gram – but this price is, if you'll excuse the pun, immaterial when establishing an economy if there is no usefulness associated with it.

Historically, our first stab at economy was barter, the trade of objects. Then came the use of precious materials and thereafter coinage, which represented a kind of promise - a promise of exchange for something useful in the future.

Here were the first steps towards a concept of money that became increasingly detached from material

objects. With the world economy working largely on 'fiat money' - money that has a value decreed by the government - since the 1970s, and now with the concept of e-money, the substance and reality of money has diminished almost beyond recognition.

Keats's antimatter economy simultaneously makes a mockery of the standard economic models, and causes a derailing of the thought processes related to modern materialism. He has decoupled the idea of intrinsic value at the outset by choosing a substance that not only has no utilitarian value, but that in fact annihilates that which does (matter)-- a true attempt to make something out of nothing.

The anti-money will be printed on rags to ensure they survive the economic apocalypse, in denominations ranging from 10,000 positrons to 1,000,000 positrons.

Perhaps his initial exchange rate of $10 for 10,000 positrons is another dig at the current system: given the current estimates of a positron's worth and its tiny mass, $10 should buy you trillions of positrons. By inflating the value so wildly from the start, Keats is bucking traditional economic trends. Perhaps he is hoping for anti-inflation.

Keats's new project uses the principles of modern physics to highlight the ethereal nature of our world economy--with a satirical sense of humour that is to be expected from the same artist who copyrighted his own mind and, inspired by string theory, bought the rights to the extra-dimensional spaces of several Bay-area properties.

Now, with the antimatter bank, he may also have found a great new source of funding for particle accelerator establishments like CERN.

The First Bank of Antimatter opens at the Modernism Gallery in San Francisco on 12 November

Anti-money can be purchased by sending a cheque to The First Bank of Antimatter, c/o Modernism Gallery, 685 Market St., San Francisco, CA 94105, US.

http://www.newscientist.com/blogs/culturelab/2009/11/laughing-all-the-way-to-the-anti-bank.php

Cité du Design: Solar Powered International Design Center Unveiled

by Bridgette Meinhold, 11/06/09

Situated in an defunct arms manufacturing facility in Saint-Etienne, the recently unveiled Cité du Design is a stunning international center for design. Designed by LIN, the project completely renovated the historic complex and integrated a new facility made out of triangular scaffolding. Powered by solar energy and supplemented by an efficient heating system, the energy efficient Cité du Design is a world class design center that lives up to its name.Designed by Berlin and Paris based LIN, the €41.5 million Cité du Design just opened at the beginning of October. Inside the complex are auditoriums, meeting rooms, exhibition space, a media library, and indoor gardens with an observation tower located alongside the long hall. A latticed 3D structure forms the walls and roof of the complex, and the interior of the hall is left open without any supports or beams to get in the way.The center is very energy efficient and utilizes a heat exchange and recovery system to reduce energy used for heating. Pre-conditioned air from the internal gardens, which are not heated, is drawn into the system to heat the nearby rooms. The skin of the building is composed up of 14,000 equilateral triangles made from different materials that help to control light, temperature and air flow according to environmental conditions. Some of these triangles are actually photovoltaic cells used to generate power for use in the building.

+ Cité du Design

+ LIN

The Architectural Review via Notcot

http://www.inhabitat.com/2009/11/06/cite-du-design-solar-powered-international-design-center-unveiled/?utm_source=Inhabitat+Weekly&utm_campaign=1d15d7f7bd-Inhabitat_Weekly_November_12th11_12_2009&utm_medium=email

Taipei 101 To Be World's Tallest Green Building

by Bridgette Meinhold, 11/05/09

Taipei 101, famous for being one of the world's tallest buildings, is set to get some major eco-upgrades in an effort to save money, reduce its impact, and gain the much coveted title of **"World's Tallest Green Building."** In 2007, the Burj Dubai surpassed Taipei 101 in terms of height, but the Taiwanese building won't give up the fight, throwing down $1.8 million in energy efficiency upgrades, which are expected to yield **$20 million annually** in savings and make it the Earth's greenest building that's also closest to the heavens!Over the next 18 months, the skyscraper will undergo significant energy efficiency upgrades and will also seek LEED Gold certification for existing buildings. The certification will largely depend on the building performance after the upgrades and renovations take place. The owners of Taipei 101 are teaming up with SL+A International Asia Inc., Siemens and EcoTech International Inc. to complete the eco-upgrades, which were just announced this week.Harace Lin, Chairman of the Taipei Financial Center Corporation, said on Monday, "As the world's tallest [completed] building, Taipei 101 aims to raise people's awareness about our environment and be a pioneer of international green building certification for existing buildings." Besides upgrades to the major energy systems used inside the building for heating, cooling and ventilation, the landscape will be altered to be more eco-friendly, lighting will be upgraded, and food in the restaurants will be more efficiently used to avoid waste. This improvements add to some of the buildings current eco-systems like low-e glass, waste recycling, a gray water system and building energy management.

Via GreenerBuildings.com and Taiwan News Online **+ Taipei 101**

http://www.inhabitat.com/2009/11/05/taipei-101-worlds-tallest-green-building/?utm_source=Inhabitat+Weekly&utm_campaign=1d15d7f7bd-Inhabitat_Weekly_November_12th11_12_2009&utm_medium=email

India's Barefoot Solar Engineers Are Building a Brighter Future

by Mike Chino, 11/09/09

Throughout India there are many rural villages that are completely removed from the grid. With no source of power for cooking, light, and heating they currently must rely on firewood, kerosene or diesel for fuel. Now green jobs are blossoming throughout these remote areas as the Orissa Tribal Empowerment & Livelihoods Programme trains women and youth to become barefoot solar engineers. This brilliant initiative provides a bright future for the semi-literate and illiterate rural poor by teaching them to harness the sun through the construction of photovoltaic systems and solar powered lanterns.The initiative makes a lot of sense – rather than dropping down solar technology from above, teach those who will use it how it works and they'll be able to repair it, will pass the information on to others in need, and will benefit from the green jobs that are created. The Orissa Tribal Empowerment & Livelihoods Programme (funded by the UK's Department for International Development) also stands to increase the availability of renewable energy, reduce dependence on volatile fossil fuels, and cut down on the use of dangerous kerosene lamps.Talsa Miniaka, Pulka Wadeka, Minakshi Diwan, and Bundei Hidreka are four barefoot solar engineers in Tinginapu, in the Eastern Ghats of Orissa. Thanks to their training they now have a contract to build **3,000** solar-powered lanterns for schools and other institutions. These lanterns enable students to study after dark without using kerosene lamps and have encouraged local businesses by enabling villagers to work at night from their homes.

+ Orissa Tribal Empowerment & Livelihoods Programme Via Guardian UK

Photo Credit: Abbie Trayler-Smith for DFID

http://www.inhabitat.com/2009/11/09/indias-barefoot-solar-engineers-are-building-a-brighter-future/?utm_source=Inhabitat+Weekly&utm_campaign=1d15d7f7bd-Inhabitat_Weekly_November_12th11_12_2009&utm_medium=email

Beautiful Buildings Made From Whole Trees

by Daniel Flahiff, 11/10/09

According to the Forest Products Laboratory, a whole, unmilled tree can support **50 percent more weight** than the largest piece of lumber milled from the same tree. Putting this principle into practice, Whole Tree Architecture is dedicated to building with materials that lumber companies consider scrap – weed trees, also know as 'managed forest thinnings.' The resulting projects are beautiful displays of locally sourced and sustainably managed materials.Not to be confused with a traditional log cabin, building with whole trees is a sustainable, affordable building philosophy Roald Gundersun has been refining for the past 16 years. As much a forest management process as it is a building technique, Gundersun uses only local, small diameter — 10-inches or less — trees culled from the client's site, and larger trees already downed by disease or wind. Trees are selected based on forest stand density and invasive species management as well as structural integrity and aesthetics. There is no milling, transportation, or bulk curing.The benefits are economic as well as ecological. According to WTA, "*…whole tree construction invests a greater proportion of its costs into local jobs and materials than conventional construction and also promotes healthy forest management for local timber resources*." Gunderson's philosophy is holistic; every aspect of a project — design, engineering, construction and craftsmanship — is considered in light of the local ecology and economy.While Whole Tree Architecture is obviously not feasible for everyone, it is certainly a brilliantly forward-thinking solution for the small farming community in Wisconsin where WTA is based. In our opinion, their use of local labor and local, renewable, and sustainably-managed materials offers a prescient vision of a vibrant, green future.

+ Whole Tree Architecture

Via The New York Times

Photos by Paul Kelley for The New York Times

http://www.inhabitat.com/2009/11/10/beautiful-buildings-made-from-whole-trees/?utm_source=Inhabitat+Weekly&utm_campaign=1d15d7f7bd-Inhabitat_Weekly_November_12th11_12_2009&utm_medium=email

Poor nutrition 'stunting growth'
By Nick Triggle
Health reporter, BBC News

Poor child nutrition still causes major problems in the developing world - despite some progress, experts say.

A third of deaths in children under five in those countries are linked to poor diet, a report by Unicef suggests.

It also reveals 195m children - one in three - have stunted growth, even though rates have fallen since 1990.

Unicef said the number of underweight children also remained high, with many countries struggling to hit official targets to halve the figures.

An estimated 129m children are underweight.

Rates of stunted growth are higher because while some children may be a normal weight - in fact some can even be overweight - the food they are getting is of such poor quality they they have growth problems.

Experts warn that such a condition is often irreversible and effectively condemns children to a lifetime of poor health.

Dangerous

Unicef chief Ann Veneman said: "Undernutrition steals a child's strength and makes illnesses that the body might otherwise fight off far more dangerous.

"Unless attention is paid to addressing the causes of child and maternal undernutrition today, the costs will be considerably higher tomorrow."

HOW TO TACKLE THE PROBLEM

Poor nutrition has traditionally been a problem for Peru

In 1999, the government, in partnership with Unicef and the US International Development Agency, set up the Good Start in Life programme

The project used health staff to provide ante-natal support to mothers, promote breastfeeding and offer food supplements in five mainly rural regions

By 2004, more than 75,000 children under three were benefiting and rates of stunted growth fell from 54% to 37%

A national programme is now being rolled out

The organisation has pinpointed the first 1,000 days of life as the key period in which to tackle the problem.

It said promoting breastfeeding as the exclusive source of nutrition for the first six months and continued breastfeeding until at least two was essential.

But Unicef said providing access to food supplements was also an important part of the solution.

Many aid programmes are focusing on iodised salt to aid brain development and vitamin A supplements, which help bone growth and the body's ability to fight infection.

Such steps, the report suggested, could reduce deaths by a fifth.

Monitoring schemes

Unicef said that together with its partners, which include governments and international aid agencies, it was making progress to improve nutrition for children in the 150 countries it was working in.

Indeed, since 1990 the proportion of children underweight in the developing world has fallen by a sixth, according to figures compiled from Unicef's own monitoring schemes and data provided by other bodies such as the World Health Organization and World Bank.

And stunted growth rates have dropped by a quarter over the same period. Nonetheless, just 63 out of 117 countries look like they will meet the Millennium Development Goal of halving the rates of underweight children between 1990 and 2015.

Progress has been particularly poor in Africa. Asia is performing a little better, although India is making little progress, while South America is making some significant strides.

Kitty Arie, a senior policy adviser at the Save the Children charity, also pointed out poor nutrition had long-term consequences, including lower school performance.

"This is an urgent issue that can and must be tackled."

And UK international development minister Mike Foster agreed more could be done.

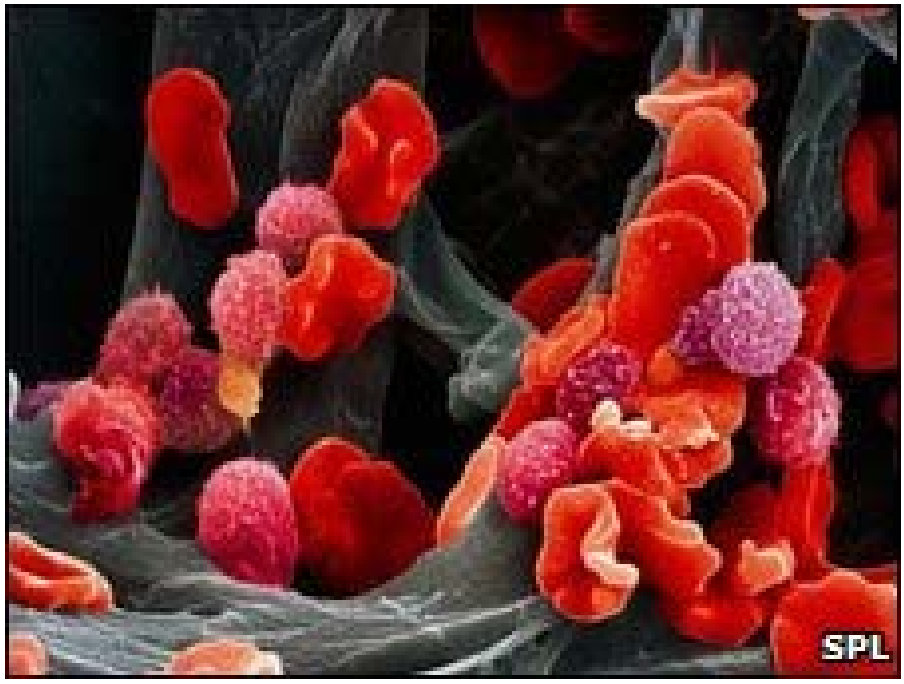
"We have to work more effectively with our development partners and national governments to make nutrition a priority."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8353594.stm

Published: 2009/11/11 16:09:23 GMT

Cancer protein 'can be disarmed'

Scientists have found a way to disarm a protein thought to play a key role in leukaemia and other cancers.



The breakthrough raises hopes of a new type of therapy that could treat cancer and other diseases.

Previous attempts to neutralise the protein had failed, leading experts to conclude it was effectively "undruggable".

The study, carried out by the US Dana-Farber Cancer Institute, features in the journal Nature.

The protein is one of the body's transcription factors, which turn genes on or off and set in motion genetic cascades that control how cells grow and develop. They also help fuel the growth of tumours.

The transcription factor targeted in the latest study is a protein called Notch.

The gene responsible for manufacturing the protein is often damaged or mutated in patients with a form of blood cancer known as T-cell acute lymphoblastic leukaemia (ALL).

" **Stapled peptides promise to significantly expand the range of what's considered 'druggable'** "
Professor Greg Verdine Dana-Farber Cancer Institute

As a result the gene is switched on all the time, driving the uncontrolled cell growth characteristic of cancer.

Similar abnormalities in Notch also underlie other cancers, including lung, ovarian, pancreatic and gastrointestinal tumours.

Examining the structure of Notch closely, the researchers isolated a potential weak spot in its structure.

They employed a state-of-the-art technique using chemical braces to mould protein snippets called peptides into specific three dimensional shapes.

These "stapled" peptides are readily absorbed by cells, and are so tiny they can be deployed to alter gene regulation at specific sites.

After designing and testing several synthetic stapled peptides, the researchers identified one that was able to disrupt Notch's function.

When tested in mice it was found to limit the growth of cancer cells.

" **It may lead to alternative drugs and better treatments for this kind of leukaemia and maybe other cancers** "
Dr David Ish-Horowicz Cancer Research UK

Analysis showed that activity was depressed in genes both directly and indirectly controlled by Notch.

The researchers hope the technique could also be used to target other transcription factors with a similar structure.

Researcher Professor Greg Verdine said: "Stapled peptides promise to significantly expand the range of what's considered 'druggable'.

"With our discovery, we've declared open season on transcription factors and other intractable drug targets."

Dr David Ish-Horowicz, head of developmental genetics at Cancer Research UK's London Research Institute, described the research as "very interesting".

He said: "There is already considerable work by scientists into ways to block Notch to try and reverse the effects of ALL, but the current drugs have some serious side-effects.

"This study describes the design of a new chemical that blocks the mechanism in a different way.

"The new chemical has only been tested in mice so far, and so we don't know how it will behave in humans.

"But, long term, it may lead to alternative drugs and better treatments for this kind of leukaemia and maybe other cancers."

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/8353229.stm

Published: 2009/11/12 00:20:46 GMT

Amazon deforestation 'record low'
By Gary Duffy
BBC News, Sao Paulo

The rate of deforestation in the Amazon has dropped by 45% and is the lowest on record since monitoring began 21 years ago, Brazil's government says.

According to the latest annual figures, just over 7,000 sq km was destroyed between July 2008 and August 2009.

The drop is welcome news for the government in advance of the Copenhagen summit on climate change.

But Greenpeace says there is still too much deforestation and the government's targets are not ambitious enough.

According to the Brazilian space agency, which monitors deforestation in the Amazon, the annual rate of destruction fell by 45%.

Green credentials

Welcoming the news, President Luiz Inacio Lula da Silva described the drop in the level of deforestation as "extraordinary".

He said climate change was the most challenging issue the world was facing.

The Brazilian government will undoubtedly view the latest figures as a boost to its green credentials coming just before the Copenhagen summit in December.

At the summit, the Brazilian government seems certain to present its efforts to reduce destruction in the Amazon as a key part of its strategy to combat climate change.

The environment ministry here is said to be proposing that around half of a 40% cut in Brazil's carbon emissions would come from reducing deforestation.

The Brazilian government wants to see an 80% reduction in the deforestation rate by 2020.

The environmental pressure group, Greenpeace, welcomed the latest drop as important, but said that there was still too much destruction in the rainforest.

In a statement, it said the president would be happy if, in 11 years time, the Amazon was being destroyed at a rate of a little less than three cities the size of Sao Paulo a year.

Some environmentalists believe that the fall in deforestation may be connected to the economic downturn, and that when things improve, the Amazon could face renewed pressure.

Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/americas/8358094.stm

Published: 2009/11/13 00:38:41 GMT

Greenland ice loss 'accelerating'
By Richard Black
Environment correspondent, BBC News website

The Greenland ice sheet is losing its mass faster than in previous years and making an increasing contribution to sea level rise, a study has confirmed.

Published in the journal Science, it has also given scientists a clearer view of why the sheet is shrinking.

The team used weather data, satellite readings and models of ice sheet behaviour to analyse the annual loss of 273 thousand million tonnes of ice.

Melting of the entire sheet would raise sea levels globally by about 7m (20ft). For the period 2000-2008, melting Greenland ice raised sea levels by an average of about 0.46mm per year.

" **If you multiply these numbers up it puts us well beyond the IPCC estimates for 2100** "
Professor Roger Barry

Since 2006, that has increased to 0.75mm per year.

"Since 2000, there's clearly been an accelerating loss of mass [from the ice sheet]," said lead researcher Michiel van den Broeke from Utrecht University in the Netherlands.

"But we've had three very warm summers, and that's enhanced the melt considerably.

"If this is going to continue, I cannot tell - but we do of course expect the climate to become warmer in the future."

In total, sea levels are rising by about 3mm per year, principally because seawater is expanding as it warms.

Sea change

Changes to the Greenland sheet and its much larger counterpart in Antarctica are subjects commanding a lot of interest within the scientific community because of the potential they have to raise sea levels to an extent that would flood many of the world's major cities.

The 2007 Intergovernmental Panel on Climate Change (IPCC) report projected a sea level rise of 28-43cm during this century.

But it acknowledged this was almost certainly an underestimate because understanding of how ice behaves was not good enough to make reliable projections. By combining different sources of data in the way it has, and by quantifying the causes of mass loss, the new study has taken a big step forwards, according to Roger Barry, director of the World Data Center for Glaciology at the University of Colorado in Boulder, US.

"I think it's a very significant paper; the results in it are certainly very significant and new," he said. "It does show that the [ice loss] trend has accelerated, and the reported contribution to sea level rise also shows a significant acceleration - so if you multiply these numbers up it puts us well beyond the IPCC estimates for 2100."

Professor Barry was an editor on the section of the IPCC report dealing with the polar regions.

On reflection

An ice sheet can lose mass because of increased melting on the surface, because glaciers flow more quickly into the ocean, or because there is less precipitation in the winter so less bulk is added inland.

The new research shows that in Greenland, about half the loss comes from faster flow to the oceans, and the other half from changes on the ice sheet itself - principally surface melting. Another analysis of satellite data, published in September, showed that of 111 fast-moving Greenland glaciers studied, 81 were thinning at twice the rate of the slow-moving ice beside them. This indicates that the glaciers are accelerating and taking more ice into the surrounding sea. Melting on the ice sheet's surface acts as a feedback mechanism, Dr van den Broeke explained, because the liquid water absorbs more and reflects less of the incoming solar radiation - resulting in a heating of the ice.

"Over the last 10 years, it's quite simple; warming over Greenland has caused the melting to increase, and that's set off this albedo feedback process," he told BBC News. "Quite likely the oceans have also warmed, and it's likely that explains the [acceleration of] outlet glaciers because they're warmed from below."

Data provided over just the last few years by the Grace satellite mission - used in this study - is giving researchers a closer view of regional variations across the territory. Grace's twin satellites map gravity at the Earth's surface in unprecedented detail; and it is now possible to tease out from the data that most of the mass is being lost in the southeast, southwest and northwest at low elevations where the air will generally be warmer than at high altitudes.

Professor Barry cautioned that the Grace mission, which has produced valuable data about Antarctica as well as Greenland, has only a further two years to run, and that no replacement is currently scheduled.

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Story from BBC NEWS:
http://news.bbc.co.uk/go/pr/fr/-/2/hi/science/nature/8357537.stm

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Notes on an art crisis

This recession will bring a sea change in the way we look at, write about, and make art. Adrian Searle reveals what he's looking forward to

- Adrian Searle

guardian.co.uk,

The war on habit, complacency and indifference … Miroslaw Balka's How It Is. Photograph: David Levene

Two weeks ago, I went to an evening in New York in honour of the dancer and choreographer Merce Cunningham, who died earlier this year. Three spaces had been cleared on the enormous floor of the drill hall in the Park Avenue Armory. On each stage, something different was happening; except it was all the same thing, that thing that Merce and his company did.

A lone man strode through air as thick as cement. Other dancers came together and moved apart, grouping and splintering and spiralling off. Elsewhere, dancers worked the space in worlds of their own. There was a form to all of it, but in the moment of performance it was ungraspable. Things were in constant motion, like overlapping ripples on a rainy pond. It was mesmerising – and hard to know where to look and who to follow.

The dancers were members of the current Cunningham troupe, as well as dancers who had worked with the choreographer all the way back to the 1960s. There were schoolkids dancing. Music clamoured and drifted overhead, and the echoing acoustic felt just right. There was the silence of John Cage's 4'33", a calm moment, and then we moved on. I meant to stay an hour, and remained for almost four. Sometimes I'd find myself taking respite beside a stage void of dancers, a visual equivalent to Cage's silent work, finding myself looking at the clear patch of floor as if it might tell me something. I bumped into a few friends, but we mostly kept our distance, not wanting to break one another's mood. As well as watching, there was space and time to reflect. The best art always returns you to yourself.

A part of me wanted to keep this experience to myself and not write about it. When it was over, I walked into the evening with a kind of aimless purpose – almost tearful, though it's hard to say exactly why. The

experience was complicated, a relationship between setting and dance, music and acoustics, the occasion itself and everyday life beyond.

I had gone to New York after speaking in Toronto, in a series of panels and lectures on the current state of art in the economic downturn. The art world is in crisis. First there was too much money; now there isn't enough. Newspapers and print media are in crisis. Theory is in crisis (does anyone have time to do more than look at the pictures in magazines nowadays?). Curating is in crisis. The professional critic is in crisis (they are dropping like flies in north America). Artists – well, they're always in crisis, drama queens that they are.

But crisis is good. Crisis is sexy. Crisis shakes you up. And if it changes our habits when it comes to looking at art, reading about it, or even making it, then that's probably good, too. Artists, if they're any good, are engaged in a war against habit, complacency and indifference.

Puffs, gossip and beastliness

Change is good. But pick up a British newspaper, and you would think it was still 1995. It's the same old same old: here comes Tracey; there goes Damien. And isn't that that transvestite bloke, the one who does those pots? It's not the earnest reviews and analysis that count, the ones that say time's up and let's move on – the articles I spend long nights worrying over, however urgent they may seem. The stories that count are

the personality puffs, the bits of gossip about who Jay Jopling and Sam Taylor-Wood are currently shagging or in the process of de-shagging or un-shagging and what Tracey did next that get the juices flowing. Sex and money, beauty and beastliness, and little Damien are what count: he's painting again, haven't you heard? Watching Cunningham's dancers, all this seemed very parochial and very far away.

Conceptual art began with Marcel Duchamp's witty and iconoclastic questioning of the status of the art object, in relation to other kinds of manufactured items: bicycle wheels, snow shovels, that famous urinal. He questioned what art was and what it might become in the post-industrial future. In the 1960s, conceptual art became an art of ideas, statements, theoretical drolleries and jokes.

Nowadays, there is a mistaken assumption that all sorts of current art works belong under the banner of conceptual art. Arguably, you could look back at John Cage's music, his writings and strange hieroglyphic musical notations, or at Cunningham's dances and his collaborations with artists such as Robert Rauschenberg and Jasper Johns, and see that they have at least a tangential relationship to what came to be called conceptualism. But if the phrase "conceptual art" doesn't mean that much, nor does "contemporary art". Soon it'll be old, like everything else.

Oxford's preposterous debate

A few days ago, I took part in a debate at the Oxford Union. The proposal was "This House believes that conceptual art is no art at all". Interesting or ludicrous, I thought, till ludicrous it proved. Rather than a radical re-reading of an avant-garde movement, the proposal amounted to thin stuff, and one that confused conceptualism with all sorts of other things: the YBAs, Fluxus, the opacity of contemporary art and art writing in general. It was in many ways a preposterous event. I probably made it worse when I stepped up to speak, by doing my version of Bruce Nauman's video performance piece Clown Torture — jumping up and down shouting No, No, No, No, No, as well as performing my Mark Rothko-Killed-Himself-Because-He-Met-the-People-Who-Bought-His-Art routine. But my team – me, critic Matthew Collings, artist Miroslaw Balka and the departing Tate Britain director Stephen Deuchar – won anyway, by a landslide.

August, serious, intelligent, rigorous: the Oxford Union was a lot less gruelling than the Glasgow Empire on a Thursday night. What shocked me was not just the paucity of argument in the proposal, but the

general cultural ignorance behind it, the unexamined prejudices, the kneejerk anti-intellectualism and cultural suspicion of contemporary art. I foolishly thought we'd gone beyond all that, and that an awareness of visual culture was, well, normal. That's the cloistered critic for you, imagining himself at the centre of the world. However many people one sees queuing for the Turner prize show, or wandering Tate Modern or the Centre Pompidou on a Sunday afternoon, the idea that the art of our time speaks to the wider public, and that people actually get something out of looking at it, might not be quite as true I might like to think. If Oxford University doesn't get art, who are the zombies in the art galleries?

The Stuckist Charles Thomson ranted for the motion, as did an otherwise perfectly sensible Oxford student, a smug New Zealander and artist Mark Leckey, who won last year's Turner prize. Leckey said he was on the philistine side of the debate because he hated everything the YBAs stand for. He wasn't against conceptual art but what he regarded as the pop version of it, and summed up by saying he was on the side of doubt – which of course I am, too.

I'm for ambiguity, nuance, the kinds of indeterminacy, sublety and open-endedness you get in Cage's music and in Cunningham's performances. Robert Rauschenberg once said he wanted to work in the gap between art and life: I can only celebrate that gap and the complications it brings. Doubt is difficult. Complications and contingencies mess with your head. They might not help you out of a crisis, but they are all we have. Keep dancing.

http://www.guardian.co.uk/artanddesign/2009/nov/09/art-world-crisis

Can You Believe How Mean Office Gossip Can Be?
By JOHN TIERNEY

Could adults gossiping in the office be more devious than the teenagers in "Gossip Girl"?

If you have a hard time believing this, then you must have skipped the latest issue of the Journal of Contemporary Ethnography. Perhaps you saw "ethnography" and assumed it would just be quaint reports from the Amazon and the South Seas. But this time enthnographers have returned from the field with footage of a truly savage native ritual: teachers at an elementary school in the Midwest dishing about their principal behind her back.

These are rare records of "gossip episodes," which have been the subject of a long-running theoretical debate among anthropologists and sociologists. One side, the functionalist school, sees gossip as a useful tool for enforcing social rules and maintaining group solidarity. The other school sees gossip more as a hostile endeavor by individuals selfishly trying to advance their own interests.

But both schools have spent more time theorizing than observing gossipers in their natural habitats. Until now, their flow charts of gossips' conversations (where would social science be without flow charts?) have been largely based on studies in informal settings, like the casual conversations recorded in a German housing project and in the cafeteria of an American middle school.

The earlier studies found that once someone made a negative comment about a person who wasn't there, the conversation would get meaner unless someone immediately defended the target. Otherwise, among both adults and teenagers, the insults would keep coming because there was so much social pressure to agree with the others.

Consider, for instance, the cascade of insults recorded in the earlier study of middle-school gossip by Donna Eder and Janet Lynne Enke of Indiana University. In this cafeteria conversation, a group of eighth-grade girls in the cafeteria were discussing an overweight classmate whose breasts they considered too large for her age:

Penny: In choir that girl was sitting in front of us and we kept going, "Moo."
Karen: We were going, "Come here, cow; come here, cow."
Bonnie: I know. She is one.
Penny: She looks like a big fat cow.
Julie: Who is that?
Bonnie: That girl on the basketball team.
Penny: That big red-headed cow.

Julie: Oh, yeah. I know. She is a cow.
The new study found that gossip in the workplace also tended to be overwhelmingly negative, but the insults were more subtle and the conversations less predictable, says Tim Hallett, a sociologist at Indiana University. Dr. Hallett conducted the study along with Dr. Eder and Brent Harger of Albright College.
"Office gossip can be a form of reputational warfare," Dr. Hallett says. "It's like informal gossip, but it's richer and more elaborate. There are more layers to it because people practice indirectness and avoidance. People are more cautious because they know they can lose not just a friendship but a job."
During his two years studying the group dynamics at a Midwestern elementary school, which allowed him access on condition of anonymity, Dr. Hallett found that the teachers became so comfortable with him and his camera that they would freely insult their bosses during one-on-one interviews. But at the teachers' formal group meetings, where they knew that another teacher might report their insults to the principal, they were more discreet.
Instead of making direct criticisms, they sometimes offered obliquely sarcastic comments to test the waters. They used another indirect tactic categorized as praise the predecessor, as in the meeting when a teacher fondly recalled a previous administration: "It was so calm, and you could teach. No one was constantly looking over your shoulder." The other teachers quickly agreed. No one explicitly called the current principal an authoritarian busybody, but that was the obvious implication.
Some teachers were especially adept at managing gossip. At one meeting, after someone complained about a student walking around with his hair shaped into horns ("Tell me, how is that part of the uniform dress code?"), the group began blaming the lapse in discipline on the assistant principal. The gossip seemed to be going down the same nasty track as the teenagers' she's-such-a-cow episode until another teacher, an ally of the assistant principal, smoothly intervened.
First, the teacher interrupted the attack by asking the name of the student with the horns. That deflected the group's gossip on to the student's academic difficulties and weird behavior ("He's gotta frighten the little kids"). Then the teacher masterfully completed the rescue of the assistant principal by changing the topic entirely, reminding everyone of a different disciplinary issue that was the fault of a less popular administrator — the principal, who promptly became the new focus of the groups' anger.
The teachers' gossip never got as blatantly mean as the teenage girls' — no one was ever called a cow — but in some ways the effects were more widely felt.
As teachers mocked the principal and complained about her being "stifling" and "hyper," the atmosphere got more poisonous. The principal felt that her authority was being undermined by gossip and retaliated against teachers she suspected (correctly) of criticizing her. Teachers and administrators fled the school, and the students' test scores declined.
"The gossip did serve to reinforce the teachers' group solidarity, but in this case it was also a form of warfare that brought everyone down," Dr. Hallett says. "It was reminiscent of the old saying that gossip is a three-pronged tongue: it can hurt the speaker and the listener, as well as the target."
Some bosses have tried turning the office into a "no-gossip zone," but Dr. Hallett says it is more realistic to try managing it. (If you have ideas for managing office gossip, you can suggest them at nytimes.com/tierneylab.)
If, say, an office rival seems poised to trash one of your absent allies, Dr. Hallett suggests you make a "pre-emptive positive evaluation." A quick "Isn't she doing a great job?" might be enough to stop the attack.
If your rival tries persisting with indirect sarcasm — "Oh, real great job" — you can force the issue by calmly asking what that means. That simple question, a dare made in a pleasant voice, often silenced the sarcastic gossips observed by Dr. Hallett.
And if that doesn't work, Dr. Hallett suggests you try an even simpler tactic that was used successfully at the teachers' meetings — and that is available in any workplace anytime. In fact, it's one of the tactics that distinguishes office gossip from nonoffice gossip. When the going gets tough, when the gossip gets mean, you always have one reliable escape line: "Don't we have some work to do here?"

http://www.nytimes.com/2009/11/03/science/03tier.html

A Case in Antiquities for 'Finders Keepers'
By JOHN TIERNEY

Zahi Hawass regards the Rosetta Stone, like so much else, as stolen property languishing in exile. "We own that stone," he told Al Jazeera, speaking as the secretary general of Egypt's Supreme Council of Antiquities.

The British Museum does not agree — at least not yet. But never underestimate Dr. Hawass when it comes to this sort of custody dispute. He has prevailed so often in getting pieces returned to what he calls their "motherland" that museum curators are scrambling to appease him.
Last month, after Dr. Hawass suspended the Louvre's excavation in Egypt, the museum promptly returned the ancient fresco fragments he sought. Then the Metropolitan Museum of Art made a pre-emptive display of its "appreciation" and "deep respect" by buying a piece of a shrine from a private collector so that it could be donated to Egypt.
Now an official from the Neues Museum in Berlin is headed to Egypt to discuss Dr. Hawass's demand for its star attraction, a bust of Nefertiti.
These gestures may make immediate pragmatic sense for museum curators worried about getting excavation permits and avoiding legal problems. But is this trend ultimately good for archaeology?
Scientists and curators have generally supported the laws passed in recent decades giving countries ownership of ancient "cultural property" discovered within their borders. But these laws rest on a couple of highly debatable assumptions: that artifacts should remain in whatever country they were found, and that the best way to protect archaeological sites is to restrict the international trade in antiquities.
In some cases, it makes aesthetic or archaeological sense to keep artifacts grouped together where they were found, but it can also be risky to leave everything in one place, particularly if the country is in turmoil or can't afford to excavate or guard all its treasures. After the Metropolitan Museum was pressured to hand over a collection called the Lydian Hoard, one of the most valuable pieces was stolen several years ago from its new home in Turkey.
Restricting the export of artifacts hasn't ended their theft and looting any more than the war on drugs has ended narcotics smuggling. Instead, the restrictions promote the black market and discourage the kind of open research that would benefit everyone except criminals.
Legitimate dealers, museums and private collectors have a financial incentive to pay for expert excavation and analysis of artifacts, because that kind of documentation makes the objects more valuable. A nation could maintain a public registry of discoveries and require collectors to give scholars access to the artifacts, but that can be accomplished without making everything the property of the national government.

The timing of Dr. Hawass's current offensive, as my colleague Michael Kimmelman reported, makes it look like retribution against the Westerners who helped prevent an Egyptian from becoming the leader of Unesco, the United Nation's cultural agency. But whatever the particular motivation, there is no doubt that the cultural-property laws have turned archeological discoveries into political weapons.

In his book "Who Owns Antiquity?", James Cuno argues that scholars have betrayed their principles by acquiescing to politicians who have exploited antiquities to legitimize themselves and their governments. Saddam Hussein was the most blatant, turning Iraqi archeology museums into propaganda for himself as the modern Nebuchadnezzar, but other leaders have been just as cynical in using antiquities to bolster their claims of sovereignty.

Dr. Cuno advocates the revival of partage, the traditional system in which archeologists digging in foreign countries would give some of their discoveries to the host country and take others home. That way both sides benefit, and both sides have incentives to recover antiquities before looters beat them to it. (To debate this idea, go to nytimes.com/tierneylab.)

As the director of the Art Institute of Chicago, Dr. Cuno has his own obvious motives for acquiring foreign antiquities, and he makes no apology for wanting to display Middle Eastern statues to Midwesterners.

"It is in the nature of our species to connect and exchange," Dr. Cuno writes. "And the result is a common culture in which we all have a stake. It is not, and can never be, the property of one modern nation or another."

Some of the most culturally protectionist nations today, like Egypt, Italy and Turkey, are trying to hoard treasures that couldn't have been created without the inspiration provided by imported works of art. (Imagine the Renaissance without the influence of "looted" Greek antiquities.) And the current political rulers of those countries often have little in common culturally with the creators of the artifacts they claim to own.

Dr. Hawass may consider the Rosetta Stone to be the property of his government agency, but the modern state of Egypt didn't even exist when it was discovered in 1799 (much less when it was inscribed in 196 B.C., during the Hellenistic era). The land was under the rule of the Ottoman Empire, and the local historians were most interested in studying their Islamic heritage.

The inscribed stone fragment, which had been used as construction material at a fort, didn't acquire any significance until it was noticed by Napoleon's soldiers and examined by the scholars on the expedition. When the French lost the war, they made a copy of the inscriptions before surrendering the stone to the English victors, who returned it to the British Museum. Eventually, two scholars, working separately in Britain and in France, deciphered the hieroglyphics.

This all happened, of course, long before today's nationalistic retention laws and the United Nations' Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property. But what if the Rosetta Stone were unearthed in modern times?

Were the Rosetta Stone to appear on the art market without the proper export permits and documented provenance, Dr. Cuno says, a museum curator who acquired it would risk international censure and possible criminal charges. Scholars would shun it because policies at the leading archeological journals would forbid the publication of its text.

"Not being acquired or published, the Rosetta Stone would be a mere curiosity," Dr. Cuno writes. "Egyptology as we know it would not exist, and modern Egyptians would not know to claim it as theirs."

The Supreme Council of Antiquities wouldn't even know what it was missing.

http://www.nytimes.com/2009/11/17/science/17tier.html?ref=science

An Air-Traffic Upgrade to Improve Travel by Plane
By GUY GUGLIOTTA

EGG HARBOR, N.J. — Up in the cockpit, Larry Van Hoy, a Federal Aviation Administration pilot, was flying low-tech. Radar showed a bit of nearby cloud cover, and to learn about other aircraft, he talked to the ground controller or looked out the window.

Back in the passenger cabin of the same plane, a Bombardier Global 5000, Wilson N. Felder, director of the F.A.A.'s William J. Hughes Technical Center, was flying in the cockpit of the future.
Dr. Felder was watching an Automatic Dependent Surveillance — Broadcast, or A.D.S.-B., display that uses the Global Positioning System for navigation. The display gave him an overview of the terrain below with airports labeled. He could tune in weather at any altitude. A ground-based data feed sent him a constantly updated picture of the other aircraft sharing the sky. These appeared on the display screen as green crescents.
The screen also showed two green spearheads. These, Dr. Felder said, were the nearby aircraft that were also equipped with the new technology. They sent their positions directly to the Global 5000.
A.D.S.-B. is a linchpin of the Next Generation Air Transportation System, or NextGen, the aviation agency's master plan for fixing the shortcomings of 21st-century air travel.
The United States air traffic system normally handles about 50,000 flights per day, and in the first half of 2008, more than 25 percent were either late or canceled. The scorecard improved slightly after the economy collapsed — flights are currently down to 47,500 per day — but by 2025 the F.A.A. predicts daily air traffic will be up to 80,000 flights. The current system is struggling badly. By 2025, it will not have a prayer.
There are many reasons for this mess. Radar is rapidly becoming a dinosaur — too slow for modern times. Air traffic controllers see a new ping from the planes on their scopes every six or seven seconds, and air traffic radars "see" for only about 150 miles. When aircraft are crossing the Gulf of Mexico on the same compass heading, they leave airports 10 minutes apart because each must be surrounded by 100 square miles of "sanitized" space to avoid accidents. This curtails service.
Over busy airports, planes often circle in altitude "layers," speeding up and slowing down to get into proper landing sequence. This wastes fuel. To land, they depend on controllers who are talking to every plane in a stream of nonstop oral radio transmissions. In the tower, controllers keep track of vital details by means of plastic "flight strips" that look like tile racks in a Scrabble game. A ground controller hands the strip to a local controller, who gets the plane in the air and passes the strip to another controller. The controllers have to keep everything straight on their radar screens, in their minds and on the radio. Theirs is one of the most stressful jobs around.
NextGen is supposed to fix all this. By 2025, all aircraft will be using GPS-based technology for navigation, and radar will be a backup. New technologies, like A.D.S.-B., will deliver fixes every second, and aircrews will monitor their progress on digital cockpit displays like the one Dr. Felder was using. Electronics will give controllers recommended changes in altitude, course and trajectory to ensure the most efficient and smoothest ride possible. And when a plane reaches the airport, it will use precision

navigation, even in bad weather, to come straight in, like a jewel on a string of beads. The controllers will be there, but they will not be talking constantly — only when pilots need help.
Victoria Cox, the F.A.A.'s senior vice president for NextGen and operations planning, described the system as a "supermodern concept of aviation."
But in the computer age, many may wonder why changes like these have not been in place for years. After all, motorists already use GPS devices to find their relatives in the suburbs, weekend sailors use them to fish for blues off Cape Cod and aircraft have had access to GPS for years. Pilots in the United States can already use what is known as the Wide Area Augmentation System, which offers enhanced GPS so they can fix their location more precisely.
NextGen is different. Wide Area Augmentation "gives more accurate information to let you know where you are," said Michael Romanowski, the F.A.A.'s director of NextGen integration and implementation. But, Dr. Romanowski added, "A.D.S.-B. lets everyone else, including controllers, know where you are."
NextGen's progress has been rocky. Since its beginning in 2004, lawmakers and civil aviation experts have complained of its vagueness and the absence of a concrete plan. Also, the Government Accountability Office regarded the F.A.A.'s procurement strategy generally as inefficient and "high risk," raising fears that the agency would never be able to see the program through to a finish.
This year appears somewhat smoother. The F.A.A. is off high risk for the first time in a decade, and in January it issued a plan that described how the NextGen air traffic system would look at "midterm" in 2018 on its way to completion.
The F.A.A. has asked the civil aviation industry to come up with a method of rewarding the forward-looking. Ms. Cox said companies that were the "best equipped" early innovators should be the "best served" at airports and during flights. At the same time, however, laggards must be accommodated for some years. As a result, the two systems, old and new, will have to co-exist until NextGen builds enough momentum to eclipse yesterday.
Many of NextGen's needed technologies are being developed at the F.A.A.'s technical center, a 5,000-acre stretch of runways, labs and grassland in the South Jersey flats near Atlantic City. On one summer afternoon, engineers were testing NextGen air control techniques at a virtual Newark Liberty International Airport, while F.A.A. experts a few doors away fine-tuned a futuristic electronic depiction of the runways at Logan International Airport in Boston.
A.D.S.-B. figures to be a core NextGen technology, integrated with other GPS-linked systems that will let aircraft not only fly more efficient routes, but also pick up continuous digital data feeds for updated weather and traffic information.
In the future, NextGen will provide a "data cube" that taps weather sources all over the country and delivers data that will tell aircraft and controllers what lies ahead for any flight in all three spatial dimensions and time.
Governments will cover the nation with GPS-linked ground stations about half the size of a standing refrigerator. As the technology improves, aircraft will find it easier to land in bad weather, and at some point, the electronics will be able to place them on a safe track and bring them in quickly on several runways at the same time. Airports must have the technologies ready when aircraft are ready to use them.
There appears to be little doubt that the new technology works. Unlike radar, with its immense installations costing millions of dollars, the A.D.S.-B. ground stations can be mounted anywhere.
As proof of concept, the F.A.A. distributed enough of them to cover Alaska. The accident rate in the state — extremely high because of vast, radar-free areas and wretched weather — dropped 47 percent for the small commercial aircraft that were outfitted with onboard A.D.S.-B.
In the Gulf of Mexico, the agency is mounting A.D.S.-B. ground stations on some of the gulf's 9,000 gas and oil rigs, giving the helicopters that supply them a way to travel to and from the coast in reasonably bad weather without getting laid low by a derrick. The F.A.A. expects the system to begin operations next month.
And at its hub in Louisville, Ky., UPS has outfitted all 263 of its jet cargo aircraft with A.D.S.-B. equipment and is using it to improve spacing and maneuvering during "continuous descent arrivals" into the airport.
"It's much faster," said Christian Kast, an advanced flight manager and UPS captain. "The old system has given us a great service for many, many years, but it's time to move on."

http://www.nytimes.com/2009/11/17/science/17air.html?ref=science

Breaching a Barrier to Fight Brain Cancer

By DENISE GRADY

Dr. Howard Riina threaded a slender tube through a maze of arteries in Dennis Sugrue's brain, watching X-ray images on a monitor to track his progress. At the site where a previous operation had removed a malignant tumor, he infused a drug called mannitol and unleashed a flood of the cancer drug Avastin.

Doctors and nurses watched intently, worried that the Avastin could cause brain swelling, a hemorrhage or a seizure. But Mr. Sugrue emerged unscathed. A half hour after the procedure, he woke up from anesthesia mumbling, "More is better," and wishing aloud that he could have had a bigger dose.

It was an experiment. Mr. Sugrue, 50, who works for a hedge fund and has two teenage children, was in a study for people with glioblastoma — the same type of brain tumor that killed Senator Edward M. Kennedy of Massachusetts in August — and was only the second person ever to have Avastin sprayed directly into his brain.

Getting drugs into the brain has always been a major challenge in treating tumors and other neurological diseases, because the blood-brain barrier, a natural defense system, keeps many drugs out. The study that Mr. Sugrue is in, at NewYork-Presbyterian/Weill Cornell, combines old technologies in a new way to open the barrier and deliver extraordinarily high doses of Avastin straight to these deadly tumors — without soaking the rest of the brain in the drug and exposing it to side effects.

The goal is to find better ways to treat glioblastomas. But the technique might also be useful for brain metastases, meaning cancer that has spread from other parts of the body, like the breasts or lungs — something that occurs in about 100,000 people a year in the United States. The same procedure could also deliver other drugs and might eventually be used to treat neurological disorders like multiple sclerosis or Parkinson's disease, if suitable therapies are developed.

The defense system that doctors are trying to breach evolved to keep out toxins and microbes. It consists mainly of cells that line the walls of capillaries in the brain and are so tightly packed that many molecules in the bloodstream cannot slip out between cells to reach the brain tissue itself. But certain drugs, like mannitol, will temporarily open the barrier and were first used more than 20 years ago to help other medicines reach the brain.

The new technique refines the art of opening the barrier: it uses microcatheters — fine, highly flexible tubes that are inserted into an artery in the groin and then threaded up into tiny blood vessels nearly anywhere in the brain — to spray chemotherapy directly onto tumors or areas from which they have been removed. The catheters are normally used to deliver clot-dissolving drugs to the brain to treat strokes.

"This will substantially alter the way that chemotherapy is given in the future," said Dr. John Boockvar, the brain surgeon who devised the trial. "But we have to prove that at certain doses, nobody gets hurt."

Referring to glioblastoma patients, Dr. Riina said, "Everyone is looking for something to do for these people."

"Even if you buy someone just a year, that could be a wedding or a graduation," he continued. "You never know what might happen in the year they hold onto."

The study, which began in August, is still in its earliest phase, meaning its main goal is to measure safety, not efficacy — to find out if it is safe to spray Avastin directly into brain arteries and at what dose.
Nonetheless, the doctors were pleased when M.R.I. scans of the first few patients showed that the treatment seemed to erase any sign of recurring glioblastomas. But how long the effect will last remains to be seen.
"A beautiful M.R.I. scan doesn't mean it's cured," Dr. Boockvar said.
Despite a beautiful scan, the first patient who was treated died in October, from pneumonia and the spread of glioblastoma to his brainstem.
Innovations are desperately needed to make headway against glioblastoma, which is "one of the most deadly tumors that exist in humans," said Dr. Russell Lonser, chairman of surgical neurology at the National Institutes of Health.
"This is a very good start," Dr. Lonser said. "The early data is very interesting and exciting."
The complexity of a study like this goes beyond the science. Clinical trials are also a complicated pact, emotionally and ethically, between desperate patients and doctors who must balance their ambition as researchers against their duty as clinicians, and must walk a fine line between offering too much hope and not enough.
"I tell patients, 'I'm going to try to cure your disease, but so far glioblastoma is an incurable disease,' " Dr. Boockvar said.

Extending Life

"I'm optimistic," Mr. Sugrue said one morning in September, after scheduling a second brain operation. But he had tears in his eyes.
There are about 10,000 new cases of glioblastoma a year in the United States, mostly in people over 45. The tumors are notorious for growing back like weeds even after being cut out and blasted with chemotherapy and radiation, and they are nearly always fatal. With the best treatment, the median survival time is about 15 months.
But in the last five years, the number of patients who survive 2 years has increased to 25 percent, from 8 percent, largely because doctors began using a chemotherapy pill called temozolomide, or Temodar, along with radiation (Temodar is believed to seep through the blood-brain barrier).
Dr. Boockvar said he thought that if he could just keep patients alive for two years, more advances might come along and give them time.
"The glioblastoma population is very studyable, unfortunately, because the prognosis is so grim," he said. Patients often wind up on the frontlines of research, figuring they have little to lose and hoping they will be lucky enough to test the big breakthrough. More than 500 studies for people with glioblastoma are listed on the government Web site www.clinicaltrials.gov.
Mr. Sugrue, who lives in Stamford, Conn., with his wife, Donna, and their children Molly and Tim, began having headaches in April. He thought he had a sinus problem. But a scan found a brain tumor nearly the size of a golf ball. A local doctor referred him to Dr. Boockvar. He had the standard treatment: surgery, temozolomide pills and six weeks of radiation, which ended on June 25.
By July, an ominous bright spot on his M.R.I. scan suggested that the tumor might already be growing back. He continued chemotherapy, but the spot kept enlarging.
By mid-September, the Sugrues were back in Dr. Boockvar's office to plan their next step. Stubbly hair was growing in on Mr. Sugrue's scalp, except for a bare patch, around an arcing scar above his right ear. His eyes, bright blue with thick, dark lashes that gave him a boyish look, searched the doctor's face.
The headaches had returned. New scans, displayed on a computer screen, showed signs of brain swelling and bright spots that should not have been there. Dr. Boockvar recommended more surgery and then chemotherapy with Avastin, which had recently been approved for recurring glioblastoma.
It was approved for intravenous use — to be dripped into a vein, usually in the arm — but he said Mr. Sugrue would be an ideal candidate for his study, in which the drug would be infused directly into an artery in the brain, producing levels at least 50 times what the intravenous route could achieve. One other patient had been treated that way, and M.R.I. scans showed that recurring tumors seemed to have melted away.
Mr. Sugrue said he was all for it, even though Dr. Boockvar warned him that the drug was no magic bullet. Then Dr. Boockvar ticked off the risks from a second brain operation.
"I have to quote you a 5 percent risk you'll be visibly weak," he said. "A 1 percent chance of paralysis on the left side."

Mr. Sugrue wiped his eyes and began to apologize for losing his composure, but the surgeon cut him off and said, “In neurosurgery they say that if you don’t make your patient cry, you haven’t gotten informed consent.”
The trial grew out of a conversation about a year ago between Dr. Boockvar and Dr. Riina, an expert in using microcatheters to treat strokes.
“I said, ‘Why can’t you infuse chemotherapy for my brain tumor patients?’ ” Dr. Boockvar recalled. “And he said: ‘I can. Just show me what you want to do.’ ”
Dr. Riina said, “Technically, I can go anywhere in your brain.”
He said microcatheter technology had advanced “light-years” in the last decade and was just waiting for a new drug to come along for glioblastoma.
They wrote up a plan to test what they called “superselective intra-arterial cerebral infusion” of Avastin in 30 patients with glioblastomas that had recurred after standard treatment. Each patient would receive just one treatment directed into the brain, followed weeks later by a series of intravenous treatments with Avastin.
Their study involves a technique first developed about 30 years ago, which uses mannitol to open the blood-brain barrier temporarily to get chemotherapy into the brain. Mannitol pulls water out of the tightly packed cells lining the capillaries so that they shrink and pull away from one another, opening up gaps through which drug molecules can pass into the brain.
The technique was developed by Dr. Edward A. Neuwelt, a neurosurgeon at Oregon Health Sciences University and the Veterans Affairs Hospital in Portland. Its best results have been in people with a rare type of brain tumor called a primary central nervous system lymphoma. But it has not been helpful with glioblastoma, because until recently there was no chemotherapy to infuse that would have much effect on those tumors.
Dr. Neuwelt said that Avastin had helped to renew interest in opening the blood-brain barrier but that researchers disagreed about whether the drug would lend itself to that use.
Avastin starves tumors by blocking the growth of new blood vessels, which they need to survive. Dr. Boockvar said microcatheters should increase the odds of success by delivering a high dose of the drug directly to where it was needed most. Earlier research with other drugs used larger catheters inserted into the carotid arteries, which feed the entire brain — meaning that the tumor did not receive the most concentrated dose and that healthy brain tissue was exposed to the toxic drugs.
By mid-November, the researchers had treated five patients, including Mr. Sugrue; they first infused mannitol, waited five minutes and then sprayed in the Avastin. In all the patients’ M.R.I. scans, the telltale bright spots that marked tumor growth faded away after the treatment.
“I can’t tell you what it means,” Dr. Boockvar said. “Nobody knows.”
Indeed, the death of the first patient was a reminder that glioblastoma can invade other parts of the brain and the spinal fluid and that the highly localized spray of Avastin might miss deadly seeds of cancer.
But Dr. Boockvar remained hopeful for the remaining patients, describing the scans as “astronomically far better than I had anticipated.”

Hope and Anxiety

Mr. Sugrue was still in the hospital in late September when Dr. Boockvar burst into his room and got him out of bed to look at his own before-and-after scans.
“He took me to this room with all these computers and said, ‘I’ve got to show you this,’ ” Mr. Sugrue recalled. “This M.R.I. was a thing of beauty. I’m excited that he’s excited. That means a lot to me.”
Dr. Boockvar said: “Avastin may not be the best drug for this delivery technique. What’s exciting about our results is that we’ve proven there is a local effect.
“Suppose someone said, ‘I have much better drug.’ Now I can say I at least have a delivery system.”
With patients, Dr. Boockvar tries to walk a fine line, trying to level with them and yet not rob them of all hope. He knows the emotional toll that a cancer diagnosis can take: his own father had leukemia for about eight years and died in September. Mrs. Sugrue said the doctor urged her and her husband to resist doing an Internet search for glioblastoma because they would just read that it was a death sentence.
They said they tried to follow his advice, but when the subject of prognosis came up in an interview, both had tears in their eyes.
“You don’t ask the question if you don’t want the answer,” Mrs. Sugrue said. “What will be, will be. You do what you can.”

http://www.nytimes.com/2009/11/17/health/17tumor.html?ref=science

Panel Urges Mammograms at 50, Not 40

By GINA KOLATA

Most women should start regular breast cancer screening at age 50, not 40, according to new guidelines released Monday by an influential group that provides guidance to doctors, insurance companies and policy makers.

The new recommendations, which do not apply to a small group of women with unusual risk factors for breast cancer, reverse longstanding guidelines and are aimed at reducing harm from overtreatment, the group says. It also says women age 50 to 74 should have mammograms less frequently — every two years, rather than every year. And it said doctors should stop teaching women to examine their breasts on a regular basis.

Just seven years ago, the same group, the United States Preventive Services Task Force, with different members, recommended that women have mammograms every one to two years starting at age 40. It found too little evidence to take a stand on breast self-examinations.

The task force is an independent panel of experts in prevention and primary care appointed by the federal Department of Health and Human Services.

Its new guidelines, which are different from those of some professional and advocacy organizations, are published online in The Annals of Internal Medicine They are likely to touch off yet another round of controversy over the benefits of screening for breast cancer.

Dr. Diana Petitti, vice chairwoman of the task force and a professor of biomedical informatics at Arizona State University, said the guidelines were based on new data and analyses and were aimed at reducing the potential harm from overscreening.

While many women do not think a screening test can be harmful, medical experts say the risks are real. A test can trigger unnecessary further tests, like biopsies, that can create extreme anxiety. And mammograms can find cancers that grow so slowly that they never would be noticed in a woman's lifetime, resulting in unnecessary treatment.

Over all, the report says, the modest benefit of mammograms — reducing the breast cancer death rate by 15 percent — must be weighed against the harms. And those harms loom larger for women in their 40s,

who are 60 percent more likely to experience them than women 50 and older but are less likely to have breast cancer, skewing the risk-benefit equation. The task force concluded that one cancer death is prevented for every 1,904 women age 40 to 49 who are screened for 10 years, compared with one death for every 1,339 women age 50 to 59, and one death for every 377 women age 60 to 69.

The guidelines are not meant for women at increased risk for breast cancer because they have a gene mutation that makes the cancer more likely or because they had extensive chest radiation. The task force said there was not enough information to know whether those women would be helped by more frequent mammograms or by having the test in their 40s. Other experts said women with close relatives with breast cancer were also at high risk.

Dr. Petitti said she knew the new guidelines would be a shock for many women, but, she said, "we have to say what we see based on the science and the data."

The National Cancer Institute said Monday that it was re-evaluating its guidelines in light of the task force's report.

But the American Cancer Society and the American College of Radiology both said they were staying with their guidelines advising annual mammograms starting at age 40.

The cancer society, in a statement by Dr. Otis W. Brawley, its chief medical officer, agreed that mammography had risks as well as benefits but, he said, the society's experts had looked at "virtually all" the task force and additional data and concluded that the benefits of annual mammograms starting at age 40 outweighed the risks.

Other advocacy groups, like the National Breast Cancer Coalition, Breast Cancer Action, and the National Women's Health Network, welcomed the new guidelines.

"This is our opportunity to look beyond emotions," said Fran Visco, president of the National Breast Cancer Coalition. The task force "is an independent body of experts that took an objective look at the data," Ms. Visco said. "These are the people we should be listening to when it comes to public health messages."

Some women, though, were not pleased. "I know so many people who had breast cancer and survived, and what saved their lives was early detection," Janet Doughty, 44, of San Clemente, Calif., said in a telephone interview. She said she had had an annual mammogram since her late 30s and would not stop now.
The guidelines are not expected to have an immediate effect on insurance coverage but should make health plans less likely to aggressively prompt women in their 40s to have mammograms and older women to have the test annually.

Congress requires Medicare to pay for annual mammograms. Medicare can change its rules to pay for less frequent tests if federal officials direct it to.

Private insurers are required by law in every state except Utah to pay for mammograms for women in their 40s.

But the new guidelines are expected to alter the grading system for health plans, which are used as a marketing tool. Grades are issued by the National Committee for Quality Assurance, a private nonprofit organization, and one measure is the percentage of patients getting mammograms every one to two years starting at age 40.

That will change, said Margaret E. O'Kane, the group's president, who said it would start grading plans on the number of women over 50 getting mammograms every two years.

The message for most women, said Dr. Karla Kerlikowske, a professor in the department of medicine, epidemiology and biostatistics at the University of California, San Francisco, is to forgo routine mammograms if they are in their 40s.

Starting at age 50, Dr. Kerlikowske said, "the message is to get 10 mammograms in a lifetime, one every two years." That way they get the most benefit and the least harm from the test. If women are healthy, she added, they might consider having mammograms every two years until age 74.

Nearly two-thirds of all women in their 40s had mammograms within the last two years, as did 72 percent of women age 50 to 65, according to an editorial by Dr. Kerlikowske that accompanies the report.
In order to formulate its guidelines, the task force used new data from mammography studies in England and Sweden and also commissioned six groups to make statistical models to analyze the aggregate data. The models were the only way to answer questions like how much extra benefit do women get if they are screened every year, said Donald A. Berry, a statistician at the University of Texas M. D. Anderson Cancer Center and head of one of the modeling groups.

"We said, essentially with one voice, very little," Dr. Berry said. "So little as to make the harms of additional screening come screaming to the top."

The harms are nearly cut in half when women have mammograms every other year instead of every year. But the benefits are almost unchanged.

The last time the task force issued guidelines for mammograms, in 2002, the reportwas announced by Tommy G. Thompson, the secretary of health and human services. When the group recommended mammograms for women in their 40s, some charged the report was politically motivated. But Dr. Alfred Berg of the University of Washington, who was the task force chairman at the time, said "there was absolutely zero political influence on what the task force did."

It was still a tough call to make, Dr. Berg said, adding that "we pointed out that the benefit will be quite small." In fact, he added, even though mammograms are of greater benefit to older women, they still prevent only a small fraction of breast cancer deaths.

Different women will weigh the harms and benefits differently, Dr. Berg noted, but added that even for women 50 and older, "it would be perfectly rational for a woman to decide she didn't want to do it."
Researchers worry the new report will be interpreted as a political effort by the Obama administration to save money on health care costs.

Of course, Dr. Berry noted, if the new guidelines are followed, billions of dollars will be saved.
"But the money was buying something of net negative value," he said. "This decision is a no-brainer. The economy benefits, but women are the major beneficiaries."

Roni Caryn Rabin contributed reporting.

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Israeli university puts professors on trains

AFP – Professor Hanoch Gutfreund from the Hebrew University of Jerusalem lectures commuters on a morning train …

by Gavin Rabinowitz Gavin Rabinowitz – Wed Nov 4, 11:18 am ET

MODIIN, Israel (AFP) – A morning commute seems like a good time to embark on an ambitious train of thought.

At least, that was the idea from the Hebrew University of Jerusalem, which put a professor on a train on Wednesday to lecture commuters.

Passengers on the 9:00 am train from the suburban community of Modiin to Tel Aviv put away their morning tabloids and iPods to listen to a talk from Professor Hanoch Gutfreund on "Einstein's love letters."

The lecture was the first of the university's "scientists on the rails" programme -- an attempt to broaden the appeal of higher education and bring academia to the people.

"The public needs to understand the importance of higher education," said university spokeswoman Orit Sulitzeanu. "Higher education is facing a crisis, its status is eroding and people need to understand it's a strategic asset for the country."

Gutfreund, a former university president, regaled commuters with the details of Albert Einstein's love letters to his two wives, showing how the personal details gave an insight into the life of the great scientist during the period he revolutionised the way we understand the universe.

"We wanted something scientific, but that would also speak to the wider population," Sulitzeanu said, explaining the choice of topic.

The university is also home to the Albert Einstein Archives, the repository of his personal papers.

"I've never given a lecture before where half of the people have their backs to me," said Gutfreund of the talk that was warmly received despite the occasional interruption from the conductor announcing the next station.

"It was wonderful," said Isabelle Tovi, a regular commuter on the line.

"I'd love to attend university lectures, but I just don't have the time," she said, adding that she might consider changing the time of her morning commute to catch the lectures.

Unsure how the move would be received, the train talks have been scheduled for just after morning rush-hour and only in one carriage on the train to avoid antagonising people, said Sulitzeanu.

As the train chugged through tunnels and past the airport, one woman interrupted the professor with a question.

"Will you finish your talk before we reach (Tel Aviv's) Arlozorof station?" she wanted to know.

"Madam, by the time we reach Arlozorof you'll have your BA," came the reply from Gutfreund.

http://news.yahoo.com/s/afp/20091104/od_afp/israeluniversitytrainoffbeat_20091104162647

Balearic goats could grow slow

- 17:58 17 November 2009 by **Jessica Hamzelou**

This was clearly no ordinary goat. *Myotragus balearicus* lived on the Balearic Islands in the Mediterranean Sea until 3000 years ago, and, new research shows, had bones that resembled those of a reptile. This unusual feature could explain how the species survived 5.2 million years in a barren landscape.

Fossil records show that large mammals living on islands have often evolved to be smaller than their mainland counterparts. Many think that this dwarfism allows the animals to cope with the paucity of resources on islands.

Now, Meike Köhler and Salvador Moyà-Solà at the Autonomous University of Barcelona in Spain have shown that the extinct Balearic Islands cave goat evolved an unusual way of coping with its sparse food supply. The pair found growth rings in *Myotragus*'s fossilised bones. The telltale rings, much like tree rings, are typical of cold-blooded animals. This is because such animals go through phases of slow growth, and their growth sometimes halts altogether. The bones of warm-blooded mammals, in contrast, are constantly regenerating.

The authors say the rings they found in *Myotragus* bones were "comparable to those of crocodiles" and reckon the goat-like mammal was able to slow its growth rate and delay the age at which it matured in order to live longer on few resources.

Barren beat

Brian McNab, a physiological ecologist at the University of Florida in Gainesville, says the cave goat's variable growth rate did not necessarily involve hibernation. "I presume that they remained active throughout the year, but with a low rate of energy intake and expenditure."

McNab says that although animals do not necessarily conform to being strictly warm or cold-blooded, he is "stunned" by the discovery.

Whilst Köhler and Moyà-Solà reckon a slow growth rate contributed to *Myotragus*'s success at surviving on the barren Balearic Islands – the species was around for twice as long as the average mammal species – it also led to the creature's eventual demise. The goat's low growth rate and weak, small infants would have made it an easy target for human predators, who wiped out the species around 3000 years ago.

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http://www.newscientist.com/article/dn18170-balearic-goats-could-grow-slow.html

Mobile botnets show their disruptive potential

- 17 November 2009 by **MacGregor Campbell**
- Magazine issue 2734.

DENIAL-of-services (DoS) attacks are a common tactic used by "black hats" intent on bringing down a high-profile website, one owned by a bank or political party, say. But what if these hackers now have cellphone networks in their sights?

In a standard DoS attack, a network of infected PCs, a "botnet", would swamp a server with so many requests to view a web page that it would be unable to handle legitimate requests. Now Patrick Traynor of the Georgia Institute of Technology in Atlanta and colleagues have shown how a cellphone network could be the vehicle for an attack that would cut off calls for millions of users.

Traynor and his team used software that simulates a cellular network's Home Location Register (HLR) - a massive database that stores the details of every SIM card an operator issues and would typically contain details on up to 5 million subscribers. Traynor found that a botnet of fewer than 12,000 infected cellphones could disrupt 93 per cent of traffic - voice calls and SMS messages - to a hypothetical HLR of 1 million subscribers. In a real-life attack the owners of infected handsets would be unaware that their phone was part of a botnot.

"Phones have evolved so quickly - we've gone from just the ability to make phone calls to many of the things that desktop computers can do," says Traynor. "As utility comes to this platform, we have to expect that malicious behaviour is going to follow pretty quickly."

Indeed, the first phone botnet is believed to have been assembled earlier this year after an SMS worm called "Sexy Space" cascaded across cellphone networks. Users who clicked on a link in the message had software installed on their handset that was capable of communicating with a central server, making it possible for their phone to be controlled remotely by a third party.

The first phone botnet was assembled earlier this year after an SMS worm hit cellphone networks "These threats are certainly feasible. Whether they will be implemented by an attacker remains to be seen," says Zulfikar Ramzan of network security company Symantec. Ramzan points out that while smartphones are powerful, they are still not as attractive a target as PCs, which can be hijacked to send large amounts of spam or host malicious websites. He argues that while a mobile botnet might be used to bring down part of a cellular network, it's not clear how profitable such an attack would be.

http://www.newscientist.com/article/mg20427347.000-mobile-botnets-show-their-disruptive-potential.html

The Peeriodic Table of Illusions

- 12 November 2009 by **Richard L. Gregory**

Magazine issue 2733.

Illuminating illusion (Image: Rex Features)

FOR all the fun we have with them, illusions do serious work in illuminating how our brains work, and in particular how perception works. They may also help us understand how consciousness developed, and tell us about our "neuro-archaeology" and the behaviour patterns laid down in the nervous system over evolutionary time.

But let's concentrate on perception: it is tricky enough. I've tried to classify illusions in a way that shows the principles underlying them, starting with physical causes, moving on to physiological disturbances of neural signals, and finally to cognitive processes - where the brain tries to make sense of sensory signals, not always successfully.

The distinction between physiological and cognitive is not straightforward. It's rather like the distinction between how a machine works and what it does. For example, a can opener needs two descriptions: the mechanism of levers and cutters, and what this does to open a can.

That distinction between physiological and cognitive has "real-world" consequences. Think of the placebo effect, which suggests close connections between the physiological and the cognitive-psychological. So different types of illusions could be significant in ways we do not yet know. That's why I have constructed my Peeriodic Table of Illusions (bad pun intended) thus: blindness, the ambiguities, instability, distortion, fiction, and paradox, plus their causes.

Starting with blindness perhaps seems odd but the many kinds of blindness and accompanying visual phenomena tell us much about perception. Blindness ranges from the physiological, with no sensation

of light and colour (congenitally or from injury or disease) to various mind blindnesses, such as agnosia, when light, colour, movement and form are perceived but the object seen lacks meaning.

Another form is change blindness, where a person fails to notice big differences in a picture or scene - sometimes even when someone in that scene has been substituted.

Next come the ambiguities. Confounded ambiguity illusions depend on a failure to properly distinguish between two objects, in poor light or because of our ageing senses. Differences in the brightness of regions of an object or scene help us see detail; limited light makes the visual brain choose whether neural activity is due to the presence of light or to neural "noise". Both neural noise and light fluctuate randomly so to see anything reliably we need significantly more photons.

As for flipping ambiguity, such as the duck-rabbit illusion, there are two theories about how they work: either the brain tires of one image and switches to the other, or there are two perceptions vying for centre stage. Since perception usually changes when what is "out there" changes, this spontaneous flipping may tell us the brain is switching its opinion as it ponders alternative interpretations. Oddly, flipping gets easier with practice. It is as if more or less feasible alternatives wait in the wings to challenge the present interpretation. Once, after weeks looking at ambiguous figures, I found solid objects, even concrete buildings, flipping in front of my eyes!

One of the most famous kinds of instability illusion is created by the use of those repeated patterns so typical of 1960s Op Art, which make the picture appear to be moving. Again, the causes are controversial. One view is that these patterns stimulate brain regions in the V5 area to produce sensations of movement. Or it may be that there is motion at the retina from eye tremor, and from the lens trying to focus the image, which may stimulate the movement systems - especially from high-contrast repeated lines.

Distortion illusions are arguably the most controversial since they most concern the distinction between illusions created by receiving neural signals (reception), where things can go wrong physiologically, and illusions of misreading signals (perception), where things can go wrong cognitively; back to the physiological versus the cognitive again.

Years ago I was struck by the idea that Ponzo illusions and the Muller-Lyer illusions, which normally show converging lines and arrows, are simple perspective pictures of 3D objects (corners, in the case of Muller-Lyer), or scenes (receding railway tracks, in the case of Ponzo illusions), and that to understand them we should think about how three dimensions are seen in 2D pictures. This includes the retinal images of normal objects.

We know what we see is very different from the images on our retinas because perceptions are scaled, like maps. So what sets the scaling for seeing the sizes and shapes of surrounding objects? Using ambiguity illusions I found that the scaling in Ponzo and Muller-Lyer illusions can be set from visual cues, such as the convergence of lines by perspective, or from the current perception of distance. The fact that the same retinal image can give more than one perception, as when perceptions "flip", is useful because it lets us separate "bottom-up" (from the eye) from "top-down" (from the brain) processes. This way we know that a perceptual change without a change in the eye must be top-down, from the brain, and not bottom-up, as there is no change in the image.

This leaves us with fiction and paradox. Fictional illusions are not necessarily false, any more than a novel is altogether false, though fictional. They are generated by the creative activity of the visual brain, generally guided by knowledge from the past, often predicting the immediate future. There are probability-statistical principles here known as Bayesian inference.

One "fiction" concerns the blind spot on the retina, where the optic nerve is. One of nature's most amazing illusions is that we don't see this region as a black hole in visual space. The brain generally "fills in", using surrounding colours and patterns.

One of nature's most amazing illusions is that we don't see our blind spot
The last category, paradox, brings us to René Magritte's *Carte Blanche* (left). The illusion turns on the unlikeliness or impossibility of an event. For example, a person swimming the Atlantic is unlikely, but it is "allowed" by the rules of language; a dark-haired blonde, however, is impossible and not allowed by the rules, so it is a logical paradox. In *Carte Blanche*, we see an impossible horse we know could not be ridden or even be alive. Why? While the probable is by definition more likely to be occur, unlikely things do occur and we need to pay them special attention. But the Magritte horse? My hunch is that perceptions are hypotheses, depending both on rules, which may conflict, and on assumptions, which may be wrong.

As we have seen, there are a great variety of causes of these phenomena of seeing we call illusions. Many are imperfectly understood, and some have wildly different explanations. But illusions are invaluable because the clues they hold to how we see simply could not be found elsewhere.

Profile

Richard L. Gregory is emeritus professor and senior research fellow in the department of experimental psychology at the University of Bristol, UK. This essay is based on his latest book *Seeing through Illusions*, published by the Oxford University Press

http://www.newscientist.com/article/mg20427330.900-the-peeriodic-table-of-illusions.html

A Wake-Up Call on Bedbugs

By: Nicholas Kusnetz

Ray Lopez remembers the first report of bedbugs he received. It was March of 2003 when a woman called the New York community worker complaining in Spanish of chinches. Lopez had been helping people in the East Harlem neighborhood with pest infestations for years, but he had never heard the word before.

"I did some quick searches and I made the connection that it was a bedbug," said Lopez, who runs the environmental health program for Little Sisters of the Assumption Family Health Service, a community-based organization. "The only thing in my mind was the saying, 'Don't let the bedbugs bite.' I didn't know anything else beyond that."

Since then, he's visited apartments in hundreds of buildings across East Harlem to help people control infestations. Bites can cover the body and cause painful irritation. Severe reactions lead to welts and possibly anemia. But even a mild case can turn a person's life upside down, because of sleepless nights followed by frenzied days of trying to eliminate the menace. And these cases are growing exponentially. The bugs are arriving in offices and institutional buildings. Media reports are up. Federal and city agencies are beginning to form task forces. The blood-sucking parasite even made its way onto a recent episode of NBC's *30 Rock*.

In New York, confirmed violations — likely a fraction of the whole picture — shot from 82 in 2004 to more than 4,000 last year. There are no reliable national statistics, but the National Pest Management Association says calls to pest control companies across the country rose 71 percent from 2000-2005 and have continued to rise at a similar rate since. A bill in Congress that would provide money to states to help with inspections claims the number of infestations climbed 500 percent in the last few years. Bedbugs, it turns out, are very hard to control.

Cimex lectularius, the most common bedbug species, poses some vexing problems to exterminators and public agencies. The apple-seed-sized insect is nearly flat before it feeds and can fit in just about any crack. They hide in walls, furniture, piles of clothing, almost anything that provides a dark place to pass the day. Because they are so elusive, exterminators often miss parts of a colony. In apartment buildings, the parasite can crawl up the wall to the next unit. Or they can latch onto the old shirt you bring to the Salvation Army. They are what entomologists call communicable — we spread them and they even spread themselves.

Furthermore, because they feed on blood only, they can't be lured with poisonous bait as can ants or cockroaches; no matter how clean you are, you can't remove their food source. Finally, the most effective insecticides, such as DDT, were taken off the market years ago because of the danger they pose to public health. The insects are now developing resistance to the pyrethroids that exterminators use most commonly.

The problem seems to have caught government and researchers off guard, said Jody Gangloff-Kaufmann, a specialist at New York State's Integrated Pest Management program.

"I think a lot of people didn't recognize this was a problem that was going to explode," she said.

Gangloff-Kaufmann said that New York City and many counties simply don't have the money to deal with the problem. Across the country, local and federal agencies have been slow to address the spread of bedbugs, with only a handful of cities providing coordinated responses. New York created an advisory board last spring that began meeting in September. Lopez is a member of the board and said they are still

in the fact-finding stage; it will be months before they offer recommendations. One place they could look to is Franklin County, Ohio, which includes much of Columbus.

After watching bedbug cases rise out of control in Cincinnati, Paul Wenning knew it was only a matter of time before the parasites arrived in Columbus. As a special projects coordinator for Franklin County's health department, Wenning called a summit in November 2008 that led to the creation of an interagency task force. The idea was to get ahead of the bugs and teach people how to prevent infestations before they had them.

It turned out he was too late. One ZIP code in his county had four known cases of bedbugs in 2007. By this year, he said, the number had climbed to 233. But the Central Ohio Bedbug Task Force has since established one of the few coordinated policy responses in the country and the state is on the offensive. Citing current treatment methods as inadequate, Ohio's Agriculture Department recently asked EPA permission to treat homes with propoxur, a highly toxic insecticide used on crops and in flea collars.

Wenning said the task force's primary role is still education. They've produced a Web site with information on how to help prevent and treat bedbugs. There are links with guidelines for social service and health workers. There's a page for schools that includes a form letter to send to parents in the event of an infestation. This basic coordination and availability of information is one of the best things governments can do, experts say.

Franklin County agencies have also agreed to treat the problem as a public health threat, he said, allowing them to force landlords to treat their buildings and bring property owners to court if they refuse to act.

Because the bugs have not been shown to spread disease, many health agencies do not take a leading role to control infestations. If tenants refuse entry to an apartment, housing agencies may not be able to compel treatment, while a health department may have the authority to enter a dwelling with or without consent. Wenning and others argue that the stress and anxiety that infestations cause, not to mention secondary infections that can invade scratched bites, should put the bug under a health department's authority.

Federal agencies are beginning to respond as well. The Environmental Protection Agency held a summit last spring and is now organizing an interagency task force that includes the Centers for Disease Control, the Department of Housing and Urban Development, and other agencies. In an e-mail message, an EPA spokesman said the task force is now meeting regularly.

"The task force will help us coordinate our messages, research, and other efforts on bed bug control on a federal level," the spokesperson wrote. They are working on a Web page that will provide information to the public, but there is no release date yet.

How did we get to such a frantic point?

We've been living with the creatures ever since our ancestors ventured into caves thousands of years ago, where the bugs were living and feeding off bats and other animals. The word "bug" itself may have been first used in reference to bedbugs, evolving from the Middle English word bugge, or "an object of terror."

But after World War II, widespread use of highly toxic, residual pesticides nearly wiped them out in the developed world. By the mid-1990s, entomologists had troubling finding live samples for research. But sometime in the late 1990s and early 2000s, bedbugs began to come back.

There is some disagreement on the cause of the return, but there were most likely two driving factors. The most lethal pesticides had been taken off the market years earlier -the EPA banned DDT in 1972 — so residual levels of these chemicals had dissipated. Also, more people were traveling to more far-flung corners of the world, and they likely began to bring the bug to areas where it had been eradicated.

And by this point, bedbugs had become nothing more than a quizzical part of a rhyme that grandma would tell before tucking you in to bed. People simply weren't aware of the bugs, so they weren't aware of how to prevent them either. Things may be changing now, Wenning said.

"There's been a shift in public awareness," he said. A 30 Rock mention says it all.

Ray Lopez, for his part, last year was named a Community Health Leader by the Robert Woods Johnson Foundation. Money from the grant — $105,000 for the project, $25,000 for him — is going toward his bedbug program.

While education is critical, there is consensus that concerted efforts are needed on the part of public agencies across the country, from county health departments to the CDC, to update laws and regulations and come up with a coordinated response. In New York, for example, it is often not clear whether the tenant or the landlord is responsible for treating an infestation, said Ray Lopez. Wenning said a step as simple as requiring thrift stores to wash their clothes before sale could make a big difference.

Another problem is that even though bedbugs can affect people of all incomes, they tend to become a real problem in poor neighborhoods. Tenants often do not have the money to hire an exterminator and fear retribution from a landlord if they report the problem. New York's advisory board is examining the creation of a fund that would help poor people pay for extermination, but without such a fund, people often apply insecticides themselves, sometimes with disastrous results.

"We see a lot of people overusing pesticides," Lopez said. He's had cases where people were admitted to the emergency room after treating their own apartments.

While government is beginning to step in, public officials face an uphill battle. A single bug can live months or even a year without feeding. It can lay hundreds of eggs in its lifetime. And bugs are developing resistance to the only tools we currently have. Wenning said that until federal and state governments begin to organize a better response - for example, researchers in Connecticut are looking at using a fungus to treat the bugs - and until we develop and approve better treatment methods, there is little that people like him can do.

"I don't look for it to get any better," he said. "If anything, I look for it to get worse."

http://www.miller-mccune.com/health/a-wake-up-call-on-bedbugs-1619?utm_source=Newsletter84&utm_medium=email&utm_content=1124&utm_campaign=newsletters

Review: The Importance of Being Not So Earnest

By: Lewis Beale

As far as Philippe Diaz is concerned, the issue of world poverty is a simple mathematical problem. "If we consume 30 percent more than the planet can regenerate, it means for us in the Northern Hemisphere to maintain our lifestyle, we have to plunge more people in the Southern Hemisphere into poverty. We have [an economic] system that is digging a bigger hole every year."

Diaz is the writer-director of *The End of Poverty?* a documentary that opens throughout the country over the next several months. His film spends 104 minutes attempting to explain how this all happened. In this case, that means taking the long view, which might be too long for some viewers. *The End of Poverty?* begins 500 years ago, showing how Europeans introduced capitalism to their newly acquired colonies, ripped off the indigenous cultures, sold some into slavery and basically used the Americas, Africa and parts of Asia as natural resource centers for their burgeoning industrial might.

In what the film refers to as "mental colonization" — imposing an outside culture through religion and other means — you have a film that could have been subtitled Rapacious Capitalism 101.

"I would have started even earlier" on the historical timeline, Diaz said, "if I had had time in the film. But when you have an hour and a half, you have to start somewhere, and I felt people could relate easily to the beginning of modern times."

For some, however, modern times might not arrive until about midway through the documentary, when Diaz takes on the world monetary system and how it has kept the globe's poorest countries in debt through the policies of the World Bank, International Monetary Fund and World Trade Organization. *The End of Poverty?* sees this happening in a number of ways:

• Forcing countries to pay off loans left over from the colonial era.

• Opening markets to subsidized agricultural products from more developed countries, thereby driving down prices and hurting indigenous farmers.

• Encouraging "structural adjustment" programs, which privatize key resources like water.

• Making countries reduce expenditures to pay off their debts, which means privatizing educational and health care systems.

Diaz uses footage from countries like Brazil, Venezuela, Bolivia and Kenya to show how the extreme poor are affected by these policies. Title cards spread throughout the film deliver some sobering statistics — the richest 1 percent of the world owns 32 percent of the wealth; 16,000 children die each day from hunger or hunger-related diseases; nearly a third of the world's population has no access to affordable clean water. There are also a few stats that seem a bit hard to believe, such as the claim that cutting world poverty in half would cost $20 billion. That figure wouldn't even buy every team in the NFL.

Diaz interviewed a panoply of experts — government officials, academics, Nobel Prize honorees (including economics prize winners Amartya Sen and Joseph Stiglitz) and heads of nonprofit organizations, to make his point. They all present a solid case for the destructive policies of the former colonizers and their financing institutions, although one or two come off as smug ideologues driving home their preconceived talking points.

The director denies his film is preaching to the choir. "It's not ideological, that's not the issue," he said, and adds that "in all these experts, you have two types: the pessimistic ones expecting a major crash, and the others who believe we are intelligent enough to change the system.

"I am one of the optimistic ones. Ten years ago, no one was talking about global warming; now everyone is; it's everywhere. And I believe the poverty issue is bigger than global warming, because today, people are dying every day because of it."

Solutions? Diaz says global poverty is a "systemic problem," which means big questions call for big answers. He and some of his experts think there are political solutions, like agrarian reform, an end to the monopolizing of resources and changing the tax system. But the ultimate answer may involve what Diaz refers to as "de-growth. It's consume less, but consume better. Right now, we are wasting quantities of everything. Unless we de-grow, we will explode."

The End of Poverty? is righteously impassioned, but a bit dry. All those talking heads don't help in a cinematic sense, and Diaz' focus might be too broad. Plus, some of the material, particularly that from the colonial era, seems overly familiar. Yet commitment like this is refreshing, and the issue the film is tackling is certainly of paramount importance.

"I feel," Diaz says, "we are in a major crisis we don't realize." On that point he, and his film, are certainly correct.

http://www.miller-mccune.com/culture_society/review-the-importance-of-being-not-so-earnest-1612?utm_source=Newsletter84&utm_medium=email&utm_content=1124&utm_campaign=newsletters

The Invisible Woman of Color

By: Tom Jacobs

Ralph Ellison's *Invisible Man* is a classic novel about a black man who feels unseen by his white neighbors. But new research suggests the most invisible Americans of all may be African-American women.

A just-published study suggests black women experience "a qualitatively different form of racism" that contributes to them not being "recognized or correctly credited for their contributions." On an unconscious level, African-American females are "treated as interchangeable and indistinguishable from one another," according to University of Kansas psychologists Amanda Sesko and Monica Biernat.

In the *Journal of Experimental Social Psychology*, Sesko and Biernat describe two experiments — one testing facial recognition, another examining spoken statements. In the first, 131 white undergraduates looked at 32 headshots. After completing a short filler task, they were shown those same 32 photos along with 24 new head shots — six each of white men, white women, black men and black women. They were asked to indicate whether each photo was new, or a repeat from the first group.

The results: "White participants were least likely to correctly recognize black women in comparison to the other groups. They were relatively unable to distinguish a black woman they had seen before from a 'new' black woman."

In the second study, participants listened to a recorded conversation among eight college students, and were shown photos of the discussion participants as they spoke. Afterwards, they were asked to match specific statements with photos of the people who spoke them.

"Black and white women were more likely to be confused with each other than black and white men," the researchers report. "Participants were more likely to incorrectly attribute statements made by black women to other targets than they were to misattribute white women's, black men's or white men's statements."

"These effects cannot be attributed to particular features of the targets, as careful pre-testing was conducted to ensure equal age, attractiveness, facial expression and distinctiveness (among the head shots)," the researchers conclude. "Instead, these studies provide evidence of black women's relative invisibility, at least among college-age white samples on a predominantly white campus."

http://www.miller-mccune.com/news/the-invisible-woman-of-color-1623?utm_source=Newsletter84&utm_medium=email&utm_content=1124&utm_campaign=newsletters

Bare Breasts Don't Beget Boffo Box Office

By: Tom Jacobs

Want your movie to make more money? Throw in a gratuitous sex scene. At least, that seems to be the working assumption among certain studio executives, who assume a flash of female flesh will increase the box-office take by attracting young male audiences.

It turns out they haven't been keeping abreast of the latest research."Analyses of 914 films released between 2001 and 2005 indicated that sex and nudity do not, on the average, boost box office performance, earn critical acclaim or win major awards," reports a new study titled "Sex Doesn't Sell — Nor Impress." According to the researchers, sex and nudity were negatively correlated with a film's net profits from domestic distribution and had no positive impact on a picture's popularity or prestige according to a wide variety of measures.

"I have yet to see a way of crunching the numbers where sex/nudity has a positive relationship with box office, even controlling for MPAA rating or budget," reports co-author Anemone Cerridwen, an independent scholar based in Vancouver, British Columbia. "'Sex sells' is a myth, at least for this database.""When I presented these results at European Science Days this summer, I was struck by how hard it is to overcome preconceptions about the box-office consequences of highly graphic sexual content," says co-author Dean Keith Simonton of the University of California, Davis. "But not all truisms are true."

"The most the market can apparently handle is PG-13 sexuality, and even there, there may be a loss relative to PG or even G," he adds. Their paper is published in the November issue of the journal *Psychology of Aesthetics, Creativity and the Arts*.

Cerridwen and Simonton analyzed "the bulk of the films that were widely distributed in mainstream theaters" during the five-year period, looking at box office performance (domestic and international), critical evaluations and awards. Using criterion established by the Web site Screen It, they calculated the extent of potentially objectionable material, including sex and nudity."It is apparent at once that sex doesn't sell by any of the four box office criteria, including the rough indicator of U.S. net," the researchers write. (The other criteria are gross receipts for the U.S., U.K. and worldwide.) They add that "the adverse effect of sex is actually greatest for world gross," which suggests the appetite for sexual content is actually lower outside the U.S.

In addition, they found sex and nudity have a negative relationship with critical evaluations of films (as measured by ratings in DVD guides). "In the case of movie awards," they add, "sex/nudity does have a small positive correlation with the Golden Globes, an appreciation not shared with the Oscars." (Insert your own snarky comment about the Hollywood Foreign Press Association here.)Simonton considers their findings particularly striking in light of the fact that "sex is cheap with respect to production costs. Female actors can be hired for less than male actors, and can be urged (i.e. coerced?) into displaying more sexual nudity/activity; and for various reasons, sex scenes may be less expensive to shoot. And yet, mainstream cinema still can't get an additional buck out of the practice."

If and when this lack of a payout comes to the attention of producers, the amount of needless nudity in films may decrease. But that doesn't mean Hollywood will cease to profit from catering to our ignoble instincts."In contrast (to sex and nudity)," the researchers note, "violence tends to have a positive effect on U.S. and world gross. Only the U.K. consumer seems immune to this particular content."

http://www.miller-mccune.com/mediator/bare-breasts-dont-beget-boffo-box-office-1616?utm_source=Newsletter84&utm_medium=email&utm_content=1124&utm_campaign=newsletters

Will a Computer's Conscious Mind Emerge?

If the human brain is data being passed from neuron to neuron at its basic level and we can simulate that in a computer, shouldn't a conscious mind start to emerge?

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If you want to simulate how the brain works, you need to imitate the electrical signals there that tell neurons which neurotransmitters to release.
iStockphoto

As you might have heard, supercomputers are now powerful enough to simulate crucial parts of cat brains and are on their way to map sections of the human mind to learn more about its basic functions. One day in the near future, we may very well be looking at complete simulations of a human brain that can imitate our key mental abilities. And if you believe some of the more ambitious computer science theoreticians, we'd make a giant leap towards creating conscious and aware artificial intelligence.

If the human brain is data being passed from neuron to neuron at its basic level and we can simulate that in a computer, shouldn't a conscious mind start to emerge?

Simulated Thought Is a Long Way from Real Thinking

This argument, advanced by Michael Vassar or the Singularity Institute and his colleagues, is one of those ideas that sound intuitively plausible, but highly dubious in practice. The difference between simulated thinking and conscious thinking can be illustrated by thinking about the difference between a computer simulated boat and a real one.

High end graphic programs will let you draw a boat and put it on a virtual plane of water. It will let you specify the environment, solve a number of Navier-Stokes equations, calculate the exact amount of force to apply to each section of the ship and then it will calculate how the ship reacts to the changes. The end result is a visualization of what we think looks right instead of a real boat.

If you want to simulate how the brain works, you need to imitate the electrical signals there that tell neurons which neurotransmitters to release. It's a messy and complicated process rife with constant misfiring.

Just like our example of a virtual boat, a digital human brain would be a visualization of what we're pretty sure happens in our heads according to current scientific knowledge. This is why the manager of

IBM's Cognitive Computing Unit, Dharmendra Modha, says, "Our hope is that by incorporating many of the ingredients that neuroscientists think may be important to cognition in the brain, such as general statistical connectivity pattern and plastic synapses, we may be able to use the model as a tool to help understand how the brain produces cognition."

Translation: the simulations of a human brain will give us an approximate map of how the thought process plays out and a conscious, self-aware mind is not going to arise from this statistical construct. The point is to try and make a computer that comes up with several approaches to tackling a problem, not to create a virtual human, or a digital cat that can match wits with a real human or a real feline respectively.

A Computer Brain is Still Just Code

In the future, if we model an entire brain in real time on the level of every neuron, every signal, and every burst of the neurotransmitter, we'll just end up with a very complex visualization controlled by a complex set of routines and subroutines.

These models could help neurosurgeons by mimicking what would happen during novel brain surgery, or provide ideas for neuroscientists, but they're not going to become alive or self aware since as far as a computer is concerned, they live as millions of lines of code based on a multitude of formulas and rules. The real chemistry that makes our brains work will be locked in our heads, far away from the circuitry trying to reproduce its results.

Now, if we built a new generation of computers using organic components, the simulations we could run could have some very interesting results.

http://news.discovery.com/tech/computer-conscious-mind-emerge.html

DNA 'Barcode' for Tropical Trees

Climbing to the canopy: the uppermost part of trees, an area with particularly rich biodiversity near the CNRS Nouragues Station in French Guiana. (Credit: Copyright J.CHAVE/CNRS)

ScienceDaily (Nov. 23, 2009) — In foods, soil samples or customs checks, plant fragments sometimes need to be quickly identified. The use of DNA "barcodes" to itemize plant biodiversity was proposed during the 1992 Rio de Janeiro Summit. Jérôme Chave's team from the Evolution et diversité biologique [(1)] laboratory has tested this method in the tropical forest where the CNRS Nouragues, French Guiana [(2)] research station is located.

Their study, published in *PLoS One*, shows that while the identification of plant species has improved considerably, some aspects of this method remain problematic, especially for tropical species.

Creating a large-scale inventory of plant biodiversity is essential for the development of conservation strategies. Within the framework of the Convention on Biological Diversity[(3)], the use of DNA barcoding was proposed for the identification of plant and animal species. This method consists of using tissue to sequence short DNA fragments which contain a substantial amount of information. These fragments are then compared to a reference collection to identify their origin. In August 2009, after several years of debate, an international consensus headed by the Plant Working Group of the Consortium for the Barcode of Life (CBoL) was reached, according to which two DNA markers (two gene regions dubbed rbcL and matK) would suffice to characterize 250,000 plant species.

The team from the Toulouse Evolution et diversité biologique[(1)] laboratory, in collaboration with Guyanese partners, conducted the first test of this DNA barcoding method in a tropical forest environment. A total of eight candidate barcodes were tested on over 200 tree species sampled at the CNRS Nouragues research station in French Guiana[(2)]. More than 2,000 DNA sequences were thus generated for this project. The study yielded significant progress in species discrimination. However,

identification success did not exceed 70% and one of the two markers proposed by CBoL proved very difficult to sequence.

At the crossroads between basic research and applied research, this work suggests that despite being an invaluable tool for identifying plant species, the international DNA barcoding method poses problems for exclusively tropical plant families. Solving them would, among other things, enable researchers to itemize and track the biodiversity of Amazonian plants much more efficiently.

Notes:

(1) Evolution et diversité biologique laboratory (University Toulouse 3 / CNRS / Ecole nationale de formation agronomique)

(2) The Nouragues station is a CNRS research center located in the heart of the tropical forest of the Nouragues Natural Reserve in French Guiana. It is a key location for the study of tropical forests and their biodiversity.

(3) The Convention on Biological Diversity (CBD) is an international treaty adopted during the 1992 Earth Summit in Rio de Janeiro, with the aim of developing national strategies for the conservation and sustainable use of biodiversity. Part of the terms of the CBD covers the prohibition to use protected species such as orchids and rare woods for commercial purposes.

References:

"Identification of Amazonian trees with DNA barcodes." M-A Gonzalez, C Baraloto, J Engel, SA Mori, P Pétronelli, B Riéra, A Roger, C Thébaud, J Chave. (Published October 16, 2009). PloS ONE 4(10): e7483. doi:10.1371/journal.pone.0007483

Story Source:

Adapted from materials provided by CNRS.

http://www.sciencedaily.com/releases/2009/11/091106102954.htm

Scientists Find Molecular Trigger That Helps Prevent Aging and Disease

New research has unraveled a molecular puzzle to determine that within certain parameters, a lower-calorie diet slows the development of some age-related conditions such as Alzheimer's disease, as well as the aging process. (Credit: iStockphoto)

ScienceDaily (Nov. 23, 2009) — Researchers at Mount Sinai School of Medicine set out to address a question that has been challenging scientists for years: How does dietary restriction produce protective effects against aging and disease? And the reverse: how does overconsumption accelerate age-related disease?

An answer lies in a two-part study led by Charles Mobbs, PhD, Professor of Neuroscience and of Geriatrics and Palliative Medicine at Mount Sinai School of Medicine, published in the November 17 edition of the journal *PLoS Biology*. The study examines how dietary restriction and a high-caloric diet influence biochemical responses.

Dr. Mobbs and his colleagues unraveled a molecular puzzle to determine that within certain parameters, a lower-calorie diet slows the development of some age-related conditions such as Alzheimer's disease, as well as the aging process. How the diet is restricted -- whether fats, proteins or carbohydrates are cut -- does not appear to matter. "It may not be about counting calories or cutting out specific nutrients," said Dr. Mobbs, "but how a reduction in dietary intake impacts the glucose metabolism, which contributes to oxidative stress." Meanwhile, a high calorie diet may accelerate age-related disease by promoting oxidative stress.

Dietary restriction induces a transcription factor called CREB-binding protein (CBP), which controls the activity of genes that regulate cellular function. By developing drugs that mimic the protective effects of CBP -- those usually caused by dietary restriction -- scientists may be able to extend lifespan and reduce vulnerability to age-related illnesses.

"We discovered that CBP predicts lifespan and accounts for 80 percent of lifespan variation in mammals," said Dr. Mobbs. "Finding the right balance is key; only a 10 percent restriction will produce a small increase in lifespan, whereas an 80 percent restriction will lead to a shorter life due to starvation."

The team found an optimal dietary restriction, estimated to be equivalent to a 30 percent caloric reduction in mammals, increased lifespan over 50 percent while slowing the development of an age-related pathology similar to Alzheimer's disease.

The first part of the study looked at *C. elegans*, a species of roundworm, that were genetically altered to develop Alzheimer's disease-like symptoms. Dr. Mobbs and his team reduced the roundworms' dietary intake by diluting the bacteria the worms consume. In these types of roundworms, human beta amyloid

peptide, which contributes to plaque buildup in Alzheimer's disease, is expressed in muscle, which becomes paralyzed as age progresses. This model allowed researchers to readily measure how lifespan and disease burden were simultaneously improved through dietary restriction.

The researchers found that when dietary restriction was maintained throughout the worms' adulthood, lifespan increased by 65 percent and the Alzheimer's disease-related paralysis decreased by about 50 percent.

"We showed that dietary restriction activates CBP in a roundworm model, and when we blocked this activation, we blocked all the protective effects of dietary restriction," said Dr. Mobbs. "It was the result of blocking CBP activation, which inhibited all the protective effects of dietary restriction, that confirmed to us that CBP plays a key role in mediating the protective effects of dietary restriction on lifespan and age-related disease."

In the second part of study, Dr. Mobbs and his team looked at the other end of this process: What happens to CBP in a high-calorie diet that has led to diabetes, a disease in which glucose metabolism is impaired? Researchers examined mice and found that diabetes reduces activation of CBP, leading Dr. Mobbs to conclude that a high-calorie diet that leads to diabetes would have the opposite effect of dietary restriction and would accelerate aging.

Dr. Mobbs hypothesizes that dietary restriction induces CBP by blocking glucose metabolism, which produces oxidative stress, a cellular process that leads to tissue damage and also promotes cancer cell growth. Interestingly, dietary restriction triggers CBP for as long as the restriction is maintained, suggesting that the protective effects may wear off if higher dietary intake resumes. CBP responds to changes in glucose within hours, indicating genetic communications respond quickly to fluctuations in dietary intake.

"Our next step is to understand the exact interactions of CBP with other transcription factors that mediate its protective effects with age," said Dr. Mobbs. "If we can map out these interactions, we could then begin to produce more targeted drugs that mimic the protective effects of CBP."

Story Source:

Adapted from materials provided by The Mount Sinai Hospital / Mount Sinai School of Medicine.

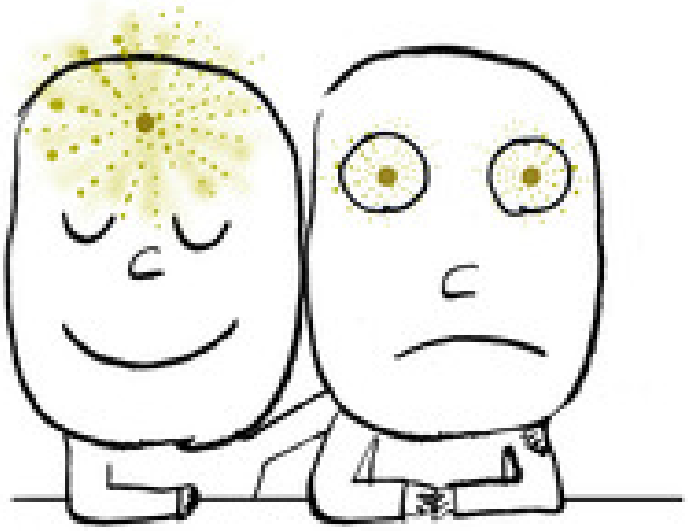
Journal Reference:

1. Zhang et al. **Role of CBP and SATB-1 in Aging, Dietary Restriction, and Insulin-Like Signaling**. *PLoS Biology*, 2009; 7 (11): e1000245 DOI: 10.1371/journal.pbio.1000245

http://www.sciencedaily.com/releases/2009/11/091118143217.htm

The Biology Behind the Milk of Human Kindness

By NATALIE ANGIER



As the festival of mandatory gratitude looms into view, allow me to offer a few suggestions on what, exactly, you should be thankful for.

Be thankful that, on at least one occasion, your mother did not fend off your father with a pair of nunchucks, but instead allowed enough contact to facilitate your happy conception. Be thankful that when you go to buy a pale, poultrylike entity, the grocery clerk will accept your credit card in good faith and even return it with a heroic garble of your last name. Be grateful for the empathetic employee working the United Airlines ticket counter the day after Thanksgiving, who understands why you must leave town today, this very minute, lest someone pull out the family nunchucks.

Above all, be thankful for your brain's supply of oxytocin, the small, celebrated peptide hormone that, by the looks of it, helps lubricate our every prosocial exchange, the thousands of acts of kindness, kind-of kindness and not-as-nakedly-venal-as-I-could-have-been kindness that make human society possible. Scientists have long known that the hormone plays essential physiological roles during birth and lactation, and animal studies have shown that oxytocin can influence behavior too, prompting voles to cuddle up with their mates, for example, or to clean and comfort their pups. Now a raft of new research in humans suggests that oxytocin underlies the twin emotional pillars of civilized life, our capacity to feel empathy and trust.

Reporting this month in The Proceedings of the National Academy of Sciences, researchers found that genetic differences in people's responsiveness to the effects of oxytocin were linked to their ability to read faces, infer the emotions of others, feel distress at others' hardship and even to identify with characters in a novel or "Doonesbury." "I came into this research as a big skeptic," said Sarina M. Rodrigues of Oregon State University, an author of the new report, "but the results had me floored."

Oxytocin may also be a capitalist tool. In a series of papers that appeared in Nature, Neuron and elsewhere, Ernst Fehr, director of the Institute for Empirical Research in Economics at the University of Zurich, and his colleagues showed that the hormone had a remarkable effect on the willingness of people to trust strangers with their money. In the Nature study, 58 healthy male students were given a single nasal squirt of either oxytocin or a placebo solution and, 50 minutes later, were instructed to start playing rounds of the Trust Game with each other, using monetary units they could either invest or withhold.

The researchers found that the oxytocin-enhanced subjects were significantly more likely than the placebo players to trust their financial partners: whereas 45 percent of the oxytocin group agreed to invest the maximum amount of money possible, just 21 percent of the control group proved so amenable. Moreover, the researchers showed that the oxytocin boost didn't simply make subjects more willing to take risks and throw their money around. When participants knew they were playing against a computer rather than a

human being, there was no difference in investment strategy between the groups. Trust, it seems, is a strictly wetware affair.

Yet the hormone doesn't turn you into a sucker. In the Nov. 1 issue of Biological Psychiatry, Simone Shamay-Tsoory of the University of Haifa and her colleagues reported that when participants in a game of chance were pitted against a player they considered arrogant, a nasal spritz of oxytocin augmented their feelings both of envy whenever the haughty one won and of schadenfreudian gloating when their opponent lost.

As a rule, though, oxytocin is a joiner not a splitter. Analogues of the molecule are found in fish, perhaps to help facilitate the delicate business of fertilization, by inhibiting a fish's natural tendency to flee from other fish. The more elaborate grew the social demands, the more roles oxytocin assumed, reaching its apotheosis in mammals. If you're going to give birth to a litter of needy young, why not let the same signal that helped push those mewlers into the world give you tips on their care and feeding? And if you're a human, bent on turning everything into an extended family affair, here is oxytocin again to cheerlead and teleprompt. C. Sue Carter of the University of Illinois at Chicago, a pioneer in the study of oxytocin, suspects that the association between the hormone and childbirth long kept scientists from taking it seriously. "But now that it's been brought into the world of economics and finance," Dr. Carter said, "suddenly it's very hot."

Oxytocin acts as a hormone, traveling through the bloodstream to affect organs far from its origin in the brain, and as a kind of neurotransmitter, allowing brain cells to communicate. Unlike most neurotransmitters, oxytocin seems to deliver its signal through just one receptor, one protein designed to recognize its shape and shudder accordingly when clasped; dopamine and serotonin, by contrast, each have five or more receptors assigned to their care. Yet the precise contours of oxytocin's hardworking receptor differ among individuals, to apparently noticeable effect.

In their new study, Dr. Rodrigues and Laura R. Saslow and Dacher Keltner of the University of California, Berkeley, looked at how two variants in the genetic code for the receptor might influence a person's capacity for empathy, as measured by a standard empathy questionnaire ("I really get involved with the feelings of the characters in a novel") and a behavioral task called "Reading the Mind in the Eyes." In it, participants looked at 36 black-and-white photographs of people's eyes and were asked to choose the word that best described each subject's mood. Uneasy, defiant, contemplative, playful? In a related measure of oxytocin's presumed calming effects, subjects were also tested for how strongly they reacted to the stress of hearing a series of loud noises.

In their sample of 192 male and female college students, the researchers found that those carrying the so-called A version of the oxytocin receptor, which previous reports had associated with autism and poor parenting skills, scored significantly lower on the eye-reading task and higher on the stress-prone test than did subjects with the G variant of the receptor.

"We're all different, and that's a good thing," Dr. Rodrigues said. "If everyone were gooey and lovey-dovey, it would be an obnoxious world." As she drolly admitted, she herself is Type A.

http://www.nytimes.com/2009/11/24/science/24angier.html?_r=1&ref=science

In Snails and Snakes, Features to Delight Darwin
By SEAN B. CARROLL

Charles Darwin seems to have had a boundless interest in the many forms life takes on earth. He could find something about any animal or plant that piqued his insatiable curiosity, and masses of such observations fueled his prodigious output of books and scientific papers.

Darwin was particularly intrigued by what he referred to as "contrivances," the various biological devices through which creatures make their livings or disperse their young.
Even the most pedestrian species seized his imagination. Take the Roman land snail Helix pomatia, for instance. If one is not a lover of escargot, this common European snail would inspire little attention. But not so for Darwin. He was gripped, and troubled, by the mere existence of land snails.
In 1857, he wrote his first letter to the naturalist Alfred Russel Wallace, who was then making his way across the Malay Archipelago. Wallace's own voyages and observations would independently lead him to the concept of natural selection.
Darwin explained his obsession: "One of the subjects on which I have been experimentising & which cost me much trouble is the means of distribution of all organic beings found on oceanic islands; & any facts on this subject would be most gratefully received: Land-Molluscs are a great perplexity to me."
To support his revolutionary theory that all species arose naturally from ancestors, Darwin was eager to find evidence of how land snails, which he knew were easily killed by salt, contrived to reach and populate oceanic islands. At home, he was conducting all sorts of experiments with submerging snails and their eggs in seawater for weeks at a time. After some Roman snails survived his long "baths," he suggested in "On the Origin of Species" that they might be transported to islands by adhering to the feet of birds or to driftwood.
On Tuesday, the world celebrates the 150th anniversary of the publication of Darwin's magnum opus. On this historic occasion, I thought that it would be most fitting to highlight some recent discoveries about some nifty contrivances that I am very sure would have delighted the great naturalist. And they all revolve around land snails.
To appreciate these discoveries, we have to know a bit about snail bodies.
While we may happily pick up and examine a nicely marked shell, most of us have, understandably, not taken the time to learn snail anatomy.
But if we look more closely at the greatest contrivance of snails, the protective shell, we can see that it is not only coiled, but also asymmetric. If we hold a shell with the opening facing us and the pointed tip facing up, the opening is usually on the right. These shells are referred to as dextral or right-handed. In rare individual snails from right-handed species, however, the shells will have the opening on the left and are referred to as sinistral, or left-handed. Some entire species are sinistral.
Biologists have known for almost a century that a simple genetic basis is behind shell handedness, at least in some species, such that the mutation of a single gene can cause right-left reversal. The mystery then is

why, if both forms can occur and reversal is genetically easy, are most species either entirely right- or left-handed?

An answer may be found in one of the logistical challenges that living with most of the body inside a shell imposes on snails — mating. Here is where handedness matters a lot. The genital opening is behind the right tentacle in right-handed snails. When land snails mate, they face each other, which brings their genital openings side by side. Snails with opposite handedness are misaligned, making it physically difficult for them to mate.

Any rare reversed individual snail would obviously have difficulty mating. As Darwin knew so well, if one cannot mate, it is the end of the line. Once of a given handedness, a species and its descendants would tend to stay that way.

But what if there were some other reversed individuals around? They could mate with one another and might form a new, reversed population. If members of that population continued to fail to mate successfully with snails of opposite handedness, that population might eventually evolve into a new species. And that seems to be exactly what has happened several times in a group of Japanese snails — and perhaps very many times in land snails in general.

The genus Euhadra is unusual in that it contains multiple left-handed species, as well as right-handed species. By tracing species pedigrees through DNA, the biologists Rei Ueshima from the University of Tokyo and Takahiro Asami from Shinshu University found that several right-handed species of Euhadra snails appeared to have evolved from a left-handed ancestor and that closely related left- and right-handed species could not successfully mate.

Both observations make perfect sense, but there may be something more to the explanation of why some species are left-handed than mating difficulties. There appears to be a greater diversity of left-handed land snails in Southeast Asia than elsewhere. Dr. Asami, Masaki Hoso and Michio Hori of Kyoto University have uncovered an astounding reason why this may be so — right-handed-snail-eating snakes.

About a dozen species of small Southeast Asian snakes in the Pareatinae subfamily specialize in eating land snails. But these escargot connoisseurs cannot crush the shell, so they extract the soft snail body from the shell by alternately retracting their left and right jawbones, or mandibles. Because the snails have asymmetric bodies, the researchers thought that the efficiency of extraction would be affected by different actions of the left and right mandibles. They examined the snakes' jaws in detail and found that they were right-handed or, better, right-mandibled.

In one species, for example, the left mandible bears 17 teeth and the right mandible 25 teeth. This asymmetry was present in all 12 snail-eating specialists, whereas the jaws of 2 nonsnail-eating species of the same subfamily were symmetrical, like those of all other snakes and vertebrates.

In order to test whether this contrivance was in fact useful to the snakes, the researchers conducted experiments in which they compared the efficiency of feeding on left- and right-handed forms of the same snail species. The snakes failed more often at consuming left-handed snails, apparently because their upper jaws barely reached the outer shell on which they needed to anchor. Even when the snakes managed to eat left-handed snails, the process of extraction required more time and effort.

The work shows that snail asymmetry has driven the evolution of a unique asymmetry in snakes, but, as Darwin would have predicted, the snakes also appear to be driving snail evolution. All right-handed snails are not all equally vulnerable to the snakes. Dr. Hoso and Dr. Hori identified a snail subspecies that had evolved a narrower aperture that impeded a snake's ability to work its jaws over the body. These snails escaped capture and predation more frequently than did their close relatives with larger apertures.

Darwin's genius was in finding great general truths among the details of humble, often obscure creatures. The lasting power of his influence stems from our ability to see the principles he, and Wallace, discovered at work wherever we look in nature.

I have to wonder, had the ship Darwin took, the H.M.S. Beagle, stopped in the Japanese Archipelago instead of the Galapagos Islands, land snails and snakes, and not finches, might be famous symbols of evolution today.

Sean B. Carroll is a molecular biologist and geneticist and the author of several books, most recently "Remarkable Creatures: Epic Adventures in the Search for the Origin of Species." He will be writing a column of the same title for Science Times, more or less monthly, on the remarkable creatures that scientists study and the remarkable creatures that many scientists are (or were). He is an investigator of the Howard Hughes Medical Institute at the University of Wisconsin.

http://www.nytimes.com/2009/11/24/science/24creature.html?ref=science

Museum Is Displaying Treasures of the Other Evolution Pioneer
By NICHOLAS WADE

One day in spring 1979, Robert E. Heggestad walked into a small antique shop in Arlington, Va. Mr. Heggestad, a young lawyer from Iowa, was looking for Chinese carpets. The selection of rugs in the small back room was disappointing, and he was about to leave when he noticed a handsome rosewood cabinet behind the cash register.

The owner wanted a sum that far exceeded Mr. Heggestad's budget — a colossal $600. "I was just out of law school, I had no money and no business buying it," he said. But the owner was willing to take installments of $100 a month, and into Mr. Heggestad's possession fell an incomparable scientific treasure.

The cabinet belonged to Alfred Russel Wallace, the English naturalist who conceived the idea of evolution through natural selection independently of Charles Darwin. It arrived earlier this month at the American Museum of Natural History on loan from Mr. Heggestad and will be on display starting Tuesday, the 150th anniversary of the publication of Darwin's "On the Origin of Species."
The cabinet is "a national treasure," said David Grimaldi, a curator at the museum, citing its historical value and Wallace's role in the theory of evolution.

Wallace, a naturalist and explorer, conceived the idea of natural selection while in Indonesia and described it in a letter to Darwin, prompting Darwin to announce his own theory, on which he had been working for many years. Work by the two authors describing their versions of the theory of evolution were announced at a meeting of the Linnaean Society in 1858.

definitive statement of the theory, and Wallace's role faded. But Wallace was a true co-discoverer of the greatest theory in biology, and an explorer and collector, like Darwin. Through their collecting, each developed a keen appreciation of natural variation. And each had read Thomas Malthus's theory of the struggle for existence at the edge of starvation, the background against which natural selection favors the fittest.

What fell into Mr. Heggestad's hands three decades ago was Wallace's personal collection of specimens, like fireflies he caught as a boy and prized items that formed the basis for his scientific work and are referred to in his books.

One other personal collection of Wallace's is known. Owned by the British Museum of Natural History, it is one-third the size and no longer in its original cabinet.

Mr. Heggestad's cabinet holds some 1,700 specimens, mostly botanical items, butterflies, dragonflies, moths and shells. The collection is in surprisingly good condition, mostly because he noticed some beetle damage and has added mothballs to every drawer for the past 30 years.

"Dermestid beetles," Dr. Grimaldi said, "would have rendered the collection to dust if he hadn't taken care of it."

What happened with the cabinet after it left Wallace's possession is mostly a mystery. Before turning up in Virginia, the cabinet was bought in 1964 by an antiques dealer from an unclaimed baggage sale in Philadelphia. He suspected that the cabinet belonged to Wallace, but never took the pains to prove it. Mr. Heggestad made some inquiries after he bought the cabinet and then let the matter drop.

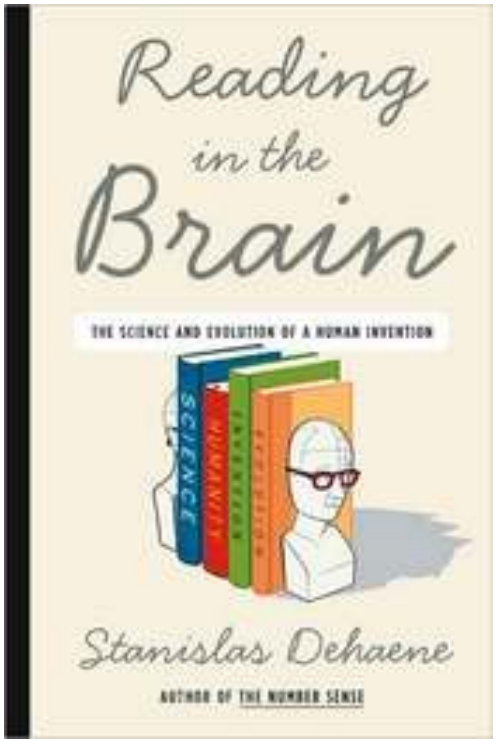
He kept the cabinet in his dining room until a friend advised him in 2007 that it should be in a museum. That inspired him to a flurry of research in which he compared the handwriting on the specimen labels with those in the British museum and studied the source of the specimens, putting beyond doubt that the collection was Wallace's.

The cabinet will be returned to Mr. Heggestad after being displayed at the American Museum of Natural History in New York. After that, he said, "I'm going to place it with a national museum, but I haven't decided which."

http://www.nytimes.com/2009/11/24/science/24cabi.html?ref=science

How our brains learned to read

Owen Flanagan, contributor



In his autobiographical *Confessions*, Augustine of Hippo recounts a strange sight: his teacher, Ambrose, reading to himself. At the time, reading was a public activity; the literate elite, being a rare commodity, would read the Bible aloud to the illiterate masses as a public service. Socrates, many intellectuals' role model, was in all likelihood illiterate.

Today we are readers. Evidence suggests that reading - which depends on an alphabet, writing materials, papyrus and such - is only about 5000 years old. The brain in its modern form is about 200,000 years old, yet brain imaging shows reading taking place in the same way and in the same place in all brains. To within a few millimetres, human brains share a reading hotspot - what Stanislas Dehaene calls the "letterbox" - on the bottom of the left hemisphere.

Dehaene builds his clear and interesting book around this "reading paradox," which is really more puzzle than paradox. It is standard procedure in cognitive neuroscience to assume that a brain area dedicated to a particular function - especially when it is universal - is an adaptation that evolved to serve a function related to reproductive success. The letterbox, however, cannot be an adaptation because reading is an utterly recent invention, unlike neurological abilities for language and socialising that were around long enough to have evolved. What's more, the letterbox does not ride on top of areas used for speech. Instead, it must be an "exaptation": a brain area that evolved to do one thing but has been co-opted to do another.

Dehaene calls this the "neuronal recycling hypothesis", which he enjoys announcing to considerable fanfare as a "novel" solution to the reading puzzle, though many neuroscientists have turned to exaptations to solve such mysteries. He sees the hypothesis as staking a middle ground between tabula-rasa and hard-wired-determinist views of human nature. The neuronal recycling hypothesis is the idea that "human brain architecture obeys strong genetic constraints, but some circuits have evolved to tolerate a fringe of variability", Dehaene writes. "Part of our visual system, for instance, is not hard-wired, but

remains open to changes in the environment. Within an otherwise well-structured brain, visual plasticity gave the ancient scribes the opportunity to invent reading."

So what did the reading module originally evolve for? Dehaene lets the answer to this question remain a mystery until the end, while he takes the reader on a fascinating tour of the neuroscience of reading. It is a rich and comprehensive book by a clear writer and a fine scientist.

Eventually we get the solution, admittedly speculative, to the puzzle. The area that reading co-opted originally evolved for the visual acuity needed to track animals, a skill with obvious survival benefits. Some of the evidence for this comes from studying line, edge and curve detection in the letterbox area, which also explains universal visual features of all alphabets.

Did we lose the capacity to track because reading has co-opted this neural space? Has our capacity to "read" patterns in nature diminished? Here Dehaene is hard to pin down. The brain has so much computing power that it seems doubtful that reading has knocked out the original ability.

I would have liked Dehaene to speculate on the future of reading. Some think reading will become obsolete as new technologies reutilise pictorial and auditory routes to do for us what reading does. What will culture and the brain conspire to do next? We may be figuring out how brains read just when we are on the verge of returning to living as very smart souls who don't read. *Socrates redux.*

Book Information:
Reading in the Brain: The science and evolution of a human invention by Stanislas Dehaene
Penguin, $27.95
http://www.newscientist.com/blogs/culturelab/2009/11/how-our-brains-learned-to-read.php?DCMP=OTC-rss&nsref=online-news

Medibots: The world's smallest surgeons

- 20 November 2009 by **Gaia Vince** and **Clare Wilson**

Magazine issue 2735.

Surgery just got smaller (Image: CP Canadian Press/The Canadian Press/Press Association Images)

A MAN lies comatose on an operating table. The enormous spider that hangs above him has plunged four appendages into his belly. The spider, made of white steel, probes around inside the man's abdomen then withdraws one of its arms. Held in the machine's claw is a neatly sealed bag containing a scrap of bloody tissue.

This is a da Vinci robot. It has allowed a surgeon, sitting at a control desk, to remove the patient's prostate gland in a manner that has several advantages over conventional methods. Yet the future of robotic surgery may lie not only with these hulking beasts but also with devices at the other end of the size spectrum. The surgeons of tomorrow will include tiny robots that enter our bodies and do their work from the inside, with no need to open patients up or knock them out. While nanobots that swim through the blood are still in the realm of fantasy, several groups are developing devices a few millimetres in size. The first generation of "mini-medibots" may infiltrate our bodies through our ears, eyes and lungs, to deliver drugs, take tissue samples or install medical devices.

The engineering challenges are formidable, including developing new methods of propulsion and power supply. Nevertheless, the first prototypes are already being tested in animals and could move into tests on people in the not-too-distant future. "It's not impossible to think of this happening in five years," says Brad Nelson, a roboticist at the Swiss Federal Institute of Technology (EHT) in Zurich. "I'm convinced it's going to get there."

It was the 1970s that saw the arrival of minimally invasive surgery - or keyhole surgery as it is also known. Instead of cutting open the body with large incisions, surgical tools are inserted through holes as small as 1 centimetre in diameter and controlled with external handles. Operations from stomach bypass to gall bladder removal are now done this way, reducing blood loss, pain and recovery time.

Combining keyhole surgery with the da Vinci system means the surgeon no longer handles the instruments directly, but via a computer console. This allows greater precision, as large hand gestures can be scaled down to small instrument movements, and any hand tremor is eliminated. There are over 1000 da Vincis being used in clinics around the world.

Heart crawler

There are several ways that such robotic surgery may be further enhanced. Various articulated, snake-like tools are being developed to access hard-to-reach areas. One such device, the "i-Snake", is

controlled by a vision-tracking device worn over the surgeon's eyes (*New Scientist*, 20 September 2008, p 21). It should be ready for testing on patients within four years, says developer Guang-Zhong Yang, a roboticist at Imperial College London.

With further advances in miniaturisation, the opportunities grow for getting medical devices inside the body in novel ways. One miniature device that is already tried and tested is a camera in a capsule small enough to be swallowed.

In conventional endoscopy, a camera on the end of a flexible tube is inserted either through the mouth or the rectum, but this does not allow it to reach the middle part of the gut. The 25-millimetre-long capsule camera, on the other hand, can observe the entire gut on its journey. More sophisticated versions are being developed that can also release drugs and take samples.

The capsule camera has no need to propel itself because it is pushed along by the normal muscle contractions of the gut. For devices used elsewhere in the body, some of the key challenges are developing new mechanisms for propulsion and power supply on a miniature scale.

One solution is to have wires connecting the robot to a control unit that remains on the outside of the body. This is the case for a robot being developed for heart surgery, called HeartLander.

Operating on the heart has always presented enormous challenges, says Marco Zenati, a heart surgeon at the University of Pittsburgh, Pennsylvania, who is one of the device's inventors. Conventionally the heart is stopped and the patient hooked up to a heart-lung machine. A more recent approach is to perform keyhole surgery on the beating heart, but even so several incisions must be made, and the left lung must be partly deflated to allow access, requiring a general anaesthetic.

The HeartLander robot is designed to be delivered to the heart through a single keyhole incision, from where it can crawl to the right spot. The heart does not have to be stopped, and the left lung need not be deflated, so the patient could be breathing naturally, with just a local anaesthetic. "Coronary surgery can become an outpatient procedure," says Cameron Riviere, the team's roboticist, based at Carnegie Mellon University in Pittsburgh.

Inchworm

The 20-millimetre-long HeartLander has front and rear foot-pads with suckers on the bottom, which allow it to inch along like a caterpillar. The surgeon watches the device with X-ray video or a magnetic tracker and controls it with a joystick. Alternatively, the device can navigate its own path to a spot chosen by the surgeon.

The HeartLander has several possible uses. It can be fitted with a needle attachment to take tissue samples, for example, or used to inject stem cells or gene therapies directly into heart muscle. There are several such agents in development, designed to promote the regrowth of muscle or blood vessels after a heart attack. The team is testing the device on pigs and has so far shown it can crawl over a beating heart to inject a marker dye at a target site (*Innovations*, vol 1, p 227).

Another use would be to deliver pacemaker electrodes for a procedure called cardiac resynchronisation therapy, when the heart needs help in coordinating its rhythm. At the moment, the electrodes are delivered to the heart by pushing them in through a vein. Riviere's group is devising electrodes that the HeartLander could attach to the outer surface of the heart. They have tested this approach successfully on one live pig, and expect to start trials in people in about four years. Riviere says there is growing evidence to show that the technique works best when the electrodes are sited in certain areas that are hard to access from inside the veins. "The HeartLander can crawl around to the best position," he notes.

While the robot could in theory be used in other parts of the body, in its current incarnation it has to be introduced through a keyhole incision thanks to its size and because it trails wires to the external control box. Not so for smaller robots under wireless control.

One such device in development is 5 millimetres long and just 1 millimetre in diameter, with 16 vibrating legs. Early versions of the "ViRob" had on-board power, but the developers decided that made it too bulky. Now it is powered externally, by a nearby electromagnet whose field fluctuates about 100 times a second, causing the legs to flick back and forth. The legs on the left and right sides respond best to different frequencies, so the robot can be steered by adjusting the frequency.

ViRob's developers at the Technion-Israel Institute of Technology in Haifa, are investigating several applications including taking tissue samples, delivering cancer drugs and getting a camera to hard-to-reach areas, such as deep within the lungs. The size of the camera is a limiting factor - the smallest models in development are 1.5 millimetres in diameter - but cameras get smaller every year, notes engineer Moshe Shoham.

The team would like their device to operate inside large blood vessels, but it is not yet powerful enough to withstand blood flow. "We don't want it swept away," says Shoham.

The first application for ViRob may benefit people born with hydrocephaly - fluid on the brain - as it may be able to extend the life of the shunts placed in the brain to drain the excess fluid. Over time such shunts tend to get blocked, and so need replacing every five to 10 years, entailing major brain surgery. Shoham says a self-cleaning shunt could be made by installing a ViRob permanently inside. About once a month it would be activated to send the device scuttling up and down the shunt, which patients might be able to do at home.

Another possible application might aid the insertion of cochlear implants. Used by deaf people, these are small electrodes placed within the delicate spiral-shaped cochlea to stimulate the auditory nerve. Shoham says ViRob would be able to carry the implant deeper inside the cochlea than can currently be done, giving patients better hearing. "The further you go into the cochlea, the more cells you excite," Shoham explains.

The ViRob would be able to carry a cochlear implant deeper into the ear
He reckons that tests on people are just a couple of years away. His team has a proven track record, having already commercialised a robot the size of a soft-drink can for a type of spinal surgery that involves fusing two vertebrae together. Called SpineAssist, the device is clamped over a keyhole incision on the spine, through which it finds the right spots on the vertebrae for the screws.

While the ViRob can crawl through tubes or over surfaces, it cannot swim. For that, the Israeli team are designing another device, called SwiMicRob, which is slightly larger than ViRob at 10 millimetres long and 3 millimetres in diameter. Powered by an on-board motor, the device has two tails that twirl like bacteria's flagella. SwiMicRob may one day be used inside fluid-filled spaces such those within the spine, although it is at an earlier stage of development than ViRob.

Another group has managed to shrink a medibot significantly further - down to 0.9 millimetres by 0.3 millimetres - by stripping out all propulsion and steering mechanisms. It is pulled around by electromagnets outside the body. The device itself is a metal shell shaped like a finned American football and it has a spike on the end.

The developers at ETH Zurich are focusing on eye surgery because it requires such a high level of precision - hand tremor can be a major problem for surgeons operating here. The other draw is that this medibot's progress inside the eye can be monitored by viewing the eye through a microscope.

One application for the ophthalmic robot, as they call it, is to measure oxygen levels at the surface of the retina, an indication of its blood supply. For this, the shell is coated with a photoluminescent chemical, the brightness of which depends on oxygen concentration.

The device could also be used to treat a major cause of blindness known as retinal vein occlusion, which occurs when a blood clot blocks the major vein at the back of the eye. Various drugs are being investigated as treatments, such as one that dissolves blood clots, but they are hard to deliver. At the moment a kind of access port known as a trocar is placed into the surface of the eye, and a needle is inserted to inject the drug into the vein, but getting the needle to the hair-thin blood vessel demands great surgical skill.

Once the ophthalmic robot is delivered through the trocar, on the other hand, it can be guided to the blocked vein by its magnetic propulsion system. Its spike pierces the blood vessel, and the drug, which coats the device, diffuses into the vein.

The Swiss team is experimenting with even tinier versions of the device that fit inside the barrel of a needle and would simply be injected into the eyeball, avoiding the need for a trocar. "We can make these smaller, but if we make them too small they cannot exert enough force to penetrate a vein," says Nelson.

If the device can be shrunk a little further it could simply be injected into the eye
Another refinement, he says, would be to make a biodegradable device that would not have to be removed from the eye. The shell would be made from a polymer, with an embedded metal particle to respond to the electromagnets. Once the polymer dissolved, the metal particle would be absorbed into the bloodstream and eventually excreted.

The team has been testing its devices on eyes removed from butchered pigs, and also on those of chicken embryos incubated in a Petri dish - a set-up that eye surgeons often practise on. So far they have shown that the robot can be put into the birds' eyes, steered to the right place and pierce the retinal vein.

The Swiss team is also among several groups who are trying to develop medibots at a vastly smaller scale, just nanometres in size, but these are at a much earlier development stage. Shrinking to this scale brings a host of new challenges, and it is likely to be some time before these kinds of devices reach the clinic.

Nelson hopes that if millimetre-sized devices such as his ophthalmic robot prove their worth, they will attract more funding to kick-start nanometre-scale research. "If we can show small devices that do something useful, hopefully that will convince people that it's not just science fiction."

Gaia Vince is a bioscience writer who is travelling the world to investigate the effects of climate change (www.wanderinggaia.com).

http://www.newscientist.com/article/mg20427351.100-medibots-the-worlds-smallest-surgeons.html

Gene change in cannibals reveals evolution in action

- 14:27 19 November 2009 by **Andy Coghlan**

Fore tribe women in 1957 suffering from kuru. The women are showing upper limb postures adopted to prevent postural tremors. From *Philosophical Transactions of the Royal Society B* (Image: 2008 The Royal Society)

It's a snapshot of human evolution in progress. A genetic mutation protecting against kuru – a brain disease passed on by eating human brains – only emerged and spread in the last 200 years.

When members of the Fore people in Papua New Guinea died, others would eat the dead person's brain during funeral rituals as a mark of respect. Kuru passed on in this way killed at least 2500 Fore in the 20th century until the cause was identified in the late 1950s and the practice halted.

Identification of kuru and how it was spread helped researchers identify how BSE – mad cow disease – spread through the feeding of infected cattle brains to other animals, and how this eventually led to variant Creutzfeldt-Jakob disease (vCJD), which has killed 166 people so far in the UK.

Simon Mead of the British prion research centre at University College London says the discovery of an "anti-kuru" gene is the most clear-cut evidence yet of human evolution in action.

"I hope it will become a textbook example of how evolution happens," he says. "It's a striking and timely example, given the 150th anniversary of the publication of Darwin's *Origin of Species*," he says.

Good mutations

Mead and his colleagues discovered the mutation after comparing stored DNA from 152 dead Fore victims of the disease with DNA from more than 3000 living Fore, including almost 560 who participated in the ritual eating of brains before it was banned.

In 51 survivors and their descendants, they discovered a hitherto-unknown variant of *PRNP*, the gene which makes prions, the proteins that spread the disease. These prions become malformed and in turn make all healthy prions they encounter malformed as well, in a chain reaction that ultimately destroys brains by turning them into a spongy mush.

The change in the gene comes at a position called codon 127. Throughout the animal kingdom, the codon contains the same amino acid, called glycine or "G", from each parent, giving the form G127G. To their astonishment, Mead and his colleagues found a variant of the codon never seen in nature

before, in which one of the glycines has been swapped for a valine amino acid, giving the new variant the name G127V.

Initially, Mead and his colleagues thought that because the variant had never been seen before, it must have damaging rather than beneficial effects. "We thought we'd found the trigger for how kuru happens, that someone ate the brain of someone with the mutation and that's how the disease started spreading through the cannibalistic funeral feasts," he said.

"Instead, we found the complete opposite, which is that it was protective."

Inherited health

The mutation first arose about 200 years ago by accident in a single individual, who then passed it down to his or her descendants. "When the kuru epidemic peaked about 100 years back, there were maybe a couple of families who found that they and their children survived while all their neighbours were dying, and so on to today's generation, who still carry the gene," says Mead. "So it was a very sudden genetic change under intense selection pressure from the disease," he says.

None of the 152 victims of kuru had the protective gene, suggesting that it provides almost complete resistance to the disease. But it's not yet known whether the variant protects against other prion diseases. Mead said that experiments are already under way in mice deliberately given the new mutation, to see if they are protected against both kuru and vCJD.

Mead says that the team has evidence that the prion protein made by the new variant might prevent the abnormal version of the prion from multiplying, giving clues to how to treat or prevent vCJD with drugs.

In 2003, Mead and his colleagues discovered a much more common variant of the prion gene that provides protection against prion diseases. The variant's position in the gene, at codon 129, is just two units away from the new one.

The protective variant at codon 129 is called "MV", standing for the amino acids methionine and valine. All deaths except one from vCJD have so far been in people with the "MM" variant, suggesting that they are specially at risk.

Jose Ordovas, who studies genetics and nutrition at Tufts University, Boston, said the finding "really supports the concept of very rapid adaptation of humans to the environment".

Journal reference: *New England Journal of Medicine*, vol 361, p 2056

http://www.newscientist.com/article/dn18172-gene-change-in-cannibals-reveals-evolution-in-action.html

Vaccine quest boosted by HIV that infects monkeys

- 23 November 2009 by **Ewen Callaway**

Magazine issue 2735.

The next big thing in HIV research (Image: Timothy Laman/NGS/Getty)
AN HIV virus modified to infect monkeys could be a big step forward for HIV research.

The disclosure last month that an experimental vaccine against HIV may not be as effective as first thought highlighted a nagging problem with HIV-vaccine research: that there is no effective way of testing them in animals.

All that could change if the new animal model of HIV is successful. Current primate models use simian immunodeficiency virus (SIV), which is similar but not identical to HIV.

The new model, developed by a team led by virologist Theodora Hatziioannou at the Aaron Diamond AIDS Research Center (ADARC) in New York, could guide future vaccine trials, drug development and basic research into the virus. "The potential applications are huge," Hatziioannou says. "It could change the way we do our animal research for HIV and AIDS." She presented her team's results at an AIDS research meeting in Boston last month.

Few researchers question the need for better animal models of the HIV virus, which about 33 million people are living with worldwide. In the early days of the AIDS epidemic, HIV therapies were tested on chimpanzees, the virus's original host. But HIV doesn't cause disease in chimps and their endangered status limited researchers' use of them. So they turned to monkeys and SIVs.

Today, labs use two main varieties of SIV: one from sooty mangabeys that causes an AIDS-like disease in macaques, and a hybrid virus called SHIV, which contains a cocktail of HIV genes spliced into SIV (see "The right virus for the job"). "Neither of the models corresponds to what happens with HIV in humans perfectly," Hatziioannou says. SIV thwarts the monkey immune system in a slightly different way to HIV, and SHIVs use only bits of HIV.

Hatziioannou's new virus, developed with Paul Bieniasz, also at ADARC, and researchers at the US National Cancer Institute in Frederick, Maryland, is based on two decades of research into how HIV and SIV foil immune systems. The research showed that the viruses work by overcoming two key defence proteins: TRIM5-alpha, which prevents retroviruses such as HIV from shedding their coat once they invade a cell, and APOBEC3G, which stashes itself inside newly formed viruses and sabotages their efforts to reproduce. HIV has learned to counter both of these proteins in humans, and SIVs do the same in monkeys. Yet monkey defences are not fooled by HIV.

Hatziioannou's breakthrough was to splice into HIV the SIV gene called *vif*, whose protein is unaffected by monkey APOBEC3G (*Proceedings of the National Academy of Sciences*, DOI: 10.1073/pnas.0812587106). The team found that the resultant virus, known as stHIV, causes a disease in pig-tailed macaques (which lack functional TRIM5-alpha) that mimics the early stages of HIV infection. This could make it a more useful tool for testing HIV drugs and vaccines than SIV or SHIV. The team also found that giving monkeys a high dose of antiretroviral drugs before infection with stHIV - a therapy being considered for people at high risk of HIV - prevented them from contracting the virus.

The spliced virus causes a disease in pig-tailed macaques that mimics early-stage HIV infection Hatziioannou's team cannot rest on these accomplishments, however. Even without drugs, the monkey's immune system eventually controls the virus and they never develop AIDS.

Malcom Martin at the National Institute of Allergy and Infectious Diseases in Bethesda, Maryland, whose team developed a similar HIV model, says more changes will be necessary. "There are a lot of other genes to think about if you really want to come up with a good animal model," he says.

The right virus for the job

SIV Asian rhesus macaques infected with simian immunodeficiency virus from sooty mangabeys develop something akin to AIDS. This is the most widely used animal model in HIV research, though SIV lacks a protein that HIV uses to thwart the human immune system.

SHIV SHIVs are hybrid viruses created by splicing a handful of HIV genes into the SIV genome. While these allow the testing of human vaccines in monkeys, some strains appear suspiciously easy for vaccines to defeat: a vaccine made by Merck that looked promising in a SHIV model failed in large-scale human trials.

stHIV In this new approach (main story), an HIV virus is redesigned to infect monkeys by adding one or two SIV genes. If it succeeds it could be used to test nearly all HIV drugs and vaccines, though it doesn't cause full-blown AIDS and works best in pig-tailed macaques, which are not widely available to researchers.

http://www.newscientist.com/article/mg20427353.600-vaccine-quest-boosted-by-hiv-that-infects-monkeys.html

US could ban caffeine-alcohol drinks within months

- 21 November 2009
- Magazine issue 2735. **Subscribe** and get 4 free issues.
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THE US Food and Drug Administration is unimpressed by the fad for drinks that contain a double hit - alcohol and caffeine. Unless makers supply the FDA with scientific evidence that the drinks are safe they could be banned within months.

The agency is worried that consuming the drinks - which can mask the effect of alcohol - leads to rash behaviour, car crashes, violence and assaults. The FDA issued the ultimatum last week in response to a request made by the National Association of Attorneys General. "Caffeine added to alcohol poses a significant public health threat," said a task force headed by the attorney-generals of Utah, Guam and Connecticut.

The FDA allows caffeine concentrations of up to 200 parts per million in soft drinks, but adding caffeine to alcohol is unregulated. At least two of the 27 companies contacted have already withdrawn their drinks.

In 2006, Cecile Marczinski and Mark Fillmore of the University of Kentucky found that consumers of the drinks felt they were less inebriated than when imbibing alcohol alone, even though they made just as many errors in standard tests of alertness and reaction time.

http://www.newscientist.com/article/mg20427353.100-us-could-ban-caffeinealcohol-drinks-within-months.html

Crohn's blamed on lazy immune cells

- 19 November 2009 by **Linda Geddes**
- Magazine issue 2735. **Subscribe** and get 4 free issues.

Gut reaction (Image: CNRI/SPL)

A MYSTERIOUS bowel disease thought to be caused by an over-exuberant immune system may paradoxically be triggered by immune cells that don't do enough in the early stages of bacterial infection.

Since some treatments for Crohn's disease aim to suppress the immune system, it's possible these drugs could be making things worse. The discovery by Anthony Segal of University College London and his colleagues is causing a stir among immunologists. Caetano Reis e Sousa at Cancer Research UK calls it "provocative", while Jean-Laurent Casanova at The Rockefeller University in New York says it is "a major breakthrough".

A similar mechanism may be at the root of a host of other "autoimmune" disorders, in which immune cells turn on the body's own tissue. Underactive immune cells could also explain why some of us are more prone to infectious diseases.

About 1 in 1000 people in the US and Europe have Crohn's. Symptoms include swollen, painful intestines and diarrhoea. Inflamed sections of gut often have to be surgically removed.

Segal and his colleagues got their first clue when they noticed a weaker immune response in people with Crohn's than in healthy people after both groups were injected with heat-killed *Escherichia coli*. The team reasoned that this lukewarm response might allow an infection to build up and eventually trigger a debilitating secondary immune response, resulting in Crohn's.

If this is the case, though, why does Crohn's only manifest itself in the intestine? After further experiments it became clear that the immune weakness only revealed itself when large numbers of killed *E. coli* were injected. As the bowel is one of the few places in the body where bacteria exist in huge numbers, Segal concluded that this is where the weakened immune response has its biggest impact. "It's only in the bowel that you routinely get massive loads of bacteria - and if these breach the intestinal wall it will cause an infection."

It still wasn't clear, however, what caused the weakened immunity in the first place. So Segal's team focused on cells called macrophages, the immune system's whistle-blowers. In people with Crohn's disease, they found that macrophages secrete lower levels of cytokines, the chemicals that rally other immune cells to infection sites (*Journal of Experimental Medicine*, DOI: 10.1084/jem.20091683).

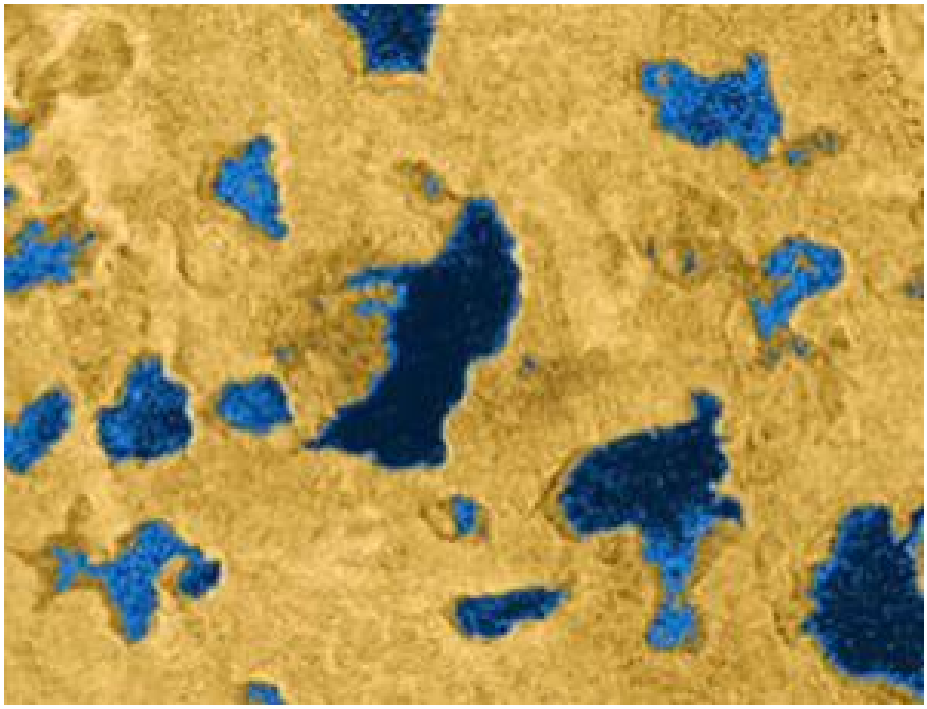
The team concluded that ineffectual rallying of immune cells in people with defective macrophages is what allows intestinal bacteria to run amok in the early stages of an infection, setting in motion the series of events that leads to Crohn's disease.

In Crohn's the immune system's whistle-blowers are bad at rallying other cells to fight infection
Now Segal would like to look at the role of defective macrophages in other autoimmune diseases, such as rheumatoid arthritis and psoriasis. Casanova suspects that they may also leave people more susceptible to illnesses such as tuberculosis. "Macrophages are central to many physiological processes," he adds.

http://www.newscientist.com/article/mg20427354.000-crohns-blamed-on-lazy-immune-cells.html

Icy moon's lakes brim with hearty soup for life

- 00:24 23 November 2009 by **David Shiga**



Titan's hydrocarbon lakes, seen here in radar images, boast life-friendly chemistry (Image: NASA/JPL)
Saturn's frigid moon Titan may be friendlier to life than previously thought. New calculations suggest Titan's hydrocarbon lakes are loaded with acetylene, a chemical some scientists say could serve as food for cold-resistant organisms.

At about -180 °Celsius, Titan's surface is far too cold for liquid water. But two pairs of scientists proposed in 2005 that alien organisms might live instead in bodies of liquid hydrocarbons on the frigid moon. They suggested such organisms could eat acetylene that falls to the surface after forming in the atmosphere, combining it with hydrogen to gain energy.

Since then, Cassini has spotted dozens of lakes on Titan's surface, thought to be made of a mixture of liquid ethane and methane. But since no probe has directly sampled them, no one knows how much acetylene they might contain.

An estimate made in 1989 suggested bodies of liquid hydrocarbons on Titan would contain a few parts in 10,000 of acetylene.

But an updated estimate based on data from the Cassini-Huygens mission to Saturn now suggests the lakes contain much more food for any hungry alien life-forms that might be present. The new calculations were made by a team of scientists led by Daniel Cordier of the Ecole Nationale Supérieure de Chimie de Renne, France.

Right temperature

Data from the Cassini spacecraft and the Huygens probe, which parachuted to Titan's surface in 2005, helped Cordier's team re-calculate the lakes' likely composition. This depends on factors like a lake's temperature, which affects how easily chemicals will dissolve in it, and the rate various chemicals are produced in the atmosphere and rain onto the surface.

The team found that acetylene would be hundreds of times as abundant as the previous estimate, making up one part in 100 of the lake's content.

"Having about a per cent of acetylene is potentially interesting from the life point of view," says team member Jonathan Lunine of the University of Arizona in Tucson. The idea of acetylene-eating organisms on Titan is "highly speculative" but intriguing, he says.

Separate layers

"I think the results are very exciting and further support the possibility for life on Titan," says Dirk Schulze-Makuch of Washington State University in Pullman, one of the scientists who proposed the possibility of acetylene-eating life in 2005. "Titan should be one of the two top targets for future astrobiology missions, the other being Mars."

But Tetsuya Tokano, a Titan researcher at the University of Cologne in Germany, says the exact amount of acetylene may be less important than other properties of the lakes that remain unknown, such as the existence of currents to keep them well-mixed.

Tokano pointed out in a recent study that without mixing, hydrogen and acetylene would stay in separate layers of the lakes, limiting reactions between them that might otherwise power exotic organisms.

Journal reference: *Astrophysical Journal Letters* (in press)

http://www.newscientist.com/article/dn18183-icy-moons-lakes-brim-with-hearty-soup-for-life.html

Guapa, it's your genetic ancestry I love

- 16:33 20 November 2009 by **Peter Aldhous**
- For similar stories, visit the **Genetics** and **Love and Sex** Topic Guides

Next time you catch a stranger's eye and feel a surge of attraction, here's something to ponder: is your ardour based partly on shared genetic ancestry? That's the intriguing question raised by a new study of Latino populations.

A team led by Neil Risch and Esteban González Burchard of the University of California, San Francisco, took DNA samples from married couples in Mexican and Puerto Rican populations, examining around 100 genetic markers from across the genome. From these markers, the researchers were able to discern the proportions of Native American, European and African ancestry for each person.

They found that within Mexican populations, people tended to pick partners with similar proportions of Native American and European ancestry, while in Puerto Rican populations couples had paired up based on their shared balance of European and African ancestry.

The team also noted each person's socioeconomic profile to see if this explained their choice of partner as convincingly as ancestry did. But these factors couldn't explain the pairings.

Sizing up

What's more, the same patterns emerged for Mexicans living in the San Francisco Bay Area as for Mexicans in Mexico, and for Puerto Ricans in both Puerto Rico and New York. So presumably people had cued into subtle variations in appearance, behaviour and even odour.

"I think it's fascinating," says Burchard. "People are sizing up their partners, maybe in subconscious ways."The tendency to seek genetically similar mates could confuse researchers searching for genes that affect our health in populations with mixed ancestry, warns Risch. This is because genetic markers that seem to be inherited along with a particular disease may simply be more common in a sub-group of the population in which that disease is more prevalent.

It's not clear whether similar trends would be seen in less genetically varied populations, such as northern Europeans. But mate choice on the basis of ancestry may be a powerful factor for African Americans, who have a rich genetic heritage including variable amounts of European ancestry.

Classic method

Companies are already offering DNA tests to help people choose their partners, based on the idea that we prefer people with immune system genes that differ from our own.

So can we expect DNA dating services to start trying to match people based on shared ancestry? Tamara Brown, who runs GenePartner, based in Zurich, Switzerland, says that her company has no immediate plans to introduce ancestry-based matching – although it is a possibility for the future. The researchers behind the new study are sceptical of DNA-based dating, however. "I prefer the classic method of just running into people while having a drink," says Marc Via, another member of the team.

Journal reference: *Genome Biology*, DOI: 10.1186/gb-2009-10-11-r132

http://www.newscientist.com/article/dn18181-guapa-its-your-genetic-ancestry-i-love.html

Scuba diving to the depths of human history

- 19 November 2009 by **Dan Jones**

Magazine issue 2735.

Searching the seas. Artifacts found underwater are often better preserved than relics found on land (Image: Jon Henderson/University of Nottingham)

1 more image

KITTED out with the latest scuba gear, Garry Momber peers through the murky water to the seabed below. It's dark - Momber is 11 metres below the water's surface and the black peat of the seabed absorbs what little light reaches the bottom. Then the tide turns, and as clearer water flows in from the open seas, the decaying remains of an ancient forest emerge from the gloom. Working quickly, he records details of the exposed material before the strengthening current forces him away from the site.

This is all in a day's work for Momber, who is director of the Hampshire and Wight Trust for Maritime Archaeology in Southampton, UK. His job is to search for clues to a prehistoric world lost beneath the waves in the channel that separates the Isle of Wight from the south coast of England - to be precise, at a location 300 metres off the port of Yarmouth.

Momber's work is just part of a growing trend for searching the deep for clues to our distant past. The field of underwater archaeology is perhaps best known for unearthing relics from more recent history, like Henry VIII's ship the Mary Rose, yet the seabed is stuffed with clues to prehistory too - especially a murky period 11,500 years ago, at the end of the last ice age, when early Europeans were slowly changing from being nomadic hunter-gatherers into settled farmers.

Back then, sea levels were 50 metres lower than today, and the vast majority of early societies would have lived on fertile land by the coast. But as the ice sheets melted, millions of square kilometres of coastal territory would have been flooded. By 4000 BC, when the coastline had stabilised to roughly

its current form, 40 per cent of prehistoric Europe was submerged - along with much of the evidence for their way of life.

"Anybody who was doing anything on the shore more than 6000 years ago was doing it below present sea levels," says Nic Flemming of the UK's National Oceanography Centre in Southampton.

The result is that remains found on land today are not going to tell you much about these early societies. "If you leave out 40 per cent of the data, you're going to make some serious mistakes," says Flemming.

What's more, finds from the sea floor are well preserved. Indeed they are often in better condition than similar discoveries on land, since the low-oxygen conditions in mud and peat sediments slow the decay of organic material. Underwater sites can therefore provide unparalleled insights into the lifestyles of our ancestors as the ice age ended. "Underwater archaeology can open the door to how societies evolved and developed," says Momber.

Underwater goes mainstream

Despite the treasures on offer, however, widespread acceptance of prehistoric underwater archaeology has been a long time coming. Until recently, underwater digs were regarded as dangerous and expensive, with the evidence hard to find. "With that attitude, people just didn't look under water," says Flemming, a pioneer of marine archaeology.

Now the tide is turning. Chance finds made by recreational divers and fishermen have whetted the appetite, and systematic investigations around the Baltic, together with improved underwater imaging techniques, have identified the best sites to look for human remains (see "Rebuilding the prehistoric world"). The final turning point came in 2003, when a multinational conference on the prehistoric potential of the North Sea and an accompanying book highlighted the new possibilities. "This really lit the blue touchpaper," says Flemming.

"It has taken some time for the scientific community to acknowledge how important this is - and is going to be," says Jonathan Benjamin of the University of Edinburgh, UK, "but underwater research is just now becoming accepted in the mainstream of prehistoric archaeology." Jeffrey Rose, an archaeologist at Oxford Brookes University, UK, agrees: "This is the next big story in archaeology."

According to mainland archaeology, tribes living at the beginning of the Mesolithic period were mobile hunter-gatherers, preying on deer and wild boar in the continental heartland of Europe. Over the following millennia, they began to concentrate on the newly formed coastlines of northern Europe, becoming dedicated fishermen in the process. Understanding this transition, and how people adapted to coastal life, is tricky because rising sea levels had submerged these coastal Mesolithic sites. "We've been missing virtually all of the relevant evidence," says archaeologist Geoff Bailey of the University of York, UK.

So where to look? The Baltic Sea seemed a good bet. Its brackish waters are particularly low in oxygen, while bays created by the convoluted coastline proved to be perfect havens for archaeological material for thousands of years.

One of the first important discoveries was made back in the 1970s, when Danish researchers unearthed a spectacular prehistoric site named Tybrind Vig, 300 metres from the current Danish coastline. Inhabited between 7500 and 6000 years ago, Tybrind Vig yielded three exquisitely preserved canoes made from hollowed-out lime trees, up to 9 metres long and each equipped with a stone fireplace, as well as paddles, fish hooks and fish traps.

It looked as though at least some of the Baltic Mesolithic tribes were intimately acquainted with the sea, but whether that was representative of Mesolithic life further afield remained unclear, until recent systematic excavations.

For example, the Sinking Coasts project, or SINCOS, has been undertaking rigorous excavations along the German coast for the past seven years. These have unearthed sophisticated wooden fish traps and weirs, as well as fish hooks made from deer bone and harpoons made from antlers. The remains of literally thousands of bones of butchered fish suggest the prehistoric diet here was largely cod, flatfish, eels and dogfish, and, later on, included seals, porpoises and perhaps even killer whales.

Futher evidence from SINCOS confirms that the shift to seafaring was accompanied by a transition from nomadic life to a more settled existence. Large dumps of shells - the remains of harvested oysters, limpets and scallops - point to prolonged occupation of sites, and evidence of hunting camps indicate that settlement here was at least seasonal. It is likely that the inhabitants lived in wooden huts, although the evidence so far has been sparse.

Momber's work at the Bouldnor Cliff site, near Yarmouth, paints a similar picture of a settled seafaring existence. Dives in the 1980s revealed the remains of an ancient forest here, but the real lucky break came in the late 90s, when archaeologists discovered dozens of flint tools from early human occupation, unearthed by burrowing lobsters.

Continued work at Bouldnor Cliff has paid off. The site also yielded the remains of what is believed to be an ancient log boat, and earlier this year Momber's team discovered a complex of intersecting timbers embedded in protective sediment, together with evidence of burnt wood, flint, pegs and string. Roughly 8150 years old, the timbers feature distinctive cut marks, a sure sign that they were worked by human hands. It looks as though the site was an area of specialised industrial activity, and possibly a waterside platform where boats could be assembled. If so, Bouldnor Cliff was home to one of Europe's oldest boatyards, underscoring the advanced craftsmanship of the Mesolithic people. "It's an absolute gem," says Flemming.

So it seems Mesolithic humans were sophisticated seafarers, but this existence wasn't to last. Over the next couple of thousand years, these tribes would face a second, equally monumental shift to farming, as Neolithic agricultural cultures spread from western Asia across Europe, finally reaching northern Europe and mainland Britain about 6000 years ago. The exact nature of this transition, though, is something of a mystery.

"One of the most important questions in prehistoric archaeology is how this transformation to early agriculture took place," says Benjamin. "Did migrating Neolithic people replace Mesolithic communities? Did they interact and trade with each other? Did Mesolithic people adopt Neolithic practices and technologies from neighbouring regions?"

Going Neolithic bit by bit

Once again, underwater archaeological projects such as SINCOS provide some clues, if not neat answers. "It's a very complicated picture," says SINCOS team member Harald Lübke of the Centre for Baltic and Scandinavian Archaeology at Schleswig-Holstein State Museum in Germany. Genetic analyses have produced conflicting results, but the underwater archaeological record hints at periods of interaction.

"If incoming Neolithic groups simply replaced Mesolithic groups, then we'd expect to see a rapid change in technology, but this is not what we see," says Lübke. Instead, it looks as if bit by bit, late Mesolithic groups assimilated distinctive Neolithic styles of pottery and flattened axes, as well as domesticated animals and cereals.

The remains of cattle bones suggest that domesticated animals may have been introduced to coastal Mesolithic life by 6000 years ago, though fish and seal remains from this time indicate that marine resources were still important. New types of pottery, imported from south-eastern Neolithic neighbours, also begin to make an appearance. "Between 7000 and 6000 years ago, these Mesolithic people adopted some elements of the Neolithic, such as new ceramics and perhaps imported cattle, but they didn't immediately change their entire subsistence system," says Lübke.

It was only later, when people on the Baltic coast came to rely heavily on domesticated animals such as sheep and goats, that yet more Neolithic tools, such as polished axes, make their way into the archaeological record. By 5500 years ago, it seems the transition was complete, and coastal sites became less important as they were abandoned in favour of early Neolithic farms.

These results from northern Europe are only the beginning of the story. Benjamin, for example, has been researching and compiling geographical, geological and archaeological data in the eastern Adriatic, where he hopes to find insights into the final stages of the transition from Mesolithic to Neolithic in this region. "After a lot of research and preparation, we've isolated a few areas where we think there should be prehistoric material under water," he says. Others hope to investigate the coastline of North America to reveal how tribal peoples migrated across the continent 15,000 years ago.

The best finds may be yet to come, but there is no time to lose. Much of the submerged Mesolithic treasure which has remained undisturbed in sediment for thousands of years is disappearing, says Anders Fischer, an archaeologist with the Heritage Agency of Denmark in Copenhagen.

Construction, dredging and trawling along coastlines are one set of problems. Then there is pollution, which destroys the underwater vegetation that helps preserve archaeological sites by stabilising the sediment. These problems are well documented in the Baltic and may be just as crucial in coastal waters elsewhere, according to Anders.

Pollution destroys underwater vegetation that helps preserve archaeological sites
Limited efforts have been made to protect some sites, by covering them with protective sheets for example. But preventing erosion and damage to sites on a broad scale around Europe is going to prove extremely difficult, says Fischer. "If we don't act soon, we're going to lose an important part of this cultural heritage forever," he says.

Rebuilding the prehistoric world

Underwater archaeology has huge potential, but it is a time-consuming and costly way to study the past. So resources need to be directed to the areas where researchers are most likely to hit pay dirt.

In practice, this means reconstructing palaeolandscapes to identify potential archaeological hotspots. "We're all looking for predictive models," says Michael Faught, a maritime archaeologist with Panamerican Consultants in Pensacola, Florida. "We're not going to simply stumble on these sites."

A first step in narrowing the search is to look for protected offshore regions - bays and convoluted coastlines - adjacent to land rich in archaeological material. Areas where little sediment has been laid down recently are preferable too, as fresh sediment can make accessing remains difficult.

Sonar is then used to generate maps of the seabed. This information, in combination with cores from the sea floor, can be used to reconstruct the submerged landscape and, crucially, to identify features associated with evidence of human prehistory on land.

Fresh water is a particularly useful clue. "Seventy-five per cent of archaeological sites are found within 500 metres of rivers," says Faught.

One of the most important areas to have emerged is Doggerland, the vast expanse of terrain that joined Britain to mainland Europe 10,000 years ago. With its rich landscape of rivers, lakes and marshes, as mapped out by Vince Gaffney and Simon Fitch of the University of Birmingham, UK, it would have been an ideal place for Mesolithic peoples to settle. Indeed, Doggerland may have been the Mesolithic heartland of northern Europe, with people hunting, gathering and fishing in the sort of craft found at Tybrind Vig and Bouldnor Cliff (see map).

Other features, such as outcrops of chert, a rock resembling flint, suggest quarries for making stone tools. In his studies of Apalachee Bay in the Gulf of Mexico off Florida, Faught has looked for such features to find artefacts crafted by Palaeoindian societies 13,000 years ago. The vast amount of seabed data amassed by oil and gas companies in regions such as the North Sea has also proved invaluable.

Looking to the future, marine archaeologists still face a key challenge, namely to develop a global database for future research.

Dan Jones is a writer based in Brighton, UK

http://www.newscientist.com/article/mg20427351.000-scuba-diving-to-the-depths-of-human-history.html

Dumb code could stop computer viruses in their tracks

- 20 November 2009 by **Paul Marks**
- Magazine issue 2735.

ON THE day a new computer virus hits the internet there is little that antivirus software can do to stop it until security firms get round to writing and distributing a patch that recognises and kills the virus. Now engineers Simon Wiseman and Richard Oak at the defence technology company Qinetiq's security lab in Malvern, Worcestershire, UK, have come up with an answer to the problem.

Their idea, which they are patenting, is to intercept every file that could possibly hide a virus and add a string of computer code to it that will disable any virus it contains. Their system chiefly targets emailed attachments and adds the extra code to them as they pass through a mailserver. A key feature of the scheme is that no knowledge of the virus itself is needed, so it can deal with new, unrecognised "zero day" viruses as well as older ones.

Many mailservers already block attachments that will run as executable programs - such as PC files with a .exe suffix - in case they are viruses. But virus writers have tricks up their sleeve to get round this. For example, they can disguise files as an innocent Microsoft Word (.doc) or Adobe Acrobat (.pdf) file, and then fool unsuspecting users into converting them into an "executable" program file that will run on their computer.

Qinetiq aims to prevent this by inserting a line of machine code - the raw code that microprocessor chips understand - into the header area of incoming files. This is the part of the file that holds the formatting data that defines such aspects as a document's layout and fonts.

If the file is simply opened by another program, the code is ignored. But if someone attempts to run it as a program in its own right, Qinetiq's code will run first - and stop the rest of the program in its tracks, either by exiting or by sending it into an infinite loop.

"This is not based on virus signature detection, so it is not something malware writers can imagine their way around," Wiseman says. Qinetiq, which has just acquired the military networking firm Boldon James, plans to exploit the trick in future secure mailservers.

This is not based on virus signatures, so it is not something malware writers can get around
"It sounds like it might have some promise," says Ross Anderson, a software security engineer at the University of Cambridge. But he adds: "I'm not sure that injecting raw machine code into attachments will be a panacea."

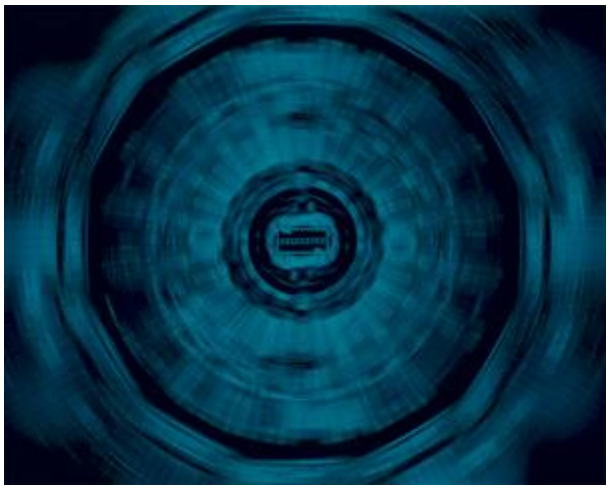
Anderson doubts the wisdom of patenting the scheme, however. "Now that Qinetiq have patented this idea nobody will use it, even if it works. Patents are seen as damage: people route around them."

http://www.newscientist.com/article/mg20427355.600-dumb-code-could-stop-computer-viruses-in-their-tracks.html?full=true&print=true

Future colliders: Beyond the LHC

- 20 November 2009 by **Jessica Griggs**

Magazine issue 2735.



Moving on (Image: CERN)

2 more images

The Large Hadron Collider is by no means the last of the particle smashers. A group at CERN recently explored the various scenarios that might emerge from the atomic debris in Geneva – and how they would shape what colliders we build next. We draw out the key points about each of the scenarios.

Detect a Higgs

What will detecting a Higgs boson mean?

If the characteristics of the Higgs fit with the predictions of the standard model of particle physics, it should be found within three years. The discovery would confirm that a Higgs "field" permeates the universe, lending all other particles their mass. If it is a Higgs that does not conform to the standard model, it may turn up even earlier, because it would likely be lighter and so more commonly produced in collisions than heavier particles.

What next?

The Super LHC will have more collisions per second and be more accurate than the LHC, and would be able to start to explore the properties of a Higgs. Its high energy would be especially useful if the Higgs turns out to be heavy, though a linear collider would be more precise. The Compact Linear Collider would have an advantage over the International Linear Collider with its higher collision energy.

No Higgs

What will failing to detect a Higgs mean?

If no Higgs is detected after three years of the LHC running at full energy, then this points to a more complicated Higgs field. It could be because the Higgs decays to known particles that are difficult to detect at the LHC or it decays to invisible particles - ones that don't interact with the detector.

Failure could also be a sign of a non-standard model Higgs - which would mean it could be lighter or heavier than expected and thus harder to find. Or it could indicate a more exotic Higgs field - perhaps with several different Higgs bosons interacting in a way not yet fully understood.

What next?

Other mechanisms for endowing particles with mass will be seriously considered. For example, when two W bosons collide, they are thought to produce a Higgs. If no Higgs exists, however, whatever else is produced by W boson scattering would be the obvious next place to look for what endows matter with mass. The process could be examined extensively with the Super LHC.

No detection at the LHC could be bad news for the International Linear Collider, because it has a lower energy than the LHC and so couldn't look for a potentially heavy Higgs. The Compact Linear Collider would be the better option.

Supersymmetry

What will evidence of supersymmetry mean?

Supersymmetry (SUSY) is a theory positing that all the known particles in the standard model have partners. Unlike a Higgs, the particles would not show themselves directly. In some models, the particles pass through the detector without interacting with it. Their presence in a collision can be inferred from the imbalance of the total momentum - or in other words, the energy missing from the collision. In the most likely version of SUSY, the lightest particles should show up via this approach within the first year at the LHC. The lightest SUSY particle is a possible candidate for dark matter.

What next?

The Super LHC could start measuring the mass and spin of most SUSY particles and could detect unexpectedly heavy particles out of reach of the LHC. However, to study SUSY in detail, a linear collider would be far superior, because the initial energy of the colliding electrons and positrons is exactly known. At the LHC and the sLHC, the energy of the quarks and gluons inside the colliding protons is not known so it is harder to keep track of the overall energy and momentum. What's more, most models predict that the SUSY particles are below 0.5 teraelectronvolts, which makes the ILC the ideal machine to explore these particles.

New physics

What are the implications of new physics?

New physics refers to anything that lies beyond the standard model. Aside from supersymmetry (see above), this includes gravitons or particles associated with extra dimensions. If light enough, these could be seen fairly early on at the LHC. Likewise a next generation of the standard model could be discovered or excluded. More exotic suggestions include "unparticles", an entirely unrecognisable type of matter that could be detected by missing collision energy.

What next?

Once a new phenomenon is found, it will be necessary to flesh out the underlying theory. For example, supersymmetry or models with extra dimensions are the first steps towards confirming string theory. The Super LHC would collect vastly more data on any new physics than the LHC, and could discover processes too rare to be detected by its predecessor. Eventually, a linear collider will be necessary to complete the job - the best of the two proposed linear colliders would depend on the energy of the new phenomenon discovered.

The next generation

The Super LHC

The sLHC would be a souped-up LHC. If all goes to plan, it will come online in around a decade after upgrades. The beams would be 10 times as bright, which would involve increasing the number of protons in each beam by a factor of 10, and result in 10 times as many collisions per hour. This means the sLHC has a greater chance of seeing an interesting collision but also has more uninteresting collisions to filter through, as well as more radiation for the detector to withstand. To cope with these challenges, the beam injectors will be replaced, additional superconducting magnets will control the brighter beams, and detectors will be upgraded to cope with the higher data rates and radiation doses.

Date of completion: 2018
Cost: $1.27 billion
Pros: Much cheaper than building a new machine
Cons: Challenging environment to make precision measurements; only small increase in particle masses probed

The International Linear Collider

If the project receives financial backing after technical reports due in 2012, the ILC would be a 35-kilometre-long straight accelerator. While the LHC collides protons, which contain quarks and gluons, the ILC will smash electrons and positrons. Collisions will be "cleaner" than the LHC because electrons and positrons are fundamental particles. This makes for less ambiguity when trying to work out what produced any new particles. In the LHC, charged particles lose energy with each rotation.

Date of completion: 2020s
Cost: $8 billion
Pros: Cleaner collisions. Technology reliable and well understood
Cons: In some scenarios, the maximum energy may not be sufficient to see all new physics of interest

The Compact Linear Collider

The CLIC would be a positron and electron linear accelerator like the ILC - and is also yet to be approved - but it would be shorter and have collisions at higher energies. A high-intensity, low-energy drive beam runs parallel to the colliding beams. Power built up in the drive beam is transferred in quick bursts to the main beams.

Date of completion: 2020s
Cost: No official estimate, ~$10 billion
Pros: Cleaner collisions. High energy and compact - the ILC would need to be 140 kilometres long to achieve the same energy, so vastly more expensive. Greater sensitivity to massive particles compared with sLHC
Cons: R&D for the new technology is still at an early stage

Far in the future

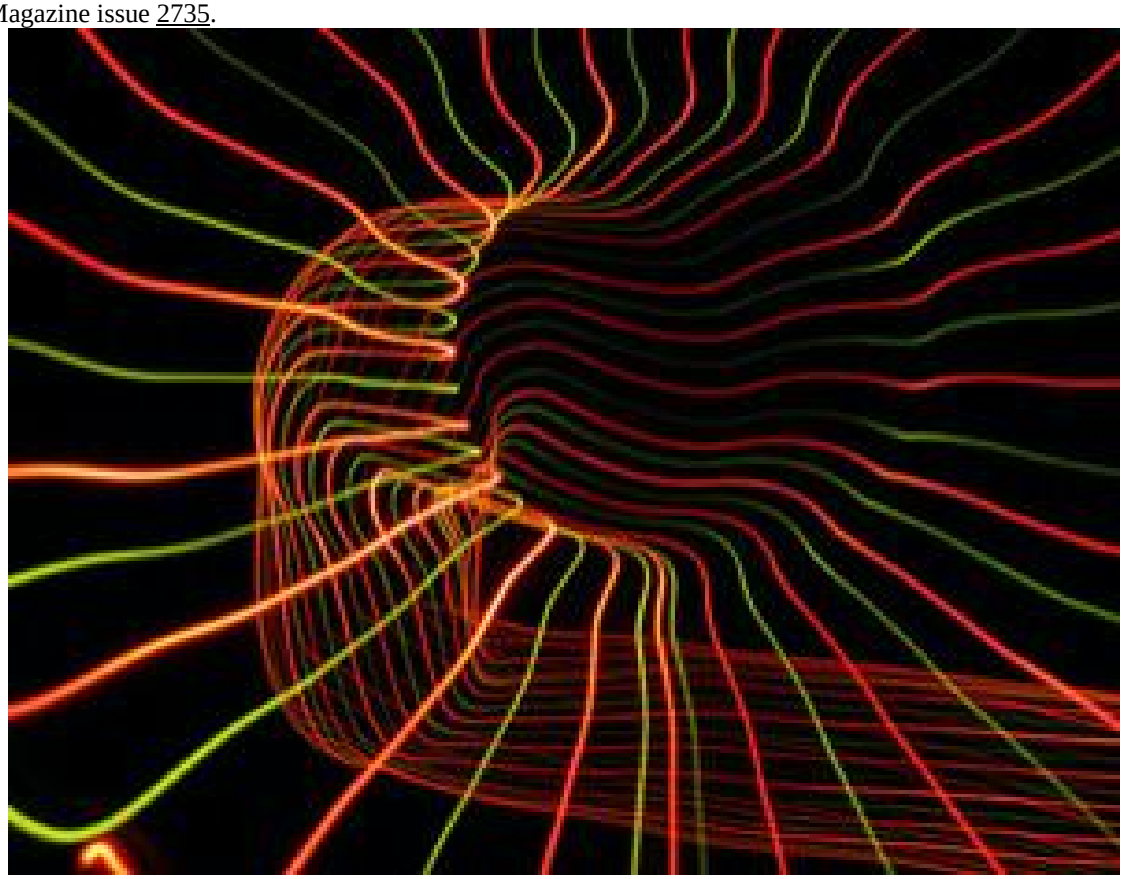
Other proposals include the Very Large Hadron Collider, which would have a collision energy of 40 to 200 TeV and would have to be built from scratch. Muon colliders, and an LHeC - smashing an electron beam into a proton beam - are also being considered.

http://www.newscientist.com/article/mg20427354.900-future-colliders-beyond-the-lhc.html?full=true&print=true

Ripples in space divide classical and quantum worlds

- 18 November 2009 by **Anil Ananthaswamy**

Magazine issue 2735.



Keeping the quantum and the classic separate (Image: tdub303/flickr/fiz-iks.com)

WHY can't we be in two places at the same time? The simple answer is that it's because large objects appear not to be subject to the same wacky laws of quantum mechanics that rule subatomic particles. But why not - and how big does something have to be for quantum physics no longer to apply? Ripples in space-time could hold the answer.

The location of the boundary between the classical and quantum worlds is a long-standing mystery. One idea is that everything starts off as a quantum system, existing in a superposition of states. This would make an object capable of being, for example, in many places at once. But when this system interacts with its environment, it collapses into a single classical state - a phenomenon called quantum decoherence.

Brahim Lamine of Pierre and Marie Curie University in Paris, France, and colleagues say that gravitational waves may be responsible for this. These waves in the very fabric of the universe were generated by its rapid expansion soon after the big bang, as well as by violent astrophysical events such as colliding black holes. As a consequence, a background of ripples at very low amplitudes pervades space-time.

Gravitational waves may be responsible for collapsing quantum ambiguity into a single classical state Lamine and colleagues calculated how this fluctuating space-time might contribute to quantum decoherence. They found that for systems with very large mass, such as the moon, decoherence induced by the gravitational waves would have caused any quantum superposition to dissipate

immediately. At the other end of the scale, such waves would have a negligible effect on massless photons.

To test whether gravitational waves do in fact cause the decoherence seen in large objects, the researchers suggest using a set-up called a matter-wave interferometer in which molecules are made to pass through multiple gratings. The wave-like nature of the molecules causes them to diffract, and the diffracted waves interact to give rise to an interference pattern. Quantum decoherence destroys this pattern, so in principle this could provide a test for whether the decohering effect of background space-time fluctuations matches predictions. Such a system would have to be completely isolated to rule out other effects.

This is, however, impossible in practice - with today's interferometers, at least. Experiments pioneered by Anton Zeilinger, Markus Arndt and colleagues at the University of Vienna, Austria, have been able to generate interference with beams of 60-atom carbon buckyballs, but even with molecules of this size the effect of gravitational waves would be too small to be observed.

According to Lamine, who presented his work last month at the Gravitation and Fundamental Physics in Space meeting at Les Houches in the French Alps, the effect should be measurable in larger systems at high energy. Supersonic beams of about 3000 carbon atoms would do the trick if made to interfere over an effective area of about 1 square metre. This is far beyond the reach of any foreseeable technology.

Some speculative theories predict, however, that quantum decoherence will occur on a lower energy scale than that suggested by Lamine. If so, this could be within experimental reach. "That is why our experiments are pushing [up] the interference mass limit, step by step," says Arndt.

http://www.newscientist.com/article/mg20427353.800-ripples-in-space-divide-classical-and-quantum-worlds.html

The Mandelbulb: first 'true' 3D image of famous fractal

- 13:31 18 November 2009 by **Jacob Aron**
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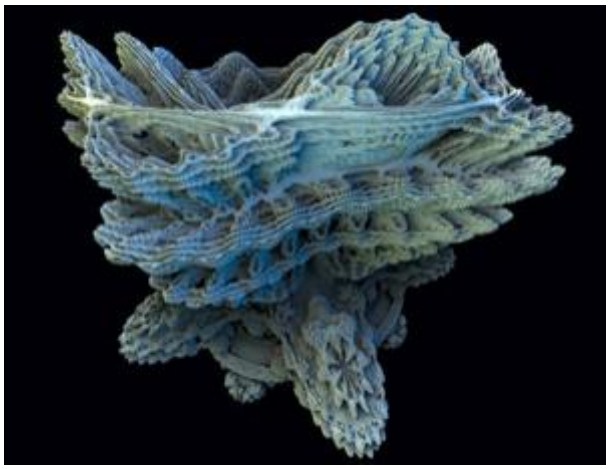

Reaching new dimensions (Image: Daniel White) **See:** More images
See: our gallery of how the Mandelbrot set burst out of two dimensions

It may look like a piece of virtuoso knitting, but the makers of an image they call the Mandelbulb (see right) claim it is most accurate three-dimensional representation to date of the most famous fractal equation: the Mandelbrot set.

Fractal figures are generated by an "iterative" procedure: you apply an equation to a number, apply the same equation to the result and repeat that process over and over again. When the results are translated into a geometric shape, they can produce striking "self-similar" images, forms that contain the same shapes at different scales; for instance, some look uncannily like a snowflake. The tricky part is finding an equation that produces an interesting image.

The most famous fractal equation is the 2D Mandelbrot set, named after the mathematician Benoît Mandelbrot of Yale University, who coined the name "fractals" for the resulting shapes in 1975.

But there are many other types of fractal, both in two and three dimensions. The "Menger sponge" is one of the simplest 3D examples.

Fake fractal

There have been previous attempts at a 3D Mandelbrot image, but they do not display real fractal behaviour, says Daniel White, an amateur fractal image maker based in Bedford, UK.

Spinning the 2D Mandelbrot fractal like wood on a lathe, raising and lowering certain points, or invoking higher-dimensional mathematics can all produce apparently three-dimensional Mandelbrots. Yet none of these techniques offer the detail and self-similar shapes that White believes represent a true 3D fractal image.

Two years ago, he decided to find a "true" 3D version of the Mandelbrot.

The next dimension

"I was trying to see how the original 2D Mandelbrot worked and translate that to the third dimension," he explains. "You can use complex maths but you can also look at things geometrically."

This approach works thanks to the properties of the "complex plane", a mathematical landscape where ordinary numbers run from "east" to "west", while "imaginary" numbers, based on the square root of -1, run from "south" to "north". Multiplying numbers on the complex plane is the same as rotating it, and addition is like shifting the plane in a particular direction.

To create the Mandelbrot set, you just repeat these geometrical actions for every point in the plane. Some will balloon to infinity, escaping the set entirely, while others shrink down to zero. The different colours on a typical image reflect the number of iterations before each point hits zero.

White wondered if performing these same rotations and shifts in a 3D space would capture the essence of the Mandelbrot set without using complex numbers – real numbers plus imaginary numbers – which do not apply in three dimensions because they are on only two axes. In November 2007, White published a formula for a shape that came pretty close.

Higher power

The formula published by White gave good results, but still lacked true fractal detail. Collaborating with the members of Fractal Forums, a website for fractal admirers, he continued his search. It was another member, Paul Nylander, who eventually realised that raising White's formula to a higher power – equivalent to increasing the number of rotations – would produce what they were looking for.

White's search isn't over, though. He admits the Mandelbulb is not quite the "real" 3D Mandelbrot. "There are still 'whipped cream' sections, where there isn't detail," he explains. "If the real thing does exist – and I'm not saying 100 per cent that it does – one would expect even more variety than we are currently seeing."

Part of the problem is that extending the Mandelbrot set to 3D requires many subjective choices that influence the outcome. For example, you could extend a flat plane to 3D by stretching it to form a box, but you could also turn it into a sphere.

"It's an interesting academic exercise to think what you should get," says Martin Turner, a computer scientist specialising in fractal images at the University of Manchester, UK, "but it all depends on what properties you want to keep in the third dimension."

The equations White used may get the job done, but the system of algebra used is not applicable to all 3D mathematics. "The next stage is mathematical rigour," says Turner.

http://www.newscientist.com/article/dn18171-the-mandelbulb-first-true-3d-image-of-famous-fractal.html

Mystery 'dark flow' extends towards edge of universe

- 16 November 2009 by **Marcus Chown**

Magazine issue 2734.

Galaxies going places (Image: NASA/M.Markevitch et al/STSCI; Maggellan/U.Arizona/D.Clowe et al)
SOMETHING big is out there beyond the visible edge of our universe. That's the conclusion of the largest analysis to date of over 1000 galaxy clusters streaming in one direction at blistering speeds. Some researchers say this so-called "dark flow" is a sign that other universes nestle next door.

Last year, Sasha Kashlinsky of the Goddard Space Flight Center in Greenbelt, Maryland, and colleagues identified an unusual pattern in the motion of around 800 galaxy clusters. They studied the clusters' motion in the "afterglow" of the big bang, as measured by the Wilkinson Microwave Anisotropy Probe (WMAP). The photons of this afterglow collide with electrons in galaxy clusters as they travel across space to the Earth, and this subtly changes the afterglow's temperature.

The team combined the WMAP data with X-ray observations and found the clusters were streaming at up to 1000 kilometres per second towards one particular part of the cosmos (*The Astrophysical Journal Letters*, vol 686, p L49).

Many researchers argued the dark flow would not turn up in later observations, but now the team claim to have confirmed its existence. Their latest analysis reveals 1400 clusters are part of the flow, and that it continues to around 3 billion light years from Earth, a sizeable fraction of the distance to the edge of the observable universe (arxiv.org/abs/0910.4958). This is twice as far as seen in the previous study.

The dark flow appears to have been caused shortly after the big bang by something no longer in the observable universe. It has no effect today because reaching across this horizon would involve travelling faster than light.

One explanation for the flow would be the gravity of a huge concentration of matter, but this is very unlikely. Within the standard big bang picture, massive cosmic structures were "seeded" by random quantum fluctuations, so overall, matter should be spread evenly.

There could be an exotic explanation. Laura Mersini-Houghton of the University of North Carolina, Chapel Hill, thinks the flow is a sign of a neighbouring universe. If the tiny patch of vacuum that inflated to become our universe was quantum entangled with other pieces of vacuum - other universes - they could have exerted a force from beyond the present-day visible horizon (see "Nosey neighbours").

Yet despite the new findings, the existence of the dark flow remains disputed. Charles Bennett, principal investigator of WMAP says the cluster analysis is not statistically significant. "There is no evidence for the large-scale dark flow, using all of the best data available."

Nosey neighbours

Was our universe once entangled with a neighbour? The observation of "dark flow" in galaxy clusters was predicted in 2006 by Laura Mersini-Houghton of the University of North Carolina at Chapel Hill and colleagues. She proposes that the effect occurs because our universe was once influenced by neighbouring domains (arxiv.org/abs/0810.5388).

Mersini-Houghton reasoned that if a force exerted by other universes squeezed ours, it could generate a repulsive effect that would impede the shrinkage of matter into clusters but not leave an imprint on smaller scales. "This skews the distribution of lumps so they are not the same in all directions," she says. "There is a preferred direction - the dark flow."

She also predicted in 2006 that there should be two "holes" - regions with fewer galaxies than expected. Sure enough, there does appear to be a hole - the so-called "cold spot" identified by the WMAP probe. The hole is a very large region of space where the afterglow is cooler than average. However, its cause - and even existence - is disputed, and Mersini-Houghton's hypothesis remains controversial.

http://www.newscientist.com/article/mg20427345.000-mystery-dark-flow-extends-towards-edge-of-universe.html

First universal programmable quantum computer unveiled

- 18:00 15 November 2009 by **Colin Barras**
- For similar stories, visit the **Quantum World** Topic Guide

The world's first universal programmable quantum computer has been put through its paces. But the test program revealed significant hurdles that must be overcome before the device is ready for real work.

Earlier in the year, a team at the National Institute of Standards and Technology in Boulder, Colorado, built a quantum computer capable of processing two quantum bits, or qubits. Qubits store more information than the simple "on" or "off" bits of conventional computing, which means that a quantum computer outperform conventional computers in tasks such as cryptanalysis.

As in a classical computer, a series of logic gates processes the information – although here the gates are quantum logic, or qubit, gates. "For example, a simple single-qubit gate would change a 'one' to a 'zero' and vice versa," says David Hanneke, a member of the team. But unlike the physical logic gates of a classical computer, the quantum logic gates used in the team's device are each encoded into a laser pulse.

Logic trick

The experimental device uses beryllium ions to store qubits in the way they spin while the laser-pulse quantum gates perform simple logic operations on the qubits. The trick to making a quantum logic gate is in designing a series of laser pulses that manipulate the beryllium ions in a way that processes information. Another laser then reads off the results of the calculations.

"Once we had demonstrated we could successfully combine lots of components in this way, we ask: what can you do with that?" says Hanneke.

They found their answer in quantum computational theory. "One of the more interesting results to come out of the early years of quantum information was that you can do any quantum operation on any number of qubits using only single and two-qubit logic gates," says Hanneke. Although one and two-qubit gates have already been built and used to perform specific algorithms, no one had yet built a device capable of all possible quantum routines. Until now.

Infinite possibilities

At the heart of the device is a gold-patterned aluminium wafer containing a tiny electromagnetic trap some 200 micrometres across, into which the team placed four ions – two of magnesium and two of beryllium. The magnesium ions act as "refrigerants", removing unwanted vibrations from the ion chain and so keeping the device stable.

There are an infinite number of possible two-qubit operations, so the team chose a random selection of 160 to demonstrate the universality of the processor. Each operation involves hitting the two qubits with 31 distinct quantum gates encoded into the laser pulses. The majority were single-qubit gates, and so the pulse needed to interact with just one ion, but a small number were two-qubit gates requiring the pulse to "talk" to both ions.

By controlling the voltage on the gold electrodes surrounding the trap, the team can uncouple the ions when single-qubit gates are needed and couple them again for two-qubit operations.

Not perfect

The team ran each of the 160 programs 900 times. By comparing the results with theoretical predictions, they were able to show that the processor had worked as planned.

But it did so with an accuracy of only 79 per cent, says Hanekke. "Each gate is more than 90 per cent accurate, but when you stack them together the total figure falls to 79 per cent or so for a given operation," he says.

That's because each of the laser pulses that act as the gates varies slightly in intensity. "They're not 'square' pulses [that switch on and off cleanly] – they fluctuate," he says. And the beam has to be split, reflected and manipulated in various ways beforehand, which also introduces errors.

Such errors would drown the results of any more extensive computations. The fidelity needs to increase to around 99.99 per cent before it could be a useful component of a quantum computer. That could be done by improving the stability of the laser and reducing the errors from optical hardware, says the team.

If those levels of accuracy can be reached, the new chip could form an integral part of a useful quantum processor. "If you have a simple and repetitive task you might have a dedicated region [of the processor] to do that," he says. "But you need regions that can do all kinds of stuff – this is just such a device."

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http://www.newscientist.com/article/dn18154-first-universal-programmable-quantum-computer-unveiled.html

Artery Disease in Some Very Old Patients

By NATASHA SINGER

The Book of Exodus in the King James translation of the Bible describes a pharaoh who "hardened his heart" against the exodus of the Jews from ancient Egypt. But if a research letter published last week in The Journal of the American Medical Association is correct, the pharaoh may have been suffering from hardened arteries.

The new report recounts how a team of cardiologists used CT scanning on mummies in the Egyptian National Museum of Antiquities in Cairo to identify atherosclerosis — a buildup of cholesterol, inflammation and scar tissue in the walls of the arteries, a problem that can lead to heart attack and stroke.The cardiologists were able to identify the disease in some mummies because atherosclerotic tissue often develops calcification, which is visible as bright spots on a CT image. The finding that some mummies had hardened arteries raises questions about the common wisdom that factors in modern life, including stress, high-fat diets, smoking and sedentary routines, play an essential role in the development of cardiovascular disease, the researchers said.

"It tells us that we have to look beyond lifestyles and diet for the cause and progression of this disease," said Dr. Randall C. Thompson, a cardiologist at St. Luke's Mid America Heart Institute in Kansas City, Mo., and part of the team of cardiovascular imaging specialists who traveled to Cairo last year. "To a certain extent, getting the disease is part of the human condition."Last February, the team of cardiologists — one Egyptian and four American — conducted whole-body scans of 20 of the museum's mummies that were well preserved and thus likely to have identifiable arteries. The study also included two mummies that had been scanned by other researchers.

Sixteen of the people mummified had been members of a pharaoh's court, among them two priests, a king's minister and his wife, and a nursemaid to a queen. They lived between 1981 B.C. and A.D. 334, the cardiologists said.

Among the 16 mummies that had identifiable cardiovascular tissue, there were 5 confirmed and 4 probable cases of atherosclerosis.

The researchers found calcification in the leg arteries and the aorta of some mummies, which means that these ancient Egyptians had risk factors for problems like strokes and heart attacks — though not

necessarily that they had developed heart disease before they died. As with modern humans, arterial calcification was more prevalent among the mummies who lived longer. The study's small sample and the subjects' high socioeconomic status may mean the findings do not extend to more ordinary ancient Egyptians, said Dr. Adel H. Allam, the Egyptian cardiologist on the team.

"They were rich people, and the habit of diet and physical activity could be a little bit different than other Egyptians who lived at that time," said Dr. Allam, an assistant professor of cardiology at the Al Azhar Medical School in Cairo.

The group hit upon the idea of examining mummies for arterial disease in 2007, when another cardiologist, Dr. Gregory S. Thomas, was visiting Dr. Allam in Cairo and happened upon a mummified pharaoh named Menephtah in the museum. A plaque by Menephtah's case explained that the pharaoh, who died about 1200 B.C., had been afflicted with atherosclerosis.

Dr. Thomas, a clinical professor of medicine and cardiology at the medical school of the University of California, Irvine, did not believe it.

"For one thing, how would they know?" Dr. Thomas said in a phone interview last week from Cairo. "For another thing, what would people be doing with atherosclerosis 3,000 years ago, without tobacco, with an all-natural diet and, presumably, with much more walking?"

Egypt's Supreme Council of Antiquities gave permission for the team to scan a group of mummies, provided that none were royalty. The team used a CT scanning system, housed in a trailer at the back of the museum, that had been donated by the medical device maker Siemens and had been used by a different team in 2005 to scan Tutankhamen. Siemens, the National Bank of Egypt and St. Luke's Mid America Heart Institute were sponsors of the study.

The oldest mummy in whom the group found hardened arteries was Lady Rai, a nursemaid to a famous queen, who died in about 1530 B.C. when she was between 30 and 40 years old. Dr. Thompson said the calcification in her aorta looked similar to that in images of his own patients with atherosclerosis in Kansas City.

"She went in a relic," Dr. Thompson said of the mummified Lady Rai. "She came out a patient."

Modern habits have long been linked to cardiovascular disease in the public mind — in part, said Dr. Roger S. Blumenthal, director of the Ciccarone Center for the Prevention of Heart Disease at Johns Hopkins, because of correlations like the one between smoking and heart disease.

Heart disease increased in the 20th century as more people took up smoking. Then it declined after the surgeon general's famous warning in 1964, said Dr. Blumenthal, who is not affiliated with the mummy researchers.

But Dr. Thomas says he now views arterial buildup as being more like wrinkles — a human condition whose progression may be inhibited by behavior like avoiding cigarettes and too much sunlight, but which is ultimately inevitable. If that is the case, he said, preventive lifestyle changes become even more important.

"You have to think about it differently if everyone is going to get it," Dr. Thomas said. "I don't want to say it is something we can prevent, but it is something we can delay."

http://www.nytimes.com/2009/11/24/health/24heart.html?ref=science

By Happy Accident, Chemists Produce a New Blue

By KENNETH CHANG

Blue is sometimes not an easy color to make.

Blue pigments of the past have often been expensive (ultramarine blue was made from the gemstone lapis lazuli, ground up), poisonous (cobalt blue is a possible carcinogen and Prussian blue, another well-known pigment, can leach cyanide) or apt to fade (many of the organic ones fall apart when exposed to acid or heat).
So it was a pleasant surprise to chemists at Oregon State University when they created a new, durable and brilliantly blue pigment by accident.
The researchers were trying to make compounds with novel electronic properties, mixing manganese oxide, which is black, with other chemicals and heating them to high temperatures.
Then Mas Subramanian, a professor of material sciences, noticed that one of the samples that a graduate student had just taken out of the furnace was blue.
“I was shocked, actually,” Dr. Subramanian said.
In the intense heat, almost 2,000 degrees Fahrenheit, the ingredients formed a crystal structure in which the manganese ions absorbed red and green wavelengths of light and reflected only blue.
When cooled, the manganese-containing oxide remained in this alternate structure. The other ingredients — white yttrium oxide and pale yellow indium oxide — are also required to stabilize the blue crystal. When one was left out, no blue color appeared.
The pigments have proven safe and durable, Dr. Subramanian said, although not cheap because of the cost of the indium. The researchers are trying to replace the indium oxide with cheaper oxides like aluminum oxide, which possesses similar properties.
The findings appear in the Journal of the American Chemical Society.

http://www.nytimes.com/2009/11/24/science/24obpigment.html?ref=science

Fairy Tales, but Strictly Adults-Only
By CAROL KINO

THINK of the artist Paul McCarthy, and it's hard not to imagine him the way he has appeared in countless videos and performances through the years — stuffing a bunch of mayonnaise-and-ketchup-slathered hot dogs in his mouth, as he did, say, in "Hot Dog" (1974), or wearing a clown's nose and muttering maniacally while sloshing paint on canvas ("Painter," 1995), or running amok with a gang of elves in a filthy, chocolate-smeared Santa suit ("Santa Chocolate Shop," 1996-97). Or else doing other things in projects over the years — things involving Barbie dolls, sausages, Vaseline and his own and other people's bodily orifices — that cannot be described here.

But during a recent interview at the Hauser & Wirth gallery in New York, the day before the opening of his new show of works on paper there, "White Snow" (through Dec. 24), Mr. McCarthy presented a strikingly different persona.

Surrounded by scores of small framed drawings he has made over the last 18 months or so, the burly, bearded artist was wedged into a rolling desk chair in a second-floor exhibition space, nursing a fractured femur that had announced itself partway through the installation. (A notorious workaholic, he had returned to the studio too soon after hip-replacement surgery in September.) Every so often his wife of 43 years, Karen, looked in to make sure he was still sitting down. His son, Damon, who works closely with Mr. McCarthy in Los Angeles, was hard at work downstairs, finishing up the installation of a dozen large mixed-media works on paper. With his family buzzing around him (he also has a daughter, Mara), Mr. McCarthy himself, at 64, seemed very much the genial, loving patriarch, a strong contrast to the notion of patriarchy as it appears in his work.

Then there were the drawings on the walls: storyboardlike groupings that play off the fairy tale "Snow White," they are sexual and scatological, to be sure, but also gorgeously made, as though the ribald, pop-culture-obsessed provocateur had suddenly revealed himself to be an old master. Mr. McCarthy, although he is said to dislike interviews, proved to be surprisingly voluble about the works.

"These were sketches for sculpture," he said, wheeling himself over to a suite of 16 expressionistic pencil on vellum drawings, in which a ceramic Disneyesque Snow White figurine metamorphoses into a vagina and then into Daisy Duck. Of a larger single work, in pencil and collage on paper, that presents a detailed, near-architectural rendering of the dwarves' house. "It's sort of a plan for a physical structure," he said, possibly a sculpture or stage set.

Nearby the pencil-on-vellum drawings that started the series just over a year ago showed Snow White sleeping chastely in her coffin, then awakening and masturbating, her legs spread wide, before dissolving into an abstraction.

While making this work, he said, "I was thinking about erotic drawings, from Klimt to Egon Schiele," as well as Marcel Duchamp's last great work, "Étant Donnés" (1946-66), and Gustave Courbet's 1866 "Origin of the World," an up-close portrait of a woman with her legs spread, an enigmatic assemblage that presents a female mannequin in a similar pose.

Mr. McCarthy spent a lot of time making drawings like this in his early 20s, when he and Karen, newly wed, had moved to California from Salt Lake City and he was studying painting and performance at the San Francisco Art Institute.

In the 1970s, after they had moved to Los Angeles, he turned away from works on paper to pursue performance, beginning a journey that led him to video, sculpture and ever more elaborate constructions and installations. For years his drawings served mainly as source material for other kinds of work.

After toiling as the proverbial artist's artist in Los Angeles for the first quarter-century of his career, Mr. McCarthy came to national attention in 1992, when his work was included in "Helter Skelter: L.A. Art in the 1990s," an influential survey at the Museum of Contemporary Art in Los Angeles. He contributed the showstopping installation "The Garden" (1991): a lushly fake-garden stage set populated by two animatronic men who copulate with a tree and a hole in the earth. Soon after he joined a New York gallery, Luhring Augustine, and his reputation began to take off. It was solidified in 2000, with a retrospective at the New Museum of Contemporary Art that toured to Los Angeles and France.

Even today, although Mr. McCarthy's work is highly influential — partly a consequence of his nearly two decades teaching at the University of California, Los Angeles, art school — it remains underrecognized. "This has to do with the work's complexity," said Marc Payot, a partner in Hauser & Wirth, which represents him worldwide. "It's not just an immediate reaction, that you see it and you get it."

The lack of recognition also has to do with how much of his work has sex, scatology and abjection writ large — sort of a slapstick take on the Viennese Actionists — and with how hard a lot of it is to watch. He is often dismissed as either a troublemaking bad boy or a troubled individual.

Yet this analysis ignores other aspects of his oeuvre that seem to spring straight from Minimalism, like "The Box" (2001), a wooden box that houses an exacting, full-scale replica of his Los Angeles studio, tilted at a dizzying 90 degrees; or "The Bang Bang Room" (1992), a free-standing, life-size room whose walls swing wildly and whose doors suddenly slam shut.

"If you want to think about a context for his work," said Donna De Salvo, chief curator at the Whitney Museum of American Art and a longtime friend, "you can look at the Viennese actionists but also Happenings," the semi-scripted public performance events organized by Allan Kaprow and others in the early 1960s. "These were artists who were trying to figure out how to go beyond Pollock, how to go beyond the action of the canvas. So when Paul goes into a space, as he does in his early performances, it is that form of expression."

Certainly Mr. McCarthy's earliest work is grounded in postwar art history. For his first performance, in 1966, he and a friend tried to recreate Yves Klein's 1960 photocollage "Leap Into the Void" sight-unseen by jumping feet first out a window. Many of his other early performances also recalled Klein using his body as a paintbrush — as in "Face Painting — Floor, White Line" (1972), in which he pushed his face and body against an overturned bucket of white paint and smeared it along the floor. Sometimes he painted with his penis or used ketchup, mayonnaise or feces as the medium. In the catalog for Mr. McCarthy's retrospective, Lisa Phillips, the director of the New Museum, described such materials as metaphors "for the primal substances of life — blood, pus, urine, feces, sperm, milk, sweat," erasing the boundary between the "interior of the body and the exterior world." (Over time, she added, Mr. McCarthy had evolved a "signature palette," involving ketchup, mayonnaise and chocolate syrup — all things that are "emblematic of American family life.")

Soon Mr. McCarthy was also using props, like ketchup bottles, masks and Barbie dolls and other toys, which pushed him in a new direction. "A lot of times," he said, "I would be down low looking at a toy during a performance, and I would think, 'Oh, a sculpture.' So in the '70s I had this idea of blowing up toys into sculptures." By 1983 "I had this idea that I was going to move toward making lifelike figures, sculptures and architecture, but lifelike figures that were kinetic or robotic, like Disney figures," he said. "The robotic figures could also be a way to replace my performance."

And then there were his so-called performance installations, like "Painter" from 1995. "Out of that comes videos, sculptures and drawings," Mr. McCarthy said. "And then along comes the idea to build a larger set, which is a town." And so on.

In the early 1980s he resumed drawing for its own sake. And when the image of the spread-eagle woman suddenly returned last year, he experienced a revelation. “In nearly all of these,” he said, sounding emotional, “the Snow White is personal because it becomes Karen.” As in his early drawings, he said, the figures of his recent Snow White series are “Karen when we were young.”

As Mr. McCarthy talks about his work, it’s almost as though the different decades and strands — performance, sculpture, video, installation — are happening simultaneously. For him they are: “When I’m making a piece, it’s five, six different things at all the same time,” he said. “One leads to another, and it doesn’t stop here. They’re still going on.” (That’s also why he resists interviews. “They’re too literal,” he said, “and too full of histories.”)

He also seems to have the complete freedom to walk through his subconscious almost as if it were a stage set, while letting it do the work. Take his long-running fascination with the Alps. Several of his works have been set there, like “Heidi, Midlife Crisis Trauma Center and Negative Media-Engram Abreaction Release,” a notorious 1992 installation and video he created in collaboration with Mike Kelley, in which Heidi, Johanna Spyri’s Swiss heroine, is put through surprising travails involving her grandfather and a goat.

Mr. McCarthy said that he had been drawn to Alpine culture since childhood because he did a lot of mountain climbing while growing up outside Salt Lake City. “I was really interested in mountain culture from a really early age,” he said. “I think it was something about foreign lands or something — you know how you live in small towns and you want to leave.” Later, after reading Wilhelm Reich, his old childhood passion became twinned with thoughts of Hitler, Fascism and Bavaria.

“I don’t know how things exactly rise up,” he said. “But I start thinking about a subject, and then I sort of realize things about it.” With Heidi it had been the concept of patriarchy, and with Snow White it was “this house in the woods, the Prince, the love story, the dwarves, the cave, all these archetypes that interest me.”

“And then I start making the drawings,” he said. “And then, you know, it starts.”

http://www.nytimes.com/2009/11/22/arts/design/22mccarthy.html?ref=design

Eloquent Ode to the Simple
By ALICE RAWSTHORN

It's an oddly shaped metal box with a very odd name — the LD3 AKE Unit Load Device — and is made from a grubby-looking aluminum alloy that is often scratched or dented. If you have looked out of an airplane window while waiting for take off, you're bound to have seen one, but probably didn't notice it.

Look again. Our lives wouldn't be quite the same without those grubby metal boxes, because so many of the products we use each day — everything from computers to cellphones — were once shipped inside them. Their odd shape was designed specifically to slip into an aircraft hold, just as some of their cargo will have been designed to fit inside them. Why? Packing products into the fewest possible boxes, and aircraft, minimizes shipping costs and hopefully causes (a little) less environmental damage by burning less fuel.

Those are the sort of things that the German designer Konstantin Grcic wants you to think about, the next time you spot those metal boxes. And why one is perched inside the Serpentine Gallery in London alongside several dozen other industrial objects, including a welding helmet, a car tail light, fishing tackle, an artificial heart and chairs.

Each of them was designed within the past decade and is featured in "Design Real," an exhibition that opens Thursday that has been curated by Mr. Grcic as his paean to industrial design.

"People may see a flight container as a stupid aluminum box, but it's an important product of our times," he said. "It's interesting to understand why it looks the way it looks and is made the way it is made, and to think about its impact on the economy and material world. The other objects have incredible stories too. I want people to leave the exhibition feeling as excited about them as I do."

"Design Real" is the first contemporary design show to be staged by the Serpentine, one of London's most important art and architecture galleries. It is off to a good start with its choice of curator, who is not only unusually thoughtful, but arguably the most influential product designer of recent years.

You can see why in "Konstantin Grcic: Decisive Design," a retrospective of his work that opened Friday at the Art Institute of Chicago. Mr. Grcic, 44, studied design in England before setting up a studio in his native Munich. His early products were in the studiedly simple style of fellow neo-rationalists, like the British designer Jasper Morrison. The turning point came in 2004, when he introduced Chair_One, a gawkily geometric aluminum chair, which was the result of his experiments with advanced design software.

Blunt, angular and almost ugly, Chair_One defined a new aesthetic and way of working for Mr. Grcic. He begins by making a paper model, then feeds its dimensions into a computer to finesse the design. All of his design decisions — shape, weight, texture and materials — are determined by what the object will do, not how it will look. The result is unapologetically technocratic, but with the human quality of having literally been shaped by his hands.

His gawky geometry is now widely imitated. Sadly, the copycats lack the coherence of his originals, but blaming him for them is a little like holding Le Corbusier responsible for every dilapidated high rise.

"Konstantin is a fearless designer," said Zoë Ryan, curator of design at the Art Institute of Chicago. "He is not afraid to create work that is challenging, and can even be off-putting at first glance. It challenges us to rethink the objects we use daily."

That's what he hopes to achieve with "Design Real." As Mr. Grcic admits, he faces a daunting task in following the most talked-about industrial design show of recent years, "Supernormal," which was curated by two of his friends, Mr. Morrison and the Japanese designer Naoto Fukasawa. It championed the original modernist values of simplicity, efficiency and modesty. Mr. Grcic approved, but his exhibition focuses not on the elemental qualities of particular objects, but on their relationship to daily life: how their design was influenced by industrial culture, and has since influenced it. His approach is similar to that of Carsten Höller, Phillipe Parreno, Rirkrit Tiravanija and other artists in the Relational Aesthetics movement, who have also collaborated with the Serpentine.

Rather than exhibiting the most beautiful, innovative, eco-responsible or whatever product of each type, Mr. Grcic has chosen the most eloquent one. The computer is the XO1 educational laptop designed by One Laptop Per Child for children in developing countries. "I couldn't show any other computer, not even an Apple, because the story behind OLPC is so strong," he explained.

Similarly he chose the battery of the Tesla Roadster electric sports car over the vehicle because he was intrigued by how the recent investment in developing cellphone batteries has succeeded in producing one that is small and powerful enough to move a car.

Each object is identified by its generic name: "computer," "battery" and so on. Visitors can find out more about them in the research space inside the exhibition and on the accompanying Web site, www.design-real.com, which may well steal the show.

Designed by Field Trip, it is packed with information on each exhibit, and plays a clever political role by enabling Mr. Grcic to explore the negative side of the things he is romanticizing. Take the "container" section, which covers the history of containerization and airfreight, the dumping of broken containers and their dire ecological impact.

Even so, "Design Real" is a love story about industrial objects. It is his passion for them that makes Mr. Grcic's work so compelling, but his dazzling vision of design may seem nostalgic to the eco-savvy young designers, who have rejected the modernist fascination with material culture. They are more likely to question how we can justify churning out more metal boxes as unwitting pawns in the gas-guzzling airfreight industry, than to celebrate their secrets.

http://www.nytimes.com/2009/11/23/arts/design/23iht-design23.html?ref=design

The Nature of Time, Ever Passing
By BENJAMIN GENOCCHIO

By my count, it has been more than six years since the curators at the Yale University Art Gallery organized a show of contemporary art in all media. That is difficult to understand, given that the museum collects in this area and primarily serves students, including those studying at the nearby Yale School of Art.

The wait, however, has been worth it. "Continuous Present," which examines how artists are working with ideas of time, presents some terrific contemporary artwork in an engaging yet scholarly way. Organized by Jennifer Gross, the museum's curator of modern and contemporary art, the exhibition includes the work of 11 well-known contemporary artists installed in the temporary exhibition galleries adjacent to the museum entrance. Some of the works are from the collection, but the bulk of them are on loan from other museums, galleries and collectors. There is a great deal of painting, but also works of film, video, photography, drawing and sculpture.

In addition to issues of time, the show inadvertently picks up on other trends in contemporary art. Much of the art lacks finish, or is process oriented, suggesting the influence of conceptualism. And even the less conceptual, more visually appealing pieces here are grounded in ideas that invite viewers to ponder the nature and passage of time.

On Kawara evokes the "continuous present" in his paintings of the day, month and year of execution, done in white letters on a flat background. The artist has been doing these date pictures since 1966, making this one of the world's longest running conceptual art projects.

The ebb and flow of time is the subject of Francis Alys's animated video loop of a woman pouring water back and forth between two glasses — a simple, meditative work that after a while becomes hypnotic, like listening to the tick-tock of an old clock, and the endlessness of time.

Other artists try to slow time down. For "Cabinet of" (2001), Roni Horn photographed a clown's face, with long exposure times so as to capture facial gestures and subtle shifts in observation. Rather than a snapshot of a moment, this series of 36 photographs traces her subject's movement through time. Rodney Graham's short film "City Self/Country Self" (2000) is, like a lot of contemporary art films, oblique. Things don't ever really add up. Mr. Graham is a talented filmmaker with an eye for a sensual

image, but this particular work — a looped sequence that follows two characters and a silk hat — comes off as visually captivating yet unresolved.

"The Way Things Go" (1987), by the Swiss duo Peter Fischli and David Weiss, is more focused. In this entertaining video, the artists have recorded a series of staged and carefully timed chain reactions using ephemeral materials. One event leads to another, and another, and so on, forming an endless narrative of interrelated incidents — a meditation on the inescapable importance of timing.

Instead of dealing directly with ideas of present time, many of the artists in this show work with the past, presenting art traditions in new ways. Franz West subverts the conventions of sculpture in "The Monster of the Black Lagoon" (2004), three painted papier-mâché blobs on metal stands resting on artists' pedestals that have been tipped provocatively onto their sides.

Thomas Nozkowski's abstract paintings also evince enormous freedom and imagination. They are raw, with a childlike simplicity; several are intriguing combinations of shapes resembling jigsaw-puzzle pieces. Showing here are half a dozen made between 1973 and 2009, each of which is a little gem, redolent with the playfulness and serendipitous quality we have come to expect of him. It has been years since Mr. Nozkowski had a survey show, and this selection proves he deserves one.

An exquisite and strange painting of a prostitute by Laura Owens might not at first glance appear to have much to do with the theme, though according to the exhibition catalog it is based on a painting by Ernst Ludwig Kirchner in Yale's collection. Here, time is folded back on itself, with the artist subtly transforming a piece of art history into something vibrant and new.

"Continuous Present," Yale University Art Gallery, 1111 Chapel Street, New Haven, through Jan. 10. Information: (203) 432-0600 or artgallery.yale.edu.

http://www.nytimes.com/2009/11/22/nyregion/22artct.html?ref=design

'THE ORIGINS OF EL GRECO'
Saints at a Cultural Crossroads

By HOLLAND COTTER

At monasteries on Mount Athos in northern Greece, you wake in the night to the sound of Greek Orthodox monks chanting Byzantine prayers. It's an unforgettable sound, distant and unearthly, but also inside you, like a buzz in the blood.

The painter Domenikos Theotokopoulos, better known as El Greco, almost certainly heard it growing up far to the south on the island of Crete. You can hear it today when you visit "The Origins of El Greco: Icon Painting in Venetian Crete," a lustrous exhibition at the Onassis Cultural Center in Midtown Manhattan.

With its extraordinary ensemble of almost 50 religious images, most of them painted on Crete — seven by El Greco and some of the rest by artists whose names are not known — the show is essentially a dual-purpose visual essay. On the one hand it roughs out the texture of a specific, cosmopolitan, East-meets-West island culture. On the other it tells the story of a great artist who emerged from that culture, lived outside it and lastingly belonged to it.

At the time of El Greco's birth, in 1541, Crete had been a preserve of Byzantine tradition for a hundred years, since the fall of Constantinople to the Turks in 1453, and a colonial possession of Venice for more than three centuries. Most of the population was Greek Orthodox, but economic power was in the hands of a Roman Catholic minority. Local artists necessarily catered to both, turning out Byzantine-style icons for one, late Gothic devotional paintings for the other and, increasingly, synthesizing the two modes.

The show opens with an example of Byzantine art in something like a pure form: a large 14th-century image (unsigned, as many of these paintings are) of Christ Pantokrator, or All Powerful, modeled after an older icon preserved in the Vatopedi monastery on Mount Athos. It's a classic of its kind, an egg tempera painting on a wood panel of a bust-length male figure, dressed in royal purple, against a gilded ground. The figure is half-abstract. The bearded face, set on a brawny neck, is a dainty oval topped by a turban of pulled-back hair. The nose is thin, a long droplet of flesh; the mouth, with its coral-pink lips, is minute, unsuited for eating or speaking. The eyes — large, shadowed and radiating fine stress lines — are the central feature. They look impassively at or past us, as we look into them. In the context of a church or monastery, a two-way connection between icon and worshiper is assumed.

No doubt for some viewers, the much-reproduced Pantokrator image more or less defines icons as a genre: conservative and limited in variety. But the show, organized by Anastasia Drandaki, curator of the Byzantine collection at the Benaki Museum in Athens, demonstrates otherwise.

The Virgin, for example, appears in several guises: as a nursing mother, as the mourner of an adult child, as a corpse shrouded in ultramarine and about to be beamed up to heaven. Saints come in many picturesque forms and types. In a sparkling little panel, two spun-gold soldier-saints, wearing chain-mail

miniskirts, do their martial thing: one skewers a dragon, the other pins the emperor Julian the Apostate like a bug to the ground.

A depiction of the death of St. Sabas is set in a craggy landscape dotted with hermits' caves and painted in a Tuscan, or maybe Persian, palette of pink, orange and bread-crust brown. Aged and infirm monks — one riding a lion, another hunched in a litter, a third crawling on the ground — approach the saint's prone body. Their faces are painstakingly detailed; his is gone entirely, worn away by the kisses of worshipers over the centuries.

By the time this picture was done in the second half of the 15th century, painting in Crete had moved far beyond categories like Byzantine and Gothic. Artists had absorbed Renaissance naturalism and were pushing toward Mannerism, inventing, stealing and collaging motifs as they went. In a "Pieta," on loan from the State Hermitage Museum in St. Petersburg, the figures of Jesus, Mary and St. John are straight-up Giovanni Bellini plunked down on a plain gold ground. Is the painting Cretan or Venetian? Your call.

In Crete, an art-star system, long in place in Italy, came into vogue. Many early pictures went unsigned, but as painting grew more cross-culturally idiosyncratic, names appeared. Artists like Angelos, Andreas Pavias and Nikoloas Tzafouris enjoyed considerable celebrity, as did the home-grown Mannerist Georgios Klontzas, whose fantastically seething miniaturist cosmologies are among the show's highlights. By 1584, Michael Damaskenos, who was a big deal in Venice, had returned to Crete to be a big deal there, perfecting a Byzantine-Renaissance synthesis that sold like hot cakes and spawned countless imitators.

Where was Domenikos Theotokopoulos in all of this? He was in the cosmopolitan thick of things. Until around 1567, when he was in his mid-20s, he stayed in Crete and thrived. Not much of his output from that period survives, but a few things do, and they are fascinating documents of an ambitious career on the move.

A small, beat-up "Dormition of the Virgin," which some scholars take to be his earliest known work, is standard-issue Byzantine, with foreign intrusions. Italianate angels parachute into the scene; a fancy gold candlestick with figures of female nudes sits indecorously front and center in what is, after all, a funeral.

The painting dates to sometime before 1567, when El Greco left — permanently, it turned out — for Venice. He may have spent time with Titian there. He certainly looked hard at the master's painting and at Tintoretto's, and then at Michelangelo's and Parmigianino's when he got to Rome in 1570. Bits of all of them stew around in a murky painting of the "Adoration of the Shepherds" that most likely belongs to the Roman stay.

He moved on to Spain with great hopes: King Philip II was a big fan. But then, for some reason, he wasn't. What happened? Most likely the artist's peculiar style — Mannerist extravagance laced with island-art gumbo — didn't fly after all at court, where suavity usually tends to be rewarded. So he ended up working for churches, the institutions that had hired him in the first place in Crete. And the icon painter in him gradually resurfaced.

We see it in the very last painting in the show, a 1603 oil study for a "Coronation of the Virgin" commissioned by the Hospital of Charity in the town of Illescas. The composition has an iconlike symmetry. The figures, in their expressive abstraction, are as much Byzantine as Mannerist. And the picture scintillates with light, illusionistically painted rather than reflected from gold. Even cherubs tumbling around like kittens can distract from the picture's nuclear focus: this is an image meant to promote, as music can, time-suspending, space-vivifying contemplation.

Exactly this psycho-sensual dynamic lies at the heart of how icons, as spiritual utensils, function. I wish the exhibition made something of this; had taken, as its third theme, the reality of these objects, not just as historical artifacts illustrating the progress of a culture or a famous career, but also as living and interactive energy sources, designed to embody and radiate charisma.

But that's a major subject. It needs a full-dress show of its own. Maybe some day we'll get it. In the meantime this one has some of the most enwrapping and enrapturing art in town, framed by alert scholarship, a lambent environment (the installation design is by Daniel Kershaw), and a score of Byzantine music, arranged and performed by the Greek ensemble En Chordais, that will soak into your system and stay there. Miraculously, admission to all of this is free.

"The Origins of El Greco: Icon Painting in Venetian Crete" remains at the Onassis Cultural Center, 645 Fifth Avenue, near 52nd Street, through Feb. 27; (212) 486-4448, onassisusa.org.

http://www.nytimes.com/2009/11/20/arts/design/20greco.html?ref=design

'LEONARDO DA VINCI'S WORKSHOP'
Flights of Mind, Brought to Life

By EDWARD ROTHSTEIN

Some of the models have the comforting feel of old acquaintance: the twisting, screw-like sail of a flying machine; the armored revolving saucer with cannons protruding through its port holes; the arched bridge that can swing aside for ship traffic. These wood, rope and cloth reproductions, along with glimpses of mirror-reversed Italian script on sheets marked by doodles and sketches — who could miss the distinctive traces left by the artist, inventor and scientist for whom the term Renaissance man seems custom made?

Those distinctive marks of genius are all over the startling, challenging exhibition "Leonardo da Vinci's Workshop," which opens at Discovery Times Square Exposition on Friday. The gallery may not look like any workshop Leonardo used, since it offers elaborate touch screens that allow you to dissect and probe his work in ways even he might have had difficulty imagining. And it may also differ from any workshop he had because so many of the machines on display were probably never actually constructed by him but only sketched or imagined, some as future projects, others, perhaps, as exercises on the way to a deeper understanding of some other ideas.

But this show, the creation of the gifted engineers, scholars and designers of Milan's Leonardo3 — which describes itself as "an innovative research center and media company" devoted to Leonardo — actually brings you closer to understanding the real workshop of Leonardo: his mind. There is something thrilling about the way the exhibition cumulatively assembles the evidence of his robust energy and daring, his scrupulous analysis and care.

You turn from a mechanical lion, whose design has been teased out of allusive skeletal drawings in a notebook, to an enormous display on which you leaf through one of the extraordinary codices, page by page, touching the gnomic text to allow translations and animated machinery to spring from the ink marks. Spend enough time here, and the sensations dazzle: a camel is buoyed by floats to cross a river; a marching musician plays a portable keyboard by knocking a lever with his legs; an ideal city is sketched in tantalizing fragments, including stables in which feed and water for the horses are carefully fed down pipes and waste is washed away through channels in the floor. There is scarcely an aspect of life to which Leonardo didn't apply a fierce intellectual energy.

What would make this show truly spectacular? If the various machines constructed by Leonardo3, all said to be working models, could be set in motion with a crank or slow motor. Then we would actually see the way the group's construction of Leonardo's mechanical lion simulated the movements of leg joints, even as the creature crept forward on a wheeled support. Or we would perceive that the screw-shaped flying

machine — often referred to as the first helicopter — was actually nothing of the kind, and was more a giant windup toy containing a taut spring that when released would send the screw-sail flying. Or we could watch the ratchets and springs of the "self-propelled cart" magically power the complex mechanism, once used, the exhibition proposes, to simulate magical movement on the theater stage. Of course even if we could see all this, some of the flying machines would not really take off, since, as the show points out, the wingspan of the hand-held wings of one of them would have to stretch more than 50 feet.

I was able to see some motion demonstrated. But visitors will have to rely on the computer-screen simulations. That turns out to be more than sufficient, with only a few exceptions: the children's section leads down a few unclear paths. And the displays created by the group in 2005 to catalog the great Codex Atlanticus (an interactive program that impressed me at the time) now seem almost rudimentary compared with the elaborate on-screen explorations being offered of Leonardo's codex on flight (also available on a CD-ROM) or the scans of another surviving codex known as "Manuscript B."

Somewhere along the way, though, we realize that we are not only being exposed to Leonardo's workshop but also to the mental workshop of Leonardo3. And it too is impressive, not least because, as its president and one of its founders, Massimiliano Lisa, explained in an interview, it combines serious research, scholarly ambitions and an impressive publishing program with energetic showmanship and the international touring of exhibitions like this one. The casual viewer may not even realize the extent to which the show's creators are active forces in this exhibition, tracing arcs of thought begun by Leonardo.

Mario Taddei, another founder of Leonardo3 who designed many of the models here (including the lion and the mechanical bat), paid close attention to sketches in Leonardo's notebooks, recognizing connections between, say, a drawing of pulleys and strings and a later diagram of a leg joint.

And by carefully examining the circular rings around one drawing of the "helicopter," and by noting that there is no way that Leonardo would have envisioned that such a turning structure could have lifted the weight of four men (as is often imagined), Mr. Taddei concluded that the rings represent a spring. He redefined the nature of the machine.

Similarly, based on almost painfully brief sketches of a musical instrument, Edoardo Zanon, also a founder of the organization (and creator of the first working version of the self-propelled cart with Mr. Taddei), has been designing the first functional model of a "harpsichord-viola" that will arrive here in late December. It creates tones by using a continuously moving loop of horsehair against which strings are pushed by the notes of a keyboard — a kind of inverse violin, contained in a portable case.

Scholars will have to assess these hypotheses, as well as others here, including the suggestion that a portrait overwritten by Leonardo's notes on flight shows a youthful image of the same aged man in the famous "Self-Portrait" (which may not, the show notes, actually be a self-portrait). The exhibition also offers touch-screen elucidations of details in that "Self Portrait," as well as in the Mona Lisa and "The Last Supper."

Such observations can be illuminating, but when a computer simulation also displays what these paintings must have looked like before time, accident and misuse had altered them, I was far less convinced than when encountering simulations of Leonardo's machinery. Line, tint and texture are so radically altered in these "restorations" that Leonardo's work seems to recede into insignificance. The show might also have been more powerful had its final displays of reproductions of Leonardo's drawings offered even a minute sampling of the originals that graced the exhibition at the Metropolitan Museum a few years ago. All of which is to say that the aesthetic realm has a different order of precision than the mechanical.

But it isn't for aesthetic revelation that this show should be seen. Working through it slowly, with admiration for the creator and his insightful disciples, we begin to sense the texture of Leonardo's mind, the way his drawings of a horse's leg might lead to abstract depictions of levers and pulleys. And we see how his exquisite attention to a woman's smile could lead to sensations of spiritual flight that he would try to replicate in the physical realm, his machines promising to soar into the heavens.

"Leonardo da Vinci's Workshop" is on view through March 14 at Discovery Times Square Exposition, 226 West 44th Street, Manhattan; (866) 987-9692.

http://www.nytimes.com/2009/11/20/arts/design/20leonardo.html?ref=design

Unveiling the Hanging Gardens of Armenia
By MICHAEL KIMMELMAN

YEREVAN, Armenia — Some 20,000 Armenians turned up for the opening of the Cafesjian Center for the Arts last week. They jammed the new sculpture park and the terraced gardens and galleries, including the first exhibition ever in Armenia of the Armenian-born American great, Arshile Gorky.

The center, a mad work of architectural megalomania and historical recovery, is one of the strangest but most memorable museum buildings to open in ages. Imagine an Art Deco version of the Hanging Gardens of Babylon stretching nearly the height of the Empire State Building, its decorations coded with Armenian symbolism.

Did I mention the artificial waterfalls?

Built into a gigantic hill in the commercial heart of this capital city, with a staircase that climbs the outside linking the gardens, the place was originally conceived in Soviet times to be topped by a monument to the Soviet revolution. That it has been turned into a contemporary-art center by a rich American is a twist of history whose symbolism is lost on no one here.

There's no endowment, no professional board, so it may very well soon fall flat on its face, as so much has in this country where widespread corruption, lethargy and years of isolation have led to an unemployment rate around 40 percent, a crumbling infrastructure and almost no middle class.

But for the time being, at least, it is doing what precious few museums, and even fewer vanity enterprises like it can dream of doing — namely, offering a whole nation a kind of uplift.

From morning to evening, as if out on prom night, young Armenians at the opening rode the center's escalator, in many ways the main attraction, which rises via several grand, plaza-size landings inside to, of all things, a little jazz lounge, where a view of the city unfolds beyond tall windows behind the stage.

Armenia's president, Serge Sargsyan, surrounded by swarms of security guards (politicians can't be too careful here) took time out from the debate over opening the border with Turkey. He joined Gerard L. Cafesjian, the 84-year-old Brooklyn-born Armenian-American patron of the center, and the center's director, Michael De Marsche, among others, to hear the inaugural set.

These days Armenian newspaper headlines dwell on the Turkish border opening, which the United States quietly presses for to gain an oil pipeline that can sidestep Russia and Iran. In return Turkey wants to table once and for all any talk about having committed genocide in the killing of more than a million Armenians nearly a century ago. Admitting to genocide has legal ramifications in terms of restitution. So President Obama has lately stopped using the G word, leaving Armenians to choose between desperately needed economic improvement and justice in the defining calamity of their history.

Paralyzed for decades by that event, turned in on itself, landlocked and surrounded by mostly hostile neighbors, Armenia has had until now almost no place to see modern and contemporary art from outside the country. When a perfectly anodyne fat Botero sculpture of a cat was installed in the new center's

sculpture park a few years ago, it caused a scandal. Then, resistance melted. As the center's opening proved, thousands of young Armenians are hungry for what's beyond their borders and are open to change.

I arrived, having been invited to lecture at the opening, dimly aware of the center's history, which began during the 1930s, when a prominent local architect, Alexander Tamanyan, conceived the Cascade, as it's called, a towering, white travertine ziggurat of artificial waterfalls and gardens tumbling down a promontory that links the historic residential and business centers of the city. Banquet-hall-size meeting rooms were devised for Soviet apparatchiks.

The plan was largely forgotten until the late 1970s, after which construction began. Then came the earthquake in 1988 and the breakup of the Soviet Union in 1991. Like much of the city during the post-Soviet years of transition, the Cascade was left in the lurch.

Enter Mr. Cafesjian, from Minnesota. Armenian officials agreed he could erect a building on top of the Cascade in which to show his collection if he would complete the Cascade. Work started in 2002, but costs spiraled swiftly out of control. What had been imagined as a $20 million undertaking soon topped $40 million, with no end in sight.

Mr. Cafesjian regrouped. Two years ago he hired Mr. De Marsche, then president of the Colorado Springs Fine Arts Center. The building on top was put on hold, the focus instead turned toward completing the Cascade and the sculpture park at the foot of it. Tamanyan's original meeting rooms became art galleries, a gift shop and the jazz lounge.

Peculiar doesn't begin to describe the results. The galleries are irregular and spaced far apart, some of them reachable only outdoors across the gardens, which in winter will be frigid and covered with snow. The collection is also a mixed bag. Mr. De Marsche wisely pushed for displaying only a few works from it, with the emphasis on glass.

It's a world away from other museums here. I stopped several times into the National Gallery, an aging palace of marble, worn carpets, bare light bulbs and creaky floorboards in the middle of the city. You wouldn't necessarily know it was a gallery from outside. The facade is covered by billboards for a bank. An unmarked entrance is shuttered by Venetian blinds. Even on Saturday and Sunday afternoons I was the only visitor in the entire place. Elderly female guards in starched white shirts, startled, glumly rose to watch me pass.

Through the gallery's windows, bossa nova music wafted incongruously from an empty Soviet-era amusement park nearby. A panorama of half-finished apartment blocks, Hummers and luxury shops for the oligarchs, and bulky statues of Armenian heroes on horseback spread out below.

According to Raffi Hovannisian, Armenia's former foreign minister, the country now depends for some one-third of its economy on money sent by Armenians abroad. The global collapse has been devastating. Several years of double-digit economic growth during the early 2000s have largely evaporated.

Even Dennis Doyle, who sits on the board of Mr. Cafesjian's family foundation, wondered aloud about the center's future. Mr. Cafesjian promises to pay for it. But that means it all depends on him in the end. The Armenian government is no safety net.

Karen De Marsche, Mr. De Marsche's wife, said she was sitting in a restaurant here with a friend one recent afternoon when a man rushed in, agitated, and begged for something from the manager, who disappeared into the kitchen. The friend, who knew the man, got up from the table to find out what was wrong. She returned, distressed.

"What happened?" Ms. De Marsche asked.

The friend explained that the man was canvassing restaurants. His uncle had just died in the hospital, and the man told hospital officials the rest of his family couldn't make it to town for a couple of days.

They told him, "Get ice."

http://www.nytimes.com/2009/11/19/arts/design/19abroad.html?ref=design

How to Conserve Art That Lives in a Lake?

By RANDY KENNEDY

In 1972, a year before his death in a plane crash at 35, the artist Robert Smithson wrote, "I am for an art that takes into account the direct effect of the elements as they exist from day to day." And with the creation of his greatest work — "Spiral Jetty," the huge counterclockwise curlicue of black basalt rock that juts into the Great Salt Lake in rural Utah — he certainly put that conviction to the test.

After the piece was constructed in 1970, it spent decades underwater as the lake rose. It has re-emerged in the last few years because of drought, but its appearance has changed markedly, whitened by salt crystals and the buildup of silt. Mr. Smithson, who was fascinated by the concept of entropy, might have welcomed this transformation. But it is less clear what he would have thought about changes wrought by visitors to the remote site, who have, at times, carried off some of the rocks as art souvenirs. Or moved them to construct their own tiny spiral jetties nearby. Or, in one case, used them to spell out what they were undoubtedly drinking at the time — "BEER" — in the pink-hued sand next to the earthwork.
Issues like this recently prompted the Dia Art Foundation, which owns the work, to begin exploring the idea of systematically documenting the site, photographing it from year to year to give curators and conservators a better idea of how it is changing and a better basis for making decisions — always tricky in the world of land art — about whether to intervene.
"In my field we're trained to make condition reports," said Francesca Esmay, Dia's conservator, but she added of Smithson's work, composed of more than 6,000 tons of rock and soil: "Its scale is such that I can't just go out with a camera and pencil and clipboard by myself and describe it." So several months ago she turned to the Getty Conservation Institute, an arm of the J. Paul Getty Trust, which has organized and assisted in conservation and monitoring of art and historic sites from Central America to Africa to the Middle East.
After considering nearly every possible way to document "Spiral Jetty" from above — Rent a weather satellite? An airplane? A helicopter? Use a kite? — the institute, which often works in countries where conservation projects are carried out on shoestring budgets, came up with a remarkably simple solution: a $50 disposable latex weather balloon, easily bought online.
Along with a little helium, some fishing line, a slightly hacked Canon PowerShot G9 point-and-shoot digital camera, an improvised plywood and metal cradle for the camera and some plastic zip ties (to keep the cradle attached and the neck of the balloon cinched), a floating land-art documentation machine was improvised, MacGyver-like.
"I'm not supposed to use the word cheap — it's inexpensive," Rand Eppich, a senior project manager with the Getty institute, said. Mr. Eppich, who conceived the balloon plan, made the two-and-a-half-hour

drive from Salt Lake City last May with a Getty assistant, Aurora Tang, and Ms. Esmay, to put the system in use for the first time.

And despite a couple of balloons that popped in the Utah heat ("Thankfully, we didn't have cameras on them," Mr. Eppich said), the three managed to get some spectacular and highly useful shots of the jetty from heights ranging from 800 to 1,600 feet, as they unreeled the fishing line tied to the balloon, allowing it to rise.

"You don't need to be skilled conservators to do this part — it's literally like remembering back to childhood birthday parties," said Ms. Esmay, who joined Dia three years ago as its first full-time conservator. She is also responsible for the condition of sites like Walter De Maria's "Lightning Field" in western New Mexico and for works by artists like Donald Judd, Dan Flavin and Louise Bourgeois at Dia:Beacon in Beacon, N.Y.

Mr. Eppich said the Getty's goal was to create a system that Dia could use annually at little cost and one simple enough that Ms. Esmay could operate it herself. "We want to help people do something that's repeatable and sustainable after we're gone," he said.

Preservation concerns about "Spiral Jetty" have arisen lately not only because of the work's re-emergence from the water but also because of plans announced in the last two and a half years by companies to initiate industrial projects near the site. One is a large expansion of a field of solar evaporation ponds used to extract potassium sulfate from the water for fertilizer. Another is a plan for exploratory oil drilling that Dia officials argued would disrupt the way the work would be viewed and potentially harm it physically.

As a result of the drilling proposal — currently in limbo — Dia and Utah officials have begun exploring the creation of a buffer zone around the sculpture that would help protect it while still allowing the lake area to be used for other purposes.

But in addition to industrial threats to the work, there are also natural ones, like silt, which has begun to accumulate between the outermost band of the spiral and the next one in, as the lake's level has dropped. The lake is so low it is now possible to walk a quarter-mile into it with the water reaching only knee-high.

"In my personal opinion alone," Ms. Esmay said of the silt, "I think it's to such a degree now that it's foreign to the piece. But in 10 years it could be gone or in one year it could be gone. Or it could be worse. You have no way of knowing, and that's just inherent to the work itself."

She emphasized that the documentation project was not a prelude to any active plans to rebuild or even touch up the jetty. "Something like that might not happen for 20 years, if it ever happens at all," she said, "but at least we'll have 20 years of data that will show the patterns of change."

And if any conservation plans were to go forward, then the really complicated work would begin: trying to figure out what Mr. Smithson would have thought about it.

"Nature does not proceed in a straight line," he wrote. "It is rather a sprawling development. Nature is never finished."

http://www.nytimes.com/2009/11/18/arts/design/18spiral.html?ref=design

Yemen Finds Dreamland of Architecture

By ROBERT F. WORTH

SANA, Yemen — It has been almost 800 years since Saleh Qaid Othaim's house in the heart of the Old City was built from hand-cut stones and traditional alabaster decorations.

Yet on a recent morning, Mr. Othaim watched contentedly as a group of men renovated the place using exactly the same ancient methods and materials. Workers mixed the moist chocolate-brown masonry known as teen while a master builder supervised, a dagger hanging from his belt. There was no scaffolding, no helmets, no whine of machines: only the scraping of trowels and masonry, interrupted at last by the call to prayer in the high desert air.

"I don't care how long it takes," said Mr. Othaim, a government worker. "The most important thing is that it be done in a traditional way."

The capital's Old City is one of the world's architectural gems, a thicket of unearthly medieval towers etched with white filigree and crowned with stained-glass windows. But more unusual than their mere survival is the fact that the traditional building arts continue to thrive here. Elsewhere in the Middle East, many older houses are being ripped down to make way for bland steel-and-glass high-rise buildings. The hyper-modern skyline of Dubai, United Arab Emirates, with its mismatched skyscrapers looking as if they were hurled down at the Persian Gulf from outer space, is being emulated in Beirut and other cities.

Yemen is different. For all its many woes — wars, a water crisis and the rise of Al Qaeda — the country's adherence to ancient traditions often makes it feel like a refuge. Even outside the Old City, the bands and crescents of medieval Yemeni architecture can be seen on many newer buildings and homes, along with the translucent alabaster windows known as gammariyas.

The traditions stayed alive largely because of Yemen's deep poverty and long isolation. Until 1962, north Yemen had been ruled for almost a millennium by xenophobic imams who tried to shut out all foreign influence. The country largely missed the urban renewal phase of Arab history, in which kings and presidents cleared out ancient neighborhoods and markets in an effort to bring their nations into the modern age. By the early 1980s, when Yemen was still emerging from its medieval slumber, preservation was already in vogue.

There was much to preserve. This country has been famous for its unique architecture ever since Sabaean rulers built the skyscraper palace of Ghumdan 1,800 years ago, celebrated by one medieval poet thus:

It rises, climbing into the midst of the sky
twenty floors of no mean height
wound with a turban of white cloud

and girdled in alabaster.
Architects rediscovering the Old City soon found there was more than beauty at stake. The traditional houses were also more durable and effective than concrete-based modern houses, and better suited to the climate.
“The traditional houses have many environmental advantages,” said Abdulla Zaid Ayssa, the director of the government office that oversees all building and renovation in the Old City.
The traditional plaster, joss, does not erode stones over time the way cement does, Mr. Ayssa said, and is more durable. Qadad, a stone-based insulation material used in roofs and bathrooms, is much stronger than modern equivalents. The old stones and insulation techniques are calibrated to the sharp temperature shifts of night and day in Sana’s desert climate, so that the sun’s warmth fully penetrates a house’s walls only at day’s end, and is then retained through the night and no longer, Mr. Ayssa said. They are also much more soundproof and private than concrete.
“They experimented for hundreds of years to find these techniques,” Mr. Ayssa said. “By comparison, nowadays we are building houses with a very stupid concept.”
Yemen did not preserve everything. Only a few decades ago, there were 10 or 12 massive gates to the Old City; now only one remains. Some zealous republicans associated the older architecture with the reign of the imams, and thought it should be destroyed.
Still, Yemen kept far more than many other Arab countries did and, in 1986, Unesco, the United Nations culture agency, recognized the Old City as a World Heritage site, helping to secure money for its maintenance. Mr. Ayssa’s office helps subsidize the continued use of traditional materials and methods, which often cost more than modern ones.
To prevent the Old City from becoming a mere museum, the government built a modern sewerage system in the 1980s. It cobbled the ancient earthen streets, which had led one Italian writer to call the city a “Venice of dust.”
Now it is almost too crowded, and the authorities find themselves struggling to suit the city’s architecture to new ways of living. The ground floors that were once used for camels and goats have been largely refitted as stores. Those shops are undermining the central market, the social and cultural heart of the Old City. Still, local residents seem wedded to the traditional architecture and the rituals that go with it.
“Everything is changing in the city, but still, generation after generation, it continues,” said Mahmoud Qais al-Arousi, a 65-year-old builder, as he stood watching his workers mix masonry outside Mr. Othaim’s home. The building, he pointed out, still has scrape marks on its stone corners from where horse-drawn carriages would pass by. It was once inhabited by Nasser Salahuddin, a local notable who died 720 years ago.
With Mr. Arousi were his three sons, all of them apprentices to him. The building trade goes back hundreds of years in his family, he said, and his sons are planning to continue it.
“I learned by following every step my father made — the stones, the hizams,” Mr. Arousi said, referring to the distinctive horizontal belts running around Yemeni houses. “My sons are doing the same.”

http://www.nytimes.com/2009/11/16/world/middleeast/16yemen.html?ref=design

Supervolcano Eruption In Sumatra Deforested India 73,000 Years Ago

Landsat satellite photo of Lake Toba, Sumatra, Indonesia. (Credit: Image courtesy of NASA / via Wikimedia Commons)

ScienceDaily (Nov. 24, 2009) — A new study provides "incontrovertible evidence" that the volcanic super-eruption of Toba on the island of Sumatra about 73,000 years ago deforested much of central India, some 3,000 miles from the epicenter, researchers report.

The volcano ejected an estimated 800 cubic kilometers of ash into the atmosphere, leaving a crater (now the world's largest volcanic lake) that is 100 kilometers long and 35 kilometers wide. Ash from the event has been found in India, the Indian Ocean, the Bay of Bengal and the South China Sea.

The bright ash reflected sunlight off the landscape, and volcanic sulfur aerosols impeded solar radiation for six years, initiating an "Instant Ice Age" that -- according to evidence in ice cores taken in Greenland -- lasted about 1,800 years.

During this instant ice age, temperatures dropped by as much as 16 degrees centigrade (28 degrees Fahrenheit), said University of Illinois anthropology professor Stanley Ambrose, a principal investigator on the new study with professor Martin A.J. Williams, of the University of Adelaide. Williams, who discovered a layer of Toba ash in central India in 1980, led the research.

The climactic effects of Toba have been a source of controversy for years, as is its impact on human populations.

In 1998, Ambrose proposed in the *Journal of Human Evolution* that the effects of the Toba eruption and the Ice Age that followed could explain the apparent bottleneck in human populations that geneticists believe occurred between 50,000 and 100,000 years ago. The lack of genetic diversity among humans alive today suggests that during this time period humans came very close to becoming extinct.

To address the limited evidence of the terrestrial effects of Toba, Ambrose and his colleagues pursued two lines of research: They analyzed pollen from a marine core in the Bay of Bengal that included a layer

of ash from the Toba eruption, and they looked at carbon isotope ratios in fossil soil carbonates taken from directly above and below the Toba ash in three locations in central India.

Carbon isotopes reflect the type of vegetation that existed at a given locale and time. Heavily forested regions leave carbon isotope fingerprints that are distinct from those of grasses or grassy woodlands.

Both lines of evidence revealed a distinct change in the type of vegetation in India immediately after the Toba eruption, the researchers report. The pollen analysis indicated a shift to a "more open vegetation cover and reduced representation of ferns, particularly in the first 5 to 7 centimeters above the Toba ash," they wrote in the journal *Palaeogeography, Palaeoclimatology, Palaeoecology*. The change in vegetation and the loss of ferns, which grow best in humid conditions, they wrote, "would suggest significantly drier conditions in this region for at least one thousand years after the Toba eruption."

The dryness probably also indicates a drop in temperature, Ambrose said, "because when you turn down the temperature you also turn down the rainfall."

The carbon isotope analysis showed that forests covered central India when the eruption occurred, but wooded to open grassland predominated for at least 1,000 years after the eruption.

"This is unambiguous evidence that Toba caused deforestation in the tropics for a long time," Ambrose said. This disaster may have forced the ancestors of modern humans to adopt new cooperative strategies for survival that eventually permitted them to replace neandertals and other archaic human species, he said.

Story Source:

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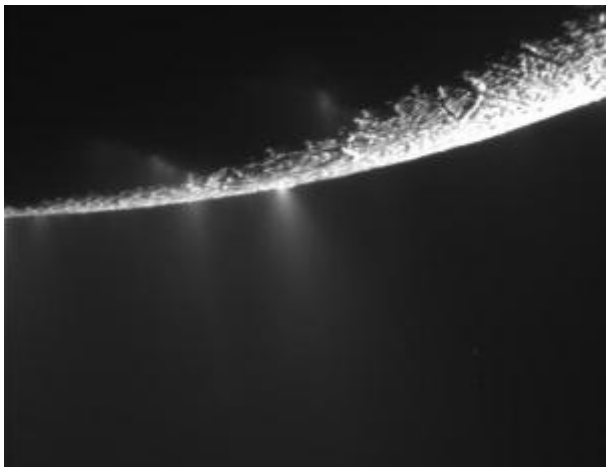
http://www.sciencedaily.com/releases/2009/11/091123142739.htm

Cassini Sends Back Images of Saturn's Moon Enceladus as Winter Nears



This unprocessed image was captured by NASA's Cassini spacecraft during its Nov. 21, 2009 flyby of Saturn's moon Enceladus. It shows the moon's south polar region, where jets of water vapor and other particles spew from fissures on the surface. (Credit: NASA/JPL/Space Science Institute)

ScienceDaily (Nov. 24, 2009) — NASA's Cassini spacecraft has sailed seamlessly through the Nov. 21 flyby of Saturn's moon Enceladus and started transmitting uncalibrated temperature data and images of the rippling terrain. These data and images will be processed and analyzed in the coming weeks. They will help scientists create the most-detailed-yet mosaic image of the southern part of the moon's Saturn-facing hemisphere and a contiguous thermal map of one of the intriguing "tiger stripe" features, with the highest resolution to date.

"These first raw images are spectacular, and paint an even more fascinating picture of Enceladus," said Bob Pappalardo, Cassini project scientist at NASA's Jet Propulsion Laboratory in Pasadena, Calif. "The Cassini teams will be delving into the data to better understand the workings of this bizarre, active moon."

Scientists are particularly interested in the tiger stripes, which are fissures in the south polar region, because they spew jets of water vapor and other particles hundreds of kilometers, or miles, from the surface. This flyby was scientists' last peek at the tiger stripes before the south pole fades into the darkness of winter for several years. The thermal imaging work focused on the tiger stripe known as Baghdad Sulcus.

The Nov. 21 encounter, which is sometimes called "E8" because it is the eighth targeted flyby of Enceladus, brought Cassini to within about 1,600 kilometers (1,000 miles) of the moon's surface, at around 82 degrees south latitude. Cassini is now cruising toward Rhea, another one of Saturn's moons, for more imaging and mapping work.

To see a full gallery of raw images, see: http://saturn.jpl.nasa.gov/photos/raw/ . For more information on the flyby, see: http://saturn.jpl.nasa.gov/mission/flybys/enceladus20091121/.

Story Source:

Adapted from materials provided by NASA/Jet Propulsion Laboratory.

http://www.sciencedaily.com/releases/2009/11/091123185902.htm

Flax and Yellow Flowers Can Produce Bioethanol

Flowers of a Brassica plant. Brassica offers a greater production of biomass per hectare and has a lesser environmental impact than flax. (Credit: Johnathan J. Stegeman and Tom Hilton/ SINC)

ScienceDaily (Nov. 24, 2009) — Surplus biomass from the production of flax shives, and generated from *Brassica carinata*, a yellow-flowered plant related to those which engulf fields in spring, can be used to produce bioethanol. This has been suggested by two studies carried out by Spanish and Dutch researchers and published in the journal *Renewable and Sustainable Energy Reviews*.

"These studies evaluate, from an environmental point of view, the production of bioethanol from two, as yet unexploited sources of biomass: agricultural residue from flax (for the production of paper fibres for animal bedding), and *Brassica carinata* crops (herbaceous plant with yellow flowers, similar to those which carpet the countryside in spring)," Sara González-García, researcher of the Bioprocesses and Environmental Engineering Group of the University of Santiago de Compostela (USC), said.

González-García, along with other researchers from USC, the Autonomous University of Barcelona and the University of Leiden (Holland), has confirmed that if bioethanol is produced from these two types of biomass "both CO_2 emissions and fossil fuel consumption will be reduced, meeting two of the objectives established by the European Union to promote biofuels."

These works have analysed the environmental load associated with the different stages of the process: the harvesting of flax or *Brassica*; the production of ethanol (through enzymatic hydrolysis followed by fermentation and distillation); mixing it with petrol (in varying proportions); and its use in passenger automobiles.

The results of both studies show that the use of ethanol-based fuels can help to mitigate climate change (by reducing greenhouse gases).

However, these fuels also "contribute to acidification, eutrophication, the formation of photochemical oxidants and toxicity (for people and the environment)." According to the experts, these negative effects could be lessened with the use of high-yield crops, as well as through optimisation of agricultural activity and better use of fertilisers.

Which is better: Flax or *Brassica*?

The studies developed by the researchers reveal that flax (which is richer in cellulose) can produce up to 0.3 kg of ethanol for every kg of dry biomass, compared with 0.25kg/kg of *Brassica*. However, when the whole production cycle is analysed, the yellow-flowered plant offers a greater production of biomass per hectare and has a lesser environmental impact.

The biofuel produced from these two plants is "second generation bioethanol," which is obtained from forest or agricultural residues, or from herbaceous crops, and does not enter into direct competition with agricultural crops intended for animal or human consumption.

The European Union and the International Monetary Fund are promoting the development of these types of biofuels. Spain is the third largest producer of bioethanol in Europe, after France and Germany, although its use still only represents 0.4% of total energy consumption.

Story Source:

Adapted from materials provided by FECYT - Spanish Foundation for Science and Technology, via EurekAlert!, a service of AAAS.

Journal References:

1. S. González-García, L. Luo, M.T. Moreira, G. Feijoo y G. Huppes. **Life cycle assessment of flax shives derived second generation ethanol fuelled automobiles in Spain**. *Renewable and Sustainable Energy Reviews*, 13(8): 1922-1933, October 2009
2. González-García et al. **Environmental aspects of ethanol-based fuels from Brassica carinata: A case study of second generation ethanol**. *Renewable and Sustainable Energy Reviews*, 2009; 13 (9): 2613 DOI: 10.1016/j.rser.2009.06.004

http://www.sciencedaily.com/releases/2009/11/091120094745.htm

Insecticide-Treated Bed Nets Reduce Infant Deaths In Democratic Republic Of Congo, Study Finds

A study found insecticide-treated bed nets to be a very cost-effective intervention. (Credit: Image courtesy of University of North Carolina School of Medicine)

ScienceDaily (Nov. 24, 2009) — Giving insecticide-treated bed nets to nearly 18,000 mothers at prenatal clinics in the Democratic Republic of Congo prevented an estimated 414 infant deaths from malaria, a study by University of North Carolina at Chapel Hill researchers concludes.

The bed nets cost about $6 each. When costs for transporting and distributing the nets and educating people how to use them are factored in, it cost just over $411 per infant death prevented. In addition, the intervention prevented an estimated 587 low birth weight deliveries, which in turn reduced long-term disability.

“This is an extremely cost-effective intervention,” said Sylvia Becker-Dreps, M.D., M.P.H., assistant professor of family medicine in the UNC School of Medicine and lead author of the study, which is published in the September 2009 issue of the *American Journal of Tropical Medicine and Hygiene*.

"In fact, it approaches the cost effectiveness of measles vaccination and is far more cost effective than prevention measures that are routine in the U.S."

The study stems from a project Becker-Dreps worked on while pursuing her Master of Public Health degree in the UNC Gillings School of Global Public Health. Andrea K. Biddle, M.P.H., Ph.D., an associate professor in the Gillings School, was one of her mentors on the project and is one of the study’s co-authors, along with three other Gillings School faculty.

In the project, study co-author Frieda Behets, Ph.D., associate professor of epidemiology at the Gillings School, helped 28 clinics in Kinshasa, the capital and largest city in the Democratic Republic of Congo, implement a program to prevent mother-to-child transmission of HIV. As part of that program, 17,893 pregnant women were given long-lasting, insecticide-treated bed nets for free.

Malaria, which is transmitted to humans by mosquitoes, is common among pregnant women in sub-Saharan Africa and is a major contributing factor to low birth weights and infant deaths in that region. "The goal of this study," Becker-Dreps said, "was to find out the costs and impact of giving bed nets to pregnant women in prenatal clinics, before their babies were born. The pregnant women could then use the bed nets during their pregnancies to reduce preterm deliveries and then use it to protect their young infants after birth."

Questionnaires administered to the mothers found that 84 percent reported sleeping under the bed net every day or almost every day, six months after delivery. Interviewers who visited a sample of the mothers reported that 70 percent had their bed nets hanging in the correct position in their homes.

Becker-Dreps and colleagues combined this data with actual infant mortality and low birth weight data from clinics in the region and then performed statistical analyses that enabled them to produce their estimates. They concluded that bed net distribution is a cost-effective addition to prenatal services in the region.

Co-authors of the study, in addition to Becker-Dreps, Biddle and Behets, include Audrey Pettifor, Ph.D., Steven Meshnick, M.D., Ph.D., all from the Gillings School; and Gertrude Musuamba, M.D. from the School of Public Health in Kinshasa and David Nku Imbie, M.D., from the Salvation Army in Kinshasa.

Story Source:

Adapted from materials provided by University of North Carolina School of Medicine.

http://www.sciencedaily.com/releases/2009/09/090903064442.htm

Common Plastics Chemicals Phthalates Linked to ADHD Symptoms

Child's cup. Phthalates are important components of many consumer products, including toys, cleaning materials, plastics, and personal care items. Researchers found a significant positive association between phthalate exposure and ADHD, meaning that the higher the concentration of phthalate metabolites in the urine, the worse the ADHD symptoms and/or test scores. (Credit: iStockphoto)

ScienceDaily (Nov. 23, 2009) — Phthalates are important components of many consumer products, including toys, cleaning materials, plastics, and personal care items. Studies to date on phthalates have been inconsistent, with some linking exposure to these chemicals to hormone disruptions, birth defects, asthma, and reproductive problems, while others have found no significant association between exposure and adverse effects.

A new report by Korean scientists, published by Elsevier in the November 15th issue of *Biological Psychiatry*, adds to the potentially alarming findings about phthalates. They measured urine phthalate concentrations and evaluated symptoms of attention-deficit/hyperactivity disorder (ADHD) using teacher-reported symptoms and computerized tests that measured attention and impulsivity.

They found a significant positive association between phthalate exposure and ADHD, meaning that the higher the concentration of phthalate metabolites in the urine, the worse the ADHD symptoms and/or test scores.

Senior author Yun-Chul Hong, MD, PhD, explained that "these data represent the first documented association between phthalate exposure and ADHD symptoms in school-aged children." John Krystal, MD, the Editor of Biological Psychiatry, also commented: "This emerging link between phthalates and symptoms of ADHD raises the concern that accidental environmental exposure to phthalates may be contributing to behavioral and cognitive problems in children. This concern calls for more definitive research."

The U.S. Centers for Disease Control and Prevention, in the Summary of their 2005 Third National Report on Human Exposure to Environmental Chemicals, state that "very limited scientific information is available on potential human health effects of phthalates at levels" found in the U.S. population. Although

this study was performed in a Korean population, their levels of exposure are likely comparable to a U.S. population.

The current findings do not prove that phthalate exposure caused ADHD symptoms. However, these initial findings provide a rationale for further research on this association.

Story Source:

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

Journal Reference:

1. Kim et al. **Phthalates Exposure and Attention-Deficit/Hyperactivity Disorder in School-Age Children**. *Biological Psychiatry*, 2009; 66 (10): 958 DOI: 10.1016/j.biopsych.2009.07.034

http://www.sciencedaily.com/releases/2009/11/091119101042.htm

International Expedition Investigates Climate Change, Alternative Fuels in Arctic

Having the potential to provide a clean and abundant fuel alternative, deposits of methane hydrates -- frozen mixtures of hydrocarbon gas (mostly methane) and water -- occur over large areas of the ocean floor. (Credit: US Geological Society)

ScienceDaily (Nov. 23, 2009) — Scientists from the Marine Biogeochemistry and Geology and Geophysics sections of the Naval Research Laboratory (NRL) organized and led a team of university and government scientists on an Arctic expedition to initiate methane hydrate exploration in the Beaufort Sea and determine the spatial variation of sediment contribution to Arctic climate change.

Utilizing the U.S. Coast Guard Cutter Polar Sea as a research platform, three cross-shelf transects were surveyed and sampled off Alaska's North Slope at Hammerhead, Thetis Island and Halkett representing three regions of the Alaskan shelf. The expedition integrated expertise in coastal geophysics, sediment geochemistry, dissolved and free methane fluxes through the water column and into the atmosphere, sediment and water column microbiology and biogeochemistry and detailed characterization of the sub-seafloor geology.

"The objective of the sampling is to help determine variations in the shallow sediment and water column methane sources, methane cycling and the subsequent flux to the atmosphere," said Richard Coffin, chief scientist, NRL Chemistry Division.

The content, location and distribution of methane in hydrate is variable and controlled by geothermal gradients and biological and thermal methane production. Large deposits of methane hydrates, frozen mixtures of hydrocarbon gas (mostly methane) and water, occur over large areas of the ocean floor.

International research has begun with a primary goal of obtaining the methane in these hydrates as an energy source.

During the 12-day expedition, Methane In The Arctic Shelf and Slope (MITAS-1), the crew conducted 34 conductivity-temperature-depth (CTD) water column casts using a rosette of Niskin bottles and collected sediment samples from 14 piston cores, three vibrocores and 20 multicores. Regions selected for this study were based on the review of Minerals Management Service and U.S. Geologic Survey (USGS) seismic data with specific sample locations decided onboard through review of the 3.5 Kilohertz (kHz) sub-bottom profiler data.

The MITAS-1 crew focused on six primary goals to include:

- Acquire and integrate seismic, acoustic, temperature, geochemical, and lithostratigraphic data for evaluation of deep sediment hydrate distributions.
- Estimate spatial variation and controls on the vertical methane flux as it relates to variations in lithostratigraphy, geologic structures, water column temperatures, heat flow, seismic and acoustic profiles, and water depth.
- Develop and calibrate models to evaluate sediment hydrate loading, hydrate destabilization through warming, and the fate of methane after destabilization.
- Determine and model the transport of methane from the sediment through the water column into the atmosphere.
- Study the control of total methane emissions by microbial methane consumption in the sediment and in the water column.
- Study the contribution of methane to the benthic and pelagic carbon cycling.

The expedition was supported by NRL, Office of Naval Research (ONR), Department of Energy (DoE), Royal Netherlands Institute for Sea Research (NIOZ), French Research Institute for Exploitation of the Sea (IFREMER) and the German Leibniz Institute of Marine Sciences (IFM-Geomar). Future expeditions will also include scientists from Scotland's Herriot-Watt University, Norway's University of Bergen and GNS Science of New Zealand.

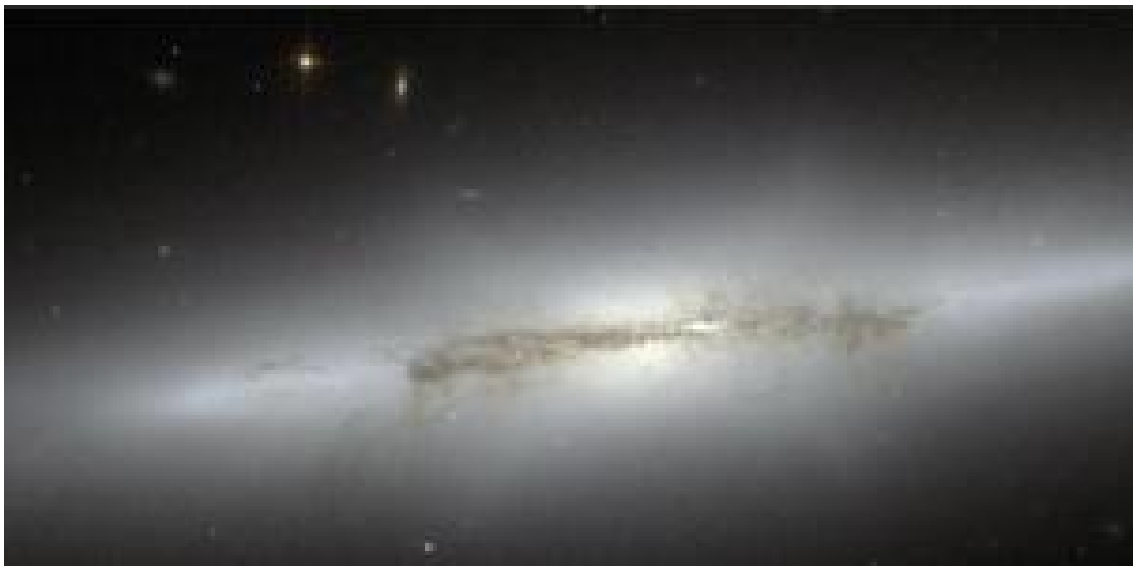
"Our project is intended to initiate a long-term collaboration in future expeditions in the Beaufort Sea and other regions of the Arctic Ocean," said Coffin.

Story Source:

Adapted from materials provided by Naval Research Laboratory.

http://www.sciencedaily.com/releases/2009/11/091122095413.htm

Spiral Galaxies: Exploring the Baffling Boxy Bulge



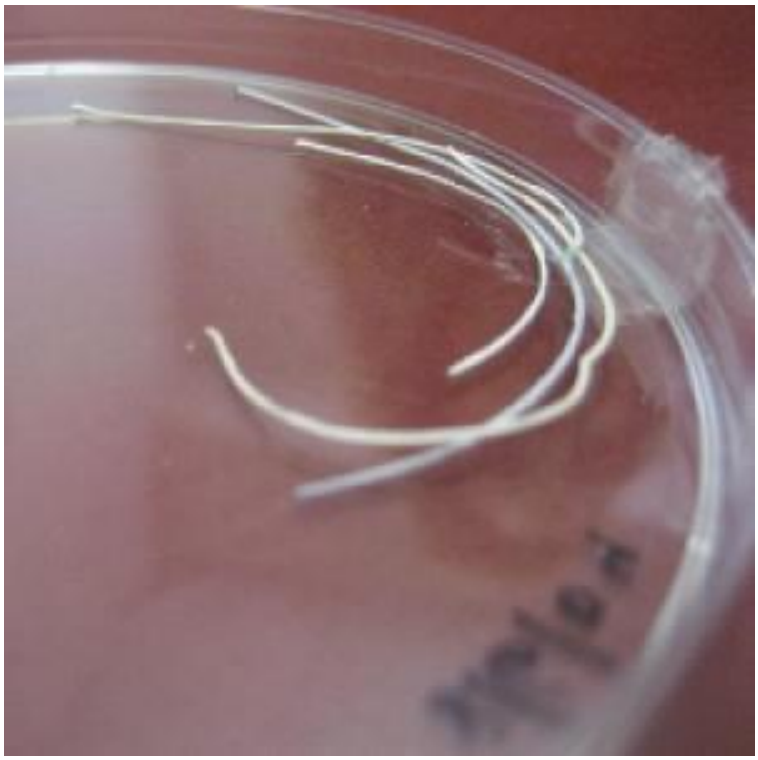
Still an astrophysical mystery, the evolution of the bulges in spiral galaxies led astronomers to the edge-on galaxy NGC 4710. When staring directly at the centre of the galaxy, one can detect a faint, ethereal "X"-shaped structure. Such a feature, which astronomers call a "boxy" or "peanut-shaped" bulge, is due to the vertical motions of the stars in the galaxy's bar and is only evident when the galaxy is seen edge-on. This curiously shaped puff is often observed in spiral galaxies with small bulges and open arms, but is less common in spirals with arms tightly wrapped around a more prominent bulge, such as NGC 4710. (Credit: NASA and ESA)

ScienceDaily (Nov. 23, 2009) — When targeting spiral galaxy bulges, astronomers often seek edge-on galaxies, as their bulges are more easily distinguishable from the disc. This exceptionally detailed edge-on view of NGC 4710 taken by the Advanced Camera for Surveys (ACS) aboard Hubble reveals the galaxy's bulge in the brightly coloured centre. The luminous, elongated white plane that runs through the bulge is the galaxy disc. The disc and bulge are surrounded by eerie-looking dust lanes.When staring directly at the centre of the galaxy, one can detect a faint, ethereal "X"-shaped structure. Such a feature, which astronomers call a "boxy" or "peanut-shaped" bulge, is due to the vertical motions of the stars in the galaxy's bar and is only evident when the galaxy is seen edge-on. This curiously shaped puff is often observed in spiral galaxies with small bulges and open arms, but is less common in spirals with arms tightly wrapped around a more prominent bulge, such as NGC 4710.NGC 4710 is a member of the giant Virgo Cluster of galaxies and lies in the northern constellation of Coma Berenices (the Hair of Queen Berenice). It is not one of the brightest members of the cluster, but can easily be seen as a dim elongated smudge on a dark night with a medium-sized amateur telescope. In the 1780s, William Herschel discovered the galaxy and noted it simply as a "faint nebula." It lies about 60 million light-years from the Earth and is an example of a lenticular or S0-type galaxy -- a type that seems to have some characteristics of both spiral and elliptical galaxies.Astronomers are scrutinising these systems to determine how many globular clusters they host. Globular clusters are thought to represent an indication of the processes that can build bulges. Two quite different processes are believed to be at play regarding the formation of bulges in spiral galaxies: either they formed rather rapidly in the early Universe, before the spiral disc and arms formed; or they built up from material accumulating from the disc during a slow and long evolution. In this case of NGC 4710, researchers have spotted very few globular clusters associated with the bulge, indicating that its assembly mainly involved relatively slow processes.

Adapted from materials provided by ESA/Hubble Information Centre.

http://www.sciencedaily.com/releases/2009/11/091118072049.htm

New Wound Dressing, Full of Antibiotics, Dissolves When Wound Has Healed



Composite drug-releasing fibers that can be used as dissolvable wound dressings. (Credit: Image courtesy of American Friends of Tel Aviv University)

ScienceDaily (Nov. 23, 2009) — Despite advances in treatment regimens and the best efforts of nurses and doctors, about 70% of all people with severe burns die from related infections. But a revolutionary new wound dressing developed at ***Tel Aviv University*** could cut that number dramatically.

Prof. Meital Zilberman of TAU's *Department of Biomedical Engineering* has developed a new wound dressing based on fibers she engineered -- fibers that can be loaded with drugs like antibiotics to speed up the healing process, and then dissolve when they've done their job. A study published in the *Journal of Biomedical Materials Research -- Applied Biomaterials* demonstrates that, after only two days, this dressing can eradicate infection-causing bacteria.

The new dressing protects the wound until it is no longer needed, after which it melts away. "We've developed the first wound dressing that both releases antibiotic drugs and biodegrades in a controlled manner," says Prof. Zilberman. "It solves current mechanical and physical limitations in wound-dressing techniques and gives physicians a new and more effective platform for treating burns and bedsores."

Not as simple as it sounds

While the concept is simple, the technology is not. Skin, Prof. Zilberman explains, serves a number of vastly different purposes. "Wound dressings must maintain a certain level of moisture while acting as a shield," she says. "Like skin, they must also enable fluids from the wound to leave the infected tissue at a certain rate. It can't be too fast or too slow. If too fast, the wound will dry out and it won't heal properly. If too slow, there's a real risk of increased contamination."

Prof. Zilberman's new wound dressing, which does not yet have a formal name, is designed to mimic skin and the way it protects the body. It combines positive mechanical and physical properties with what medical researchers call "a desired release profile of antibiotics."

Slashing mortality statistics

Unlike oral antibiotics, locally-applied antibiotics can target and kill harmful bacteria before they enter the body to cause further infection, sepsis, or death. "People who suffer from large burns don't usually die from the condition itself. The fatal culprits are the secondary bacterial infections that invade the body through these vulnerable burned areas," says Prof. Zilberman.

The new TAU dressing inhibits bacterial growth and is biodegradable, which helps doctors avoid constant wound cleaning and redressing, allowing the body to do the work on its own. "When administered at the wound, a doctor can give relatively high but local doses of antibiotics, avoiding any toxicity issues that arise when the same amount of antibiotic passes through the body," explains Prof. Zilberman, who worked on this research with Jonathan Elsner, her Ph.D. student.

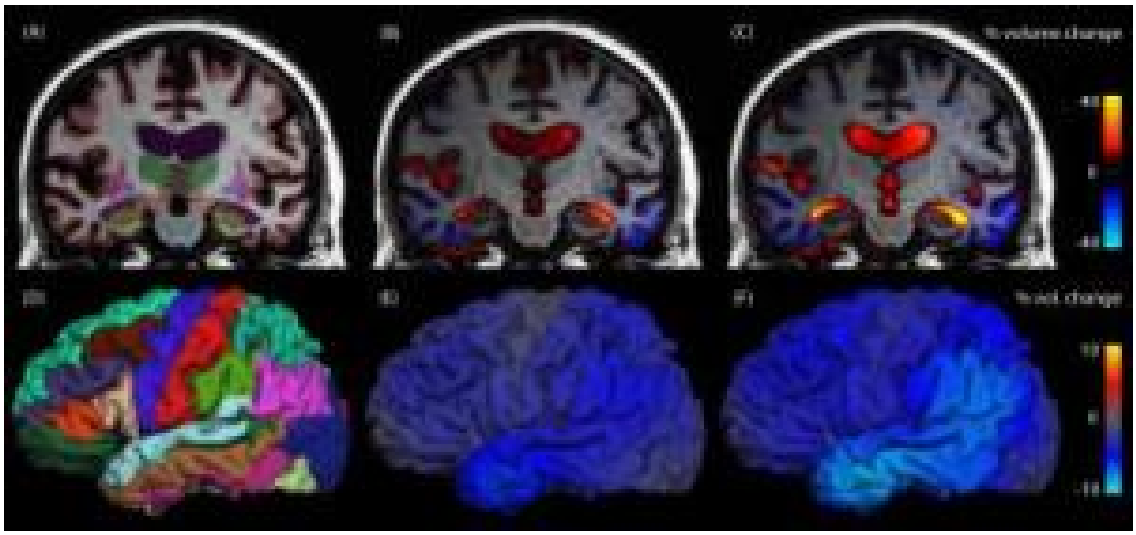
Prof. Zilberman is now starting the early stages of clinical trials on animal models. So far, her wound dressing has passed physical and mechanical tests *in vitro* and in bacterial inhibition tests in the laboratory. She is also seeking a strategic partner to co-develop the research and take it to the commercial stage.

Story Source:

Adapted from materials provided by Tel Aviv University.

http://www.sciencedaily.com/releases/2009/11/091117124015.htm

Analyzing Structural Brain Changes in Alzheimer's Disease



Serial MRI brain scans, taken six months apart, show progression from mild cognitive impairment to Alzheimer's disease, with significant atrophy (blue) and ventricle enlargement (orange/red). (Credit: University of California, San Diego, UCSD)

ScienceDaily (Nov. 23, 2009) — In a study that promises to improve diagnosis and monitoring of Alzheimer's disease, scientists at the University of California, San Diego have developed a fast and accurate method for quantifying subtle, sub-regional brain volume loss using magnetic resonance imaging (MRI).

The study will be published the week of November 16 in the *Proceedings of the National Academy of Sciences* (*PNAS*).

By applying the techniques to the newly completed dataset of the multi-institution Alzheimer's Disease Neuroimaging Initiative (ADNI), the scientists demonstrated that such sub-regional brain volume measurements outperform available measures for tracking severity of Alzheimer's disease, including widely used cognitive testing and measures of global brain-volume loss.

The general pattern of brain atrophy resulting from Alzheimer's disease has long been known through autopsy studies, but exploiting this knowledge toward accurate diagnosis and monitoring of the disease has only recently been made possible by improvements in computational algorithms that automate identification of brain structures with MRI. The new methods described in the study provide rapid identification of brain sub-regions combined with measures of change in these regions across time. The methods require at least two brain scans to be performed on the same MRI scanner over a period of several months. The new research shows that changes in the brain's memory regions, in particular a region of the temporal lobe called the entorhinal cortex, offer sensitive measures of the early stages of the disease.

"Loss of volume in the hippocampus is a consistent finding when using MRI, and is a reliable predictor of cognitive decline," said Anders M. Dale, PhD, professor of neurosciences and radiology at the UC San Diego School of Medicine, who led the study. "However, we have now developed and validated imaging biomarkers to not only track brain atrophy, but distinguish the early stages of Alzheimer's disease from changes related to normal aging."

The researchers at dozens of sites across the U.S. studied nearly 300 patients with mild cognitive impairment, 169 healthy controls and 129 subjects with AD and then measured rates of sub-regional

cerebral volume change for each group. Power calculations were performed to identify regions that would provide the most sensitive outcome measures in clinical trials of disease-modifying agents.

"The technique is extremely powerful, because it allows a researcher to examine exactly how much brain-volume loss has occurred in each region of the brain, including cortical regions, where we know the bad proteins of Alzheimer's disease build up," said study co-author James Brewer, MD, PhD, a neurologist and assistant professor in the Departments of Radiology and Neurosciences at UC San Diego. "We are particularly excited to use the techniques in new clinical trials, but also to reexamine old clinical trial data where global measures of brain shrinkage were applied. These new findings suggest that such global measures are less sensitive than regional measures for detecting the changes specific to Alzheimer's disease -- the changes these drugs are targeting."

Additional contributors to the study include Dominic Holland, Donald J. Hagler and Christine Fennema-Notestine of UC San Diego and members of the Alzheimer's Disease Neuroimaging Initiative. ADNI is funded in part by the National Institute on Aging and the National Institute of Biomedical Imaging and Bioengineering. Anders Dale is a founder and holds equity in CorTechs Labs, Inc, and also serves on its Scientific Advisory Board.

About ADNI

The five-year, $60 million Alzheimer's Disease Neuroimaging Initiative (ADNI), a landmark research study to identify brain and other biological changes associated with memory decline, was launched in 2004 by the National Institutes of Health (NIH). The project was begun by the National Institute on Aging (NIA) at the NIH and is supported by more than a dozen other federal agencies and private-sector companies and organizations, making it the largest public-private partnership on brain research underway at the NIH. Investigators at 58 sites across the United States and Canada are involved with the study. The goal of the initiative is to speed up the search for treatments and cures for Alzheimer's disease by seeing whether imaging of the brain -- through magnetic resonance imaging (MRI) or positron emission tomography (PET) scans, together with other biomarkers -- can help predict and monitor the onset and progression of Alzheimer's disease.

Story Source:

Adapted from materials provided by University of California - San Diego, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2009/11/091116165737.htm

Skin Color Gives Clues to Health

Skin that is slightly flushed with blood and full of oxygen suggests a strong heart and lungs, supporting the study's findings that rosier skin appeared healthy. (Credit: iStockphoto/Darren Baker)

ScienceDaily (Nov. 23, 2009) — Researchers from the universities of Bristol and St. Andrews in the UK have found that the color of a person's skin affects how healthy and therefore attractive they appear, and have found that diet may be crucial to achieving the most desirable complexion. The work will be published in the December issue of Springer's International *Journal of Primatology*.

Using specialist computer software, a total of 54 Caucasian participants of both sexes were asked to manipulate the skin color of male and female Caucasian faces to make them look as healthy as possible. They chose to increase the rosiness, yellowness and brightness of the skin.

"Most previous work on faces has focused on the shape of the face or the texture of the skin, but one of the most variable characteristics of the face is skin color," said Dr. Ian Stephen who is now at the University of Bristol.

"We knew from our previous work that people who have more blood and more oxygen color in their skins looked healthy, and so we decided to see what other colors affect health perceptions. This has given us some clues as to what other skin pigments may relate to a healthy appearance."

Skin that is slightly flushed with blood and full of oxygen suggests a strong heart and lungs, supporting the study's findings that rosier skin appeared healthy. Smokers and people with diabetes or heart disease have fewer blood vessels in their skin, and so skin would appear less rosy.

The preference for more golden or 'yellow-toned' skin as healthier might be explained by the 'carotenoid pigments' that we get from the fruit and vegetables in our diet.These plant pigments are powerful antioxidants that soak up dangerous compounds produced when the body combats disease. They are also important for our immune and reproductive systems and may help prevent cancer.

They are the same dietary pigments that brightly colored birds and fish use to show off their healthiness and attract mates, and the researchers think that similar biological mechanisms may be at work in humans.

"In the West we often think that sun tanning is the best way to improve the color of your skin," said Ian Stephen, "but our research suggests that living a healthy lifestyle with a good diet might actually be better."

Melanin, the pigment that causes the tan color when skin is exposed to the sun makes the skin darker and more yellow, but participants in the study chose to make skin lighter and more yellow to make it look healthier.

"This discovery is very exciting and has given us a promising lead into cues to health," said Professor David Perrett, head of the Perception Lab at the University of St. Andrews, where the research took place.

"What we eat and not just how much we eat appears to be important for a healthy appearance. The only natural way in which we can make our skin lighter and more yellow is to eat a more healthy diet high in fruit and vegetables."

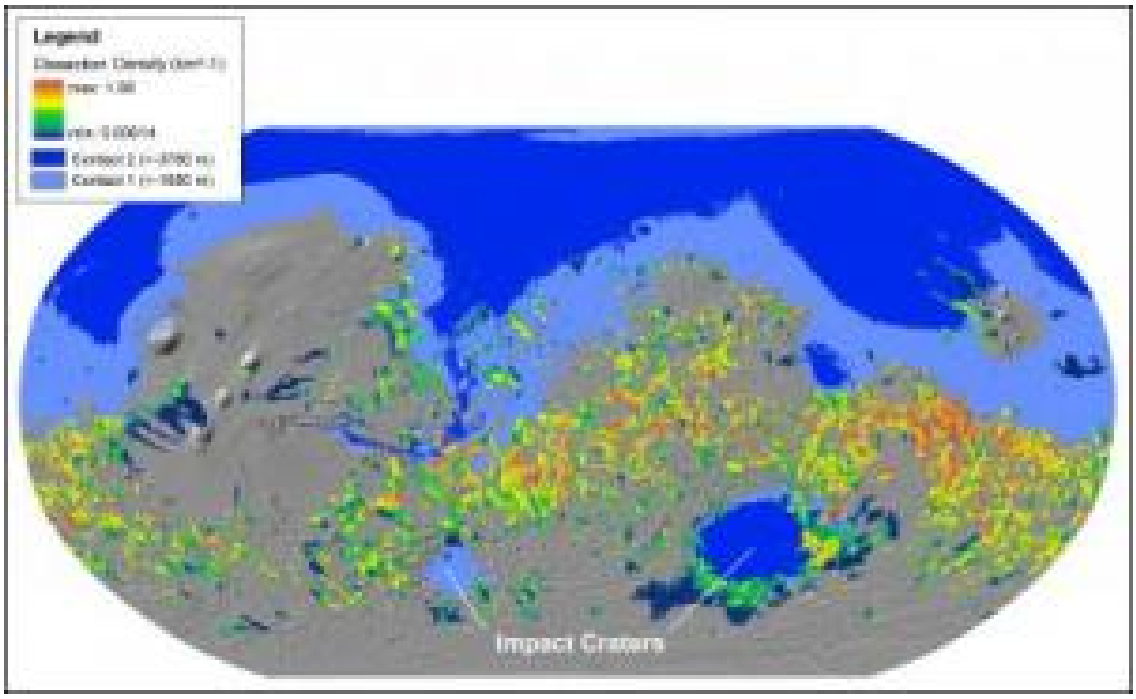
Reference 1. Stephen ID et al (2009). Facial skin coloration affects perceived health of human faces. *International Journal of Primatology* DOI 10.1007/s10764-009-9380-z

Story Source:

Adapted from materials provided by Springer.

http://www.sciencedaily.com/releases/2009/11/091116103525.htm

Extensive Valley Network on Mars Adds to Evidence for Ancient Martian Ocean



This is a global map depicting the dissection density of valley networks on Mars, in relation to the hypothesized northern ocean. Two candidate sea levels are shown: contact 1 with mean elevation at -1,680 meters and contact 2 with mean elevation of -3,760 meters. (Credit: Wei Luo, Northern Illinois University)

ScienceDaily (Nov. 23, 2009) — New research adds to the growing body of evidence suggesting the Red Planet once had an ocean.

In a new study, scientists from Northern Illinois University and the Lunar and Planetary Institute in Houston used an innovative computer program to produce a new and more detailed global map of the valley networks on Mars. The findings indicate the networks are more than twice as extensive (2.3 times longer in total length) as had been previously depicted in the only other planet-wide map of the valleys.

Further, regions that are most densely dissected by the valley networks roughly form a belt around the planet between the equator and mid-southern latitudes, consistent with a past climate scenario that included precipitation and the presence of an ocean covering a large portion of Mars' northern hemisphere.

Scientists have previously hypothesized that a single ocean existed on ancient Mars, but the issue has been hotly debated.

"All the evidence gathered by analyzing the valley network on the new map points to a particular climate scenario on early Mars," NIU Geography Professor Wei Luo said. "It would have included rainfall and the existence of an ocean covering most of the northern hemisphere, or about one-third of the planet's surface."

Luo and Tomasz Stepinski, a staff scientist at the Lunar and Planetary Institute, publish their findings in the current issue of the *Journal of Geophysical Research -- Planets*.

"The presence of more valleys indicates that it most likely rained on ancient Mars, while the global pattern showing this belt of valleys could be explained if there was a big northern ocean," Stepinski said.

Valley networks on Mars exhibit some resemblance to river systems on Earth, suggesting the Red Planet was once warmer and wetter than present.

But, since the networks were discovered in 1971 by the Mariner 9 spacecraft, scientists have debated whether they were created by erosion from surface water, which would point to a climate with rainfall, or through a process of erosion known as groundwater sapping. Groundwater sapping can occur in cold, dry conditions.

The large disparity between river-network densities on Mars and Earth had provided a major argument against the idea that runoff erosion formed the valley networks. But the new mapping study reduces the disparity, indicating some regions of Mars had valley network densities more comparable to those found on Earth.

"It is now difficult to argue against runoff erosion as the major mechanism of Martian valley network formation," Luo said.

"When you look at the entire planet, the density of valley dissection on Mars is significantly lower than on Earth," he said. "However, the most densely dissected regions of Mars have densities comparable to terrestrial values.

"The relatively high values over extended regions indicate the valleys originated by means of precipitation-fed runoff erosion -- the same process that is responsible for formation of the bulk of valleys on our planet," he added.

The researchers created an updated planet-wide map of the valley networks by using a computer algorithm that parses topographic data from NASA satellites and recognizes valleys by their U-shaped topographic signature. The computer-generated map was visually inspected and edited with help from NIU graduate students Yi Qi and Bartosz Grudzinski to produce the final updated map.

"The only other global map of the valley networks was produced in the 1990s by looking at images and drawing on top of them, so it was fairly incomplete and it was not correctly registered with current datum," Stepinski said. "Our map was created semi-automatically, with the computer algorithm working from topographical data to extract the valley networks. It is more complete, and shows many more valley networks."

Stepinski developed the algorithms used in the mapping.

"The basic idea behind our method is to flag landforms having a U-shaped structure that is characteristic of the valleys," Stepinski added. "The valleys are mapped only where they are seen by the algorithm."

The Martian surface is characterized by lowlands located mostly in the northern hemisphere and highlands located mostly in the southern hemisphere. Given this topography, water would accumulate in the northern hemisphere, where surface elevations are lower than the rest of the planet, thus forming an ocean, the researchers said.

"Such a single-ocean planet would have an arid continental-type climate over most of its land surfaces," Luo said.

The northern-ocean scenario meshes with a number of other characteristics of the valley networks.

"A single ocean in the northern hemisphere would explain why there is a southern limit to the presence of valley networks," Luo added. "The southernmost regions of Mars, located farthest from the water reservoir, would get little rainfall and would develop no valleys. This would also explain why the valleys become shallower as you go from north to south, which is the case.

"Rain would be mostly restricted to the area over the ocean and to the land surfaces in the immediate vicinity, which correlates with the belt-like pattern of valley dissection seen in our new map," Luo said.

The research was funded by NASA.

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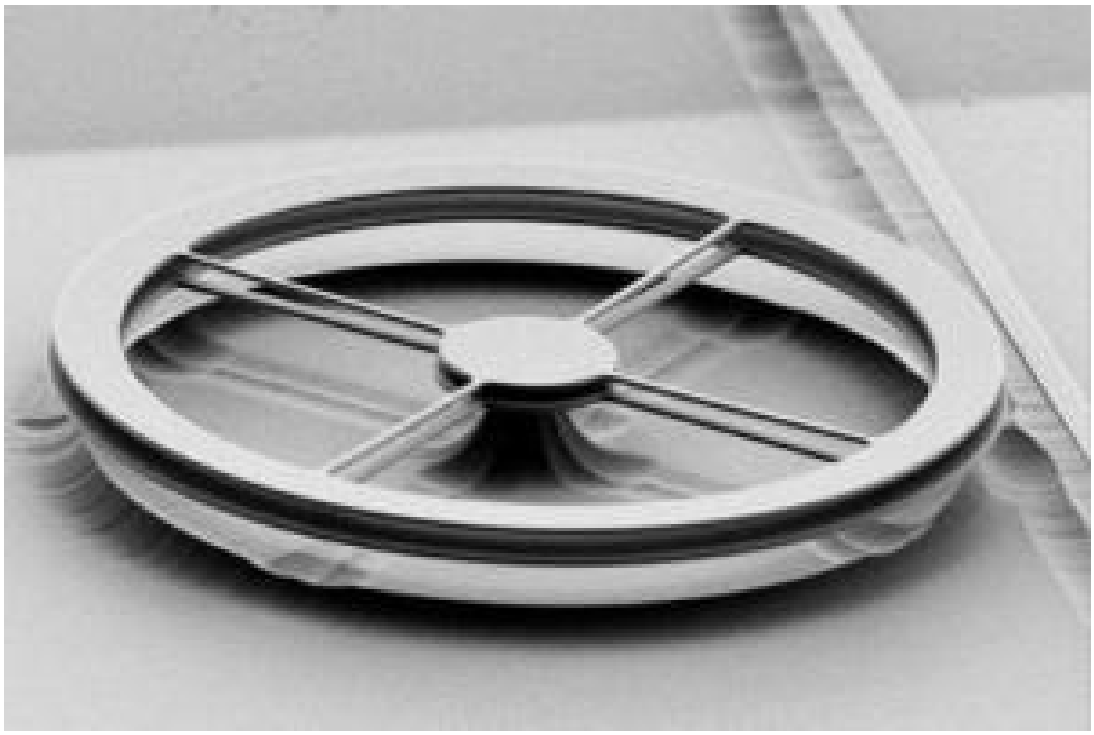
Adapted from materials provided by Northern Illinois University.

http://www.sciencedaily.com/releases/2009/11/091123094122.htm

Small Optical Force Can Budge Nanoscale Objects



Scanning electron micrograph of two thin, flat rings of silicon nitride, each 190 nanometers thick and mounted a millionth of a meter apart. Light is fed into the ring resonators from the straight waveguide at the right. Under the right conditions optical forces between the two rings are enough to bend the thin spokes and pull the rings toward one another, changing their resonances enough to act as an optical switch. (Credit: Cornell Nanophotonics Group)

ScienceDaily (Nov. 23, 2009) — With a bit of leverage, Cornell researchers have used a very tiny beam of light with as little as 1 milliwatt of power to move a silicon structure up to 12 nanometers. That's enough to completely switch the optical properties of the structure from opaque to transparent, they reported.

The technology could have applications in the design of micro-electromechanical systems (MEMS) -- nanoscale devices with moving parts -- and micro-optomechanical systems (MOMS) which combine moving parts with photonic circuits, said Michal Lipson, associate professor of electrical and computer engineering.

The research by postdoctoral researcher Gustavo Wiederhecker, Long Chen, Ph.D. '09, Alexander Gondarenko, Ph.D. '10, and Lipson appears in the online edition of the journal *Nature* and will appear in a forthcoming print edition.

Light can be thought of as a stream of particles that can exert a force on whatever they strike. The sun doesn't knock you off your feet because the force is very small, but at the nanoscale it can be significant. "The challenge is that large optical forces are required to change the geometry of photonic structures," Lipson explained.

But the researchers were able to reduce the force required by creating two ring resonators -- circular waveguides whose circumference is matched to a multiple of the wavelength of the light used -- and exploiting the coupling between beams of light traveling through the two rings.

A beam of light consists of oscillating electric and magnetic fields, and these fields can pull in nearby objects, a microscopic equivalent of the way static electricity on clothes attracts lint. This phenomenon is exploited in "optical tweezers" used by physicists to trap tiny objects. The forces tend to pull anything at the edge of the beam toward the center.

When light travels through a waveguide whose cross-section is smaller than its wavelength some of the light spills over, and with it the attractive force. So parallel waveguides close together, each carrying a light beam, are drawn even closer, rather like two streams of rainwater on a windowpane that touch and are pulled together by surface tension.

The researchers created a structure consisting of two thin, flat silicon nitride rings about 30 microns (millionths of a meter) in diameter mounted one above the other and connected to a pedestal by thin spokes. Think of two bicycle wheels on a vertical shaft, but each with only four thin, flexible spokes. The ring waveguides are three microns wide and 190 nanometers (nm -- billionths of a meter) thick, and the rings are spaced 1 micron apart.

When light at a resonant frequency of the rings, in this case infrared light at 1533.5 nm, is fed into the rings, the force between the rings is enough to deform the rings by up to 12 nm, which the researchers showed was enough to change other resonances and switch other light beams traveling through the rings on and off. When light in both rings is in phase -- the peaks and valleys of the wave match -- the two rings are pulled together. When it is out of phase they are repelled. The latter phenomenon might be useful in MEMS, where an ongoing problem is that silicon parts tend to stick together, Lipson said.

An application in photonic circuits might be to create a tunable filter to pass one particular optical wavelength, Wiederhecker suggested.

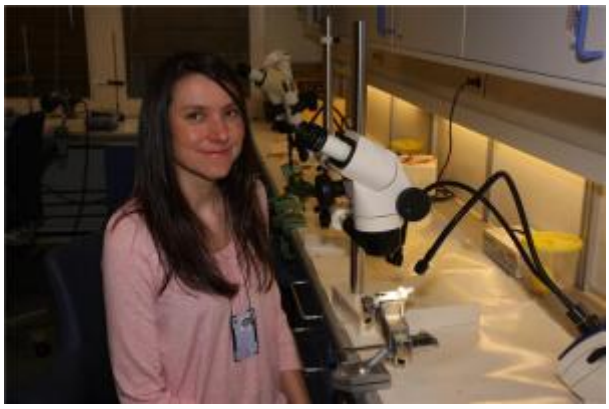
The work is supported by the National Science Foundation (NSF) and the Cornell Center for Nanoscale Systems. Devices were fabricated at the Cornell Nanoscale Science and Technology Facility, also supported by NSF.

Story Source:

Adapted from materials provided by Cornell University.

http://www.sciencedaily.com/releases/2009/11/091117161131.htm

How the Brain Filters out Distracting Thoughts to Focus on a Single Bit of Information



Laura Colgin is a postdoctoral fellow at the Norwegian University of Science and Technology's Kavli Institute for Systems Neuroscience and Centre for the Biology of Memory. (Credit: Image courtesy of The Norwegian University of Science and Technology (NTNU))

ScienceDaily (Nov. 23, 2009) — The human brain is bombarded with all kinds of information, from the memory of last night's delicious dinner to the instructions from your boss at your morning meeting. But how do you "tune in" to just one thought or idea and ignore all the rest of what is going on around you, until it comes time to think of something else?

Researchers at the Kavli Institute for Systems Neuroscience and Centre for the Biology of Memory at the Norwegian University of Science and Technology (NTNU) have discovered a mechanism that the brain uses to filter out distracting thoughts to focus on a single bit of information. Their results are reported in 19 November issue of *Nature*.Think of your brain like a radio: You're turning the knob to find your favourite station, but the knob jams, and you're stuck listening to something that's in between stations. It's a frustrating combination that makes it quite hard to get an update on swine flu while a Michael Jackson song wavers in and out. Staying on the right frequency is the only way to really hear what you're after. In much the same way, the brain's nerve cells are able to "tune in" to the right station to get exactly the information they need, says researcher Laura Colgin, who was the paper's first author. "Just like radio stations play songs and news on different frequencies, the brain uses different frequencies of waves to send different kinds of information," she says.

Gamma waves as information carriers

Colgin and her colleagues measured brain waves in rats, in three different parts of the hippocampus, which is a key memory center in the brain. While listening in on the rat brain wave transmissions, the researchers started to realize that there might be something more to a specific sub-set of brain waves, called gamma waves. Researchers have thought these waves are linked to the formation of consciousness, but no one really knew why their frequency differed so much from one region to another and from one moment to the next.

Information is carried on top of gamma waves, just like songs are carried by radio waves. These "carrier waves" transmit information from one brain region to another. "We found that there are slow gamma waves and fast gamma waves coming from different brain areas, just like radio stations transmit on different frequencies," she says.

You really can "be on the same wavelength"

"You know how when you feel like you really connect with someone, you say you are on the same wavelength? When brain cells want to connect with each other, they synchronize their activity," Colgin explains. "The cells literally tune into each other's wavelength. We investigated how gamma waves in

particular were involved in communication across cell groups in the hippocampus. What we found could be described as a radio-like system inside the brain. The lower frequencies are used to transmit memories of past experiences, and the higher frequencies are used to convey what is happening where you are right now."If you think of the example of the jammed radio, the way to hear what you want out of the messy signals would be to listen really hard for the latest news while trying to filter out the unwanted music. The hippocampus does this more efficiently. It simply tunes in to the right frequency to get the station it wants. As the cells tune into the station they're after, they are actually able to filter out the other station at the same time, because its signal is being transmitted on a different frequency.

The switch

"The cells can rapidly switch their activity to tune in to the slow waves or the fast waves," Colgin says, "but it seems as though they cannot listen to both at the exact same time. This is like when you are listening to your radio and you tune in to a frequency that is midway between two stations- you can't understand anything- it's just noise." In this way, the brain cells can distinguish between an internal world of memories and a person's current experiences. If the messages were carried on the same frequency, our perceptions of the world might be completely confused. "Your current perceptions of a place would get mixed up with your memories of how the place used to be," Colgin says.The cells that tune into different wavelengths work like a switch, or rather, like zapping between radio stations that are already programmed into your radio. The cells can switch back and forth between different channels several times per second. The switch allows the cells to attend to one piece at a time, sorting out what's on your mind from what's happening and where you are at any point in time. The researchers believe this is an underlying principle for how information is handled throughout the brain.

"This switch mechanism points to superfast routing as a general mode of information handling in the brain," says Edvard Moser, Kavli Institute for Systems Neuroscience director. "The classical view has been that signaling inside the brain is hardwired, subject to changes caused by modification of connections between neurons. Our results suggest that the brain is a lot more flexible. Among the thousands of inputs to a given brain cell, the cell can choose to listen to some and ignore the rest and the selection of inputs is changing all the time. We believe that the gamma switch is a general principle of the brain, employed throughout the brain to enhance interregional communication."

Can a switch malfunction explain schizophrenia?

People who are schizophrenic have problems keeping these brain signals straight. They cannot tell, for example, if they are listening to voices from people who are present or if the voices are from the memory of a movie they have seen. "We cannot tell for sure if it is this switch that is malfunctioning, but we do know that gamma waves are abnormal in schizophrenic patients," Colgin says. "Schizophrenics' perceptions of the world around them are mixed up, like a radio stuck between stations."

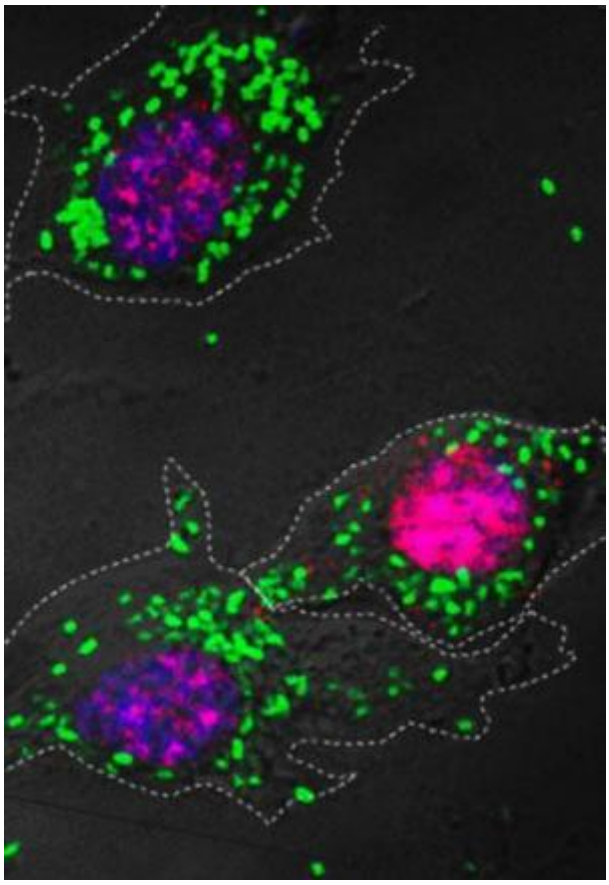
Adapted from materials provided by The Norwegian University of Science and Technology (NTNU), via AlphaGalileo.

Journal Reference:

1. Laura Lee Colgin, Tobias Denninger, Marianne Fyhn, Torkel Hafting, Tora Bonnevie, Ole Jensen, May-Britt Moser & Edvard I. Moser. **Frequency of gamma oscillations routes flow of information in the hippocampus**. *Nature*, 2009; 462 (7271): 353 DOI: 10.1038/nature08573

http://www.sciencedaily.com/releases/2009/11/091120000140.htm

Adult Cell Self-Renewal Without Stem Cells?



Bacteria (in green) "eaten" by dividing macrophages. (Credit: Copyright M.Sieweke / CNRS)

ScienceDaily (Nov. 23, 2009) — Is the indefinite expansion of adult cells possible without recourse to stem cell intermediates? The team led by Michael Sieweke at the Centre d'immunologie de Marseille Luminy (Université Aix-Marseille 2 / CNRS / INSERM) has shown that this is the case by achieving the ex vivo regeneration of macrophages, specialized cells in the immune system, over several months.

Published in *Science* on November 6, 2009, this discovery could be applied to other cell types. This research enables a clearer understanding of the mechanisms underlying cell differentiation, but above all raises many hopes for potential therapeutic applications.

The regenerative medicine of the future will be based on replacing damaged cells and repairing deficient organs, notably through the use of stem cells. Indeed, these cells are able not only to proliferate indefinitely but, in theory, to supply all types of cells to the human body. However, the processes that allow the passage from adult (rather than embryonic) cells to stem cells ("reprogramming") are complex and full of risk, as are the processes necessary for the "retransformation" of stem cells into adult cells. The question then arises: might it not be more simple to generate the cells required without passing through the stem cell stage?

Scientists at the Centre d'immunologie de Marseille Luminy (Université Aix-Marseille 2 / CNRS / INSERM) have studied a specific cell type: the macrophages(1). In most cases, when cells have acquired a specialized function (e.g. brain neurons, muscle cells, macrophages for the immune system, etc.) they cease to proliferate and normally remain "blocked" in this state until they die. Thus macrophages, which are key actors in the immune response, are usually incapable of proliferation. The team of CNRS and INSERM researchers led by Michael Sieweke has nonetheless been able to generate mouse macrophages

in vitro thanks to a genetic modification that inactivates the transcription factors(2) called MafB and c-Maf. Furthermore, once reinjected into the animal, these modified cells behave normally: they do not form a tumor, and they perfectly perform the tasks expected of an adult macrophage, such as ingesting bacteria and secreting the chemical agents capable of killing them.

This CNRS and INSERM team in Marseilles has thus found how to re-initiate the division of specialized cells. In addition, they discovered that MafB and cMaf inactivation led to the activation of two of the four transcription factors (c-Myc and KLF4) recently identified as being able to convert almost all adult cells in the body into stem cells. Although this study provides a clearer understanding of the mechanisms of cell differentiation, above all it provides hope in the application of this method for the amplification of specialized cells to other cell types. These findings suggest that a passage via stem cells may not be necessary to enable the regeneration of cells and the repair of damaged tissue.

Notes:

(1) Macrophages are large cells that intervene in immune processes by destroying cell debris and microorganisms by means of a process called phagocytosis, an immune defense mechanism that notably allows macrophages to "eat" foreign particles such as bacteria, cell debris, dust particles, etc.

(2) Transcription factors are proteins that regulate the expression of genes by activating or inhibiting them. During embryonic development, cells diversify and specialize into different cell types; this is the process of cell differentiation.

Story Source:

Adapted from materials provided by CNRS (Délégation Paris Michel-Ange).

Journal Reference:

1. Aziz et al. **MafB/c-Maf Deficiency Enables Self-Renewal of Differentiated Functional Macrophages**. *Science*, 2009; 326 (5954): 867 DOI: 10.1126/science.1176056

http://www.sciencedaily.com/releases/2009/11/091116103838.htm

Some Germs Are Good for You: Surface Bacteria Maintain Skin's Healthy Balance

Bacteria growing in a cell culture. (Credit: iStockphoto/Linde Stewart)

ScienceDaily (Nov. 23, 2009) — On the skin's surface, bacteria are abundant, diverse and constant, but inflammation is undesirable. Research at the University of California, San Diego School of Medicine now shows that the normal bacteria living on the skin surface trigger a pathway that prevents excessive inflammation after injury.

"These germs are actually good for us," said Richard L. Gallo, MD, PhD, professor of medicine and pediatrics, chief of UCSD's Division of Dermatology and the Dermatology section of the Veterans Affairs San Diego Healthcare System.

The study, to be published in the advance on-line edition of *Nature Medicine* on November 22, was done in mice and in human cell cultures, primarily performed by post-doctoral fellow Yu Ping Lai .

"The exciting implications of Dr. Lai's work is that it provides a molecular basis to understand the 'hygiene hypothesis' and has uncovered elements of the wound repair response that were previously unknown. This may help us devise new therapeutic approaches for inflammatory skin diseases," said Gallo.

The so-called "hygiene hypothesis," first introduced in the late 1980s, suggests that a lack of early childhood exposure to infectious agents and microorganisms increases an individuals susceptibility to disease by changing how the immune system reacts to such "bacterial invaders." The hypothesis was first developed to explain why allergies like hay fever and eczema were less common in children from large families, who were presumably exposed to more infectious agents than others. It is also used to explain the higher incidence of allergic diseases in industrialized countries.

The skin's normal microflora -- the microscopic and usually harmless bacteria that live on the skin -- includes certain staphylococcal bacterial species that will induce an inflammatory response when they are introduced below the skin's surface, but do not initiate inflammation when present on the epidermis, or outer layer of skin.

In this study, Lai, Gallo and colleagues reveal a previously unknown mechanism by which a product of staphylococci inhibits skin inflammation. Such inhibition is mediated by a molecule called staphylococcal lipoteichoic acid (LTA) which acts on keratinocytes -- the primary cell types found on the epidermis.

The researchers also found that Toll-like receptor 3 (TLR3) activation is required for normal inflammation after skin injury.

"Keratinocytes require TLR3 to mount a normal inflammatory response to injury, and this response is kept from becoming too aggressive by staphylococcal LTA," said Gallo. "To our knowledge, these findings show for the first time that the skin epithelium requires TLR3 for normal inflammation after wounding and that the microflora helps to modulate this response."

Additional contributors to the paper include Yuping Lai, Anna Di Nardo, Teruaki Nakatsuji, Anna L Cogen, Chun-Ming Huang and Katherine A. Radek, UCSD Division of Dermatology and the VA San Diego Healthcare System; Anke Leichtle and Allen F. Ryan, UCSD Department of Surgery/Otolaryngology and the VA San Diego Healthcare System; Yan Yang and Zi-Rong Wu, School of Life Science, East China Normal University, Shanghai; Lora V Hooper, Howard Hughes Medical Institute and University of Texas Southwestern Medical Center, Dallas; and Richard R Schmidt and Sonja von Aulock, University of Konstanz, Germany.

The study was funded by grants from the National Institutes of Health, and a US Veterans Administration Merit Award.

Story Source:

Adapted from materials provided by University of California - San Diego, via EurekAlert!, a service of AAAS.

http://www.sciencedaily.com/releases/2009/11/091122161742.htm

The Search: Computers Dig Deeper for Meaning

ScienceDaily (Nov. 23, 2009) — Search engine technology is in a state of flux as it digs ever deeper for new meaning. Europe is poised to reap the benefits of the new age of semantic search thanks to the work of European researchers.

'Search' is the gateway to the web, it keeps internet traffic moving, it provides the maps and the shortcuts through the enormous tangle of the World Wide Web.

But while there is a phenomenal amount of content, most of it is not that easy to find. Sure, text content can be skimmed or glanced, but audiovisual content has to be viewed in linear time. We cannot easily search inside a film or audio recording for relevant information.

That is changing, and one European project has created the first integrated platform for semantic search that can return results based on the content and context of film and audio files, as well as text.

Not the end for keywords

This is not the end of keyword search -- the standard technology that we use every day -- but it could well be the beginning of the end.

For instance, try to compose a meaningful query, such as "effects of military action in civil population." Traditional search engines will give results for the individual keywords introduced. A semantic engine, like MESH, will analyse the query first and then give relevant results for the actual meaning of the query.

The EU-funded MESH project sought to create a platform that integrated the state of the art in semantic search technologies and all the necessary tools to develop a working platform. But while the team's achievements are impressive, there is a length of road to travel before they are ready for universal search by everyday surfers like you and I.

Still, the platform proves the technology in two restricted news domains -- natural disasters and civil unrest and street violence -- and it has led to many useful, working applications and potential commercialisation opportunities.

"We developed a manual annotation tool to create manageable annotations for all types of media, and it is a very strong program that is easy to use," explains Pedro Concejero, coordinator of the MESH project. This tool could become a commercial product, he predicts.

The search for relevance

One partner of the project, Deutsche Welle, a German TV station, created a dossier-developing tool called Full Story. This remarkable program can help a video editor link to video, audio and text relevant to a particular topic.

The editor can then assemble these diverse elements into a dossier. For example, a dossier about flooding might assemble media outlining the mechanics of flooding, the impact of changing weather patterns, and the effect on lowland and populous areas.

TV stations do this type of feature all the time, and typically it can take days sorting through media archives for useful material to assemble a compelling dossier.

But with the Full Story program, an editor can perform the same task in hours, and the editor is much more likely to find compelling and visually interesting material, because most of the time is spent sorting through relevant results rather than searching for relevant material in a vast warehouse.

"Deutsche Welle is currently evaluating the future prospects of Full Story with further extensive user testing, a comprehensive technology implementation plan and an outline concerning potential commercialisation," notes Concejero.

Annotating user-generated content

User-generated content is another area that could benefit from the work of the MESH consortium in the short to medium term. User-generated content is a huge element of Web 2.0 applications -- it is the material that makes sites like YouTube, flickr, Facebook and Twitter so popular.

The MESH project's automated annotation tool was central to the platform's success, and it could be developed to work with user-generated content.

"Here at my company, Telefónica, we are very interested in developing semantic search and annotation for user-generated content on mobile phones, but more work would need to be done on the technology developed in MESH to make it ready for that sort of application," reveals Concejero.

That may be the work of another project. The consortium has just put the final touches on MESH, but Concejero says that some of the partners may go forward with another project in the future. In the meantime, response from peers and industry to the work of the MESH project has been encouraging.

Above all, the MESH project demonstrates that semantic search for all media types is possible and automation is improving rapidly. It's not quite there yet, but the search continues.

The MESH integrated project received funding from the ICT strand of the EU's Sixth Framework Programme for research.

Story Source:

Adapted from materials provided by ICT Results.

http://www.sciencedaily.com/releases/2009/11/091111120801.htm